

Academic Program Review

Environmental Science Graduate Program Self-Study Report

Academic Years 2018-2023

Table of Contents

0 Graduate Preface and History	4
0.1 Current Overview of the Department	4
0.2 Program Mission & History.....	4
0.3 Current Program Overview.....	5
0.4 Trends and Factors Affecting the Program Mission	8
0.5 Previous Graduate Program Review, 2018.....	16
1 Learning Outcomes.....	19
1.1 Program and Student Learning Outcomes	19
1.2 Evaluation of Program and Student Learning Outcomes	20
1.3 Use of Program and Student Learning Outcomes for Program Improvement	25
1.4 Program Alignment with our Institutional Mission	25
1.5 Assessment of Learning Outcomes Strengths, Weaknesses, and Recommendations for Change	26
2 Curriculum	27
2.1 Curriculum Content and Organization is Reviewed and Improved.....	27
2.2 Course Scheduling and Progress Toward Degrees.....	30
2.3 Advanced Academic Content.....	30
2.4 Alignment with Program Mastery and Student Learning Outcomes	31
2.5 Inclusion of Knowledge of Literature of the Discipline	32
2.6 Engagement in Research and/or Professional Experience	32
2.7 Evaluation of Distance Education Programs	33
2.8 Innovations that Advance Student Learning	33
2.9 Assessment of Curriculum Strengths, Weaknesses, and Recommendations for Change	33
3 Student Experience.....	35
3.1 Peer Group Size	35
3.2 Opportunities to Evaluate Curriculum and Faculty Quality	36
3.3 Professional Development Opportunities.....	38
3.4 Scholarly Enrichment Opportunities	41
3.5 Diverse Perspectives and Experiences	41
3.6 Academic Support Services	44
3.7 Assessment of Student Experience Strengths, Weaknesses, and Recommendations for Change	46
4 Faculty.....	47
4.1 Faculty Credentials and Quality of Teaching	47
4.2 Faculty Number, Workload Expectations, and Teaching Needs.....	52
4.3 Faculty Diversity	64
4.4 Faculty Professional Development	66
4.5 Faculty Engagement in Planning, Evaluation, and Improvement Processes that	

Measure and Advance Student Success	67
4.6 Faculty Evaluation System and Faculty Improvement	68
4.7 Assessment of Faculty Strengths, Weaknesses and Recommendations for Change	70
5 Graduate Learning Resources.....	74
5.1 Evaluation and Improvement of Equipment and Facilities	74
5.2 Learning and Support Resources to Support Teaching and Learning	82
5.3 Materials and Support to Encourage Research and Publication.....	90
5.4 Assessment of Learning Resources Strengths, Weaknesses, and Recommendations for Change	91
6 Support	95
6.1 Program Budget and Needs.....	95
6.2 Program Enrollment and Graduation Rates	98
6.3 Program Responsiveness to Local, State, Regional, and National Needs	100
6.4 Evaluation of Graduate Placement.....	101
6.5 Review of Alignment of Program with Institutional Policies and Mission	101
6.6 Assessment of Support Strengths, Weaknesses, and Recommendations for Change	102
Appendices	104

0 Graduate Preface and History

0.1 Current Overview of the Department

The Department of Biology, Geology, and Environmental Science (BGE) is one of the largest departments within the College of Arts and Sciences (CAS) at the University of Tennessee at Chattanooga (UTC), offering the BS Biology, BS Geology, BS Environmental Science, and MS Environmental Science degrees. In Fall 2023, the department has more than 800 undergraduate students and 35 MS ESC students with 35 full-time faculty members, two faculty members with administrative appointments, a faculty member with dual appointment in Computer Science and BGE, a department head from another discipline (Chemistry) and three full-time staff. BGE enrolls 20% of the CAS master's students, which is about 4% of the university-wide MS students (Fall 2023 data). We also serve other students who have graduate degree requirements that include our coursework (such as Engineering and Computer Science). UTC is composed of four colleges (Arts and Sciences, Business, Engineering & Computer Science, and Health, Education & Professional Studies) with a total graduate enrollment (through Ph.D.) of 1,398 in Fall 2023. CAS is third in size regarding graduate enrollment, with a Fall 2023 graduate enrollment of 172. UTC is a public Doctorate/Professional Classification with the additional voluntary/elective Community Engagement Classification.

For a detailed department organization and facilities history, please consult the **2023 BGE Undergraduate Self Study, Section 0 Preface and History**.

0.2 Program Mission & History

0.2.1 MS ESC

The Master of Science in Environmental Science (MS ESC) program at the University of Tennessee at Chattanooga focuses on student development of a strong scientific framework for addressing environmental issues. Toward this goal, the MS ESC program of study emphasizes sound scientific and technical training coupled with a contextual understanding of contemporary socioeconomic, political, and legal realities. Graduates are prepared to meet the needs of business, government, and the non-profit sector as environmental professionals or to continue their education in doctoral or professional programs with an environmental focus.

The MS ESC degree was approved in 1997 and thus 2023 marks the 26th year of the program. The original Tennessee Higher Education Commission (THEC) proposal outlined several lines of rationale for the development of an MS ESC program at UTC. First, a new MS ESC program would leverage the existence of a solid undergraduate program and faculty expertise in environmental science at UTC, and the multidisciplinary nature of the field also would accommodate student background and faculty expertise in biology. Second, the new program would solidify the Department's reputation as a leader in environmental science education in Tennessee and the Southeast. The Department's BS in Environmental Science program, created in 1974, was one of the first to be offered in the nation. Third, UTC was geographically well positioned to offer an MS ESC program. The proposal described widespread support for the new program from regional businesses, industry, government agencies, and non-profit organizations. Additionally, the diverse natural ecosystems and intense industrial activities in the region and Chattanooga's emerging interest in becoming a "green" city provided many opportunities for graduate engagement and research. And fourth, an MS ESC program at UTC would comprise a unique graduate offering in the state, thus addressing THEC and University of Tennessee (UT) System concerns about duplication of existing programs at comparable state institutions, such as Middle Tennessee State University and East Tennessee State University, at that time. Such concerns had hindered an attempt by the Department to initiate an MS in Biology program in the 1970s. UTC's Environmental Science

graduate degree is the oldest program in the state, but other universities have added units or concentrations with an environmental focus.

0.2.2 Post-Baccalaureate Certificates

Due to some changes in policy by THEC, the Graduate Program Director explored the addition of certificates for the graduate program. In Fall 2022, BGE completed curriculum proposals to add two post-baccalaureate certificates, [Climate Science](#) and [Environmental Science](#). These were approved and appeared for the first time in the 2023-2024 graduate catalog. We hope these two certificates will lead to an increase in graduate enrollment. Other graduate programs on campus have used certificates as recruiting tools. This will be evaluated during the next program review.

0.2.3 TADPOLES Undergraduate to Graduate Program

Another graduate program recruiting tool was the development of a Joint Undergraduate to Master's Program (JUMP) for Environmental Science. This was approved by BGE in Fall 2022 and first appeared in the 2023-2024 undergraduate catalog. Termed TADPOLES (Transformative Academic Development Program on Learning Environmental Science), this combined undergraduate and graduate program allows a current environmental science undergraduate to complete courses that will count towards both an undergraduate and graduate degree. Applications to the combined undergraduate to graduate program are limited to 10 admitted students per academic year, and must comply with all program specific requirements. An undergraduate student may submit their application for review during their junior year. Admission to the program is contingent upon approval of the Environmental Science Graduate Program Director, and the Dean of the Graduate School; the student will be admitted to the TADPOLES program as a rising senior, after completion of 90 credit hours. With the permission of the Environmental Science Graduate Program Director, a student may enroll in up to a total of nine hours of graduate course work which will count towards the undergraduate degree and the graduate degree. All undergraduate students must complete their undergraduate major requirements prior to graduation. All graduate courses for which a grade of B or better is earned may be applied to the graduate degree program, provided the student completes the academic program and submits a course substitution for the graduate hours. Any grade lower than a B may only be applied to the undergraduate program. More information on TADPOLES can be found in the [2023-2024 Undergraduate Catalog](#).

0.3 Current Program Overview

0.3.1 Admission

Prior to applying to the MS ESC program at UTC, prospective students must meet associated academic requirements and identify a faculty member who will serve as the student's graduate advisor. If a student does not select an advisor, the Graduate Program Director serves as the advisor. Academic requirements include:

1. a baccalaureate degree from a regionally accredited institution of higher education or foreign equivalent,
2. an overall GPA of 2.75 or a GPA of 3.0 for the last 60 credit hours
3. background knowledge of environmental science concepts equivalent to a two- semester undergraduate introductory environmental science sequence and/or an undergraduate or graduate ecology course

In addition, it is recommended that applicants have completed:

1. at least four upper-level undergraduate science courses with lab components
2. one course each in environmental ethics and environmental law
3. one course each in college calculus, introductory statistics, and computer science

There are additional academic preparation recommendations for the Environmental Administration and Management Concentration.

1. 15 semester hours (or equivalent) in courses covering the basic principles of life science (including plant and animal diversity, genetics, ecology, and evolution)
2. 6 credit hours of physical sciences (physics, chemistry, soil science, geology, engineering – at least 2 disciplines must be represented)
3. One year of college mathematics including college algebra, trigonometry, calculus and statistics (two courses are required)
4. An undergraduate grade point average of at least 3.25 (A = 4.0)

Applicants are informed that these admissions standards are minimums for consideration and do not guarantee acceptance into the program. Ultimately, admissions decisions are based on evaluations of quantitative and qualitative information provided in the application. The compatibility of each applicant's environmental science interests with that of our faculty and their availability is also considered.

Applicants submit all application materials via an online application portal to the UTC Graduate School, and complete applications are forwarded to program faculty for review. A complete application to the program consists of the following materials:

1. The online Graduate School application.
2. Official transcripts from every institution of higher education attended.
3. A cover letter detailing relevant experiences, reasons for pursuing the degree, and general plans for the graduate program of study, including identification of a graduate faculty advisor who has agreed to serve in this capacity.
4. A CV or resume
5. Letters of recommendation from at least three individuals familiar with the applicant's academic ability and/or relevant experience.
6. Optional supplementary materials evidencing any relevant and substantial preparation and/or experience of the applicant, such as a copy of a written capstone project or publication.

The MS ESC program accepts graduate applications for the fall, spring, and summer terms with a rolling admission. However, it is suggested that prospective students apply by mid-March for fall semester enrollment or by early-October for spring semester enrollment to allow sufficient time for application review.

0.3.2 Programs of Study

The graduate program in Environmental Science has two degree concentrations: The M.S. Environmental Science and the M. S. Environmental Science: Environmental Administration and Management. The M.S. Environmental Science has two tracks, Thesis Concentration and Non-Thesis Concentration. Each degree has a specific capstone experience to support the student's academic objectives, research interests, and career goals. Details about each degree can be found in **Section 2 Curriculum**.

0.3.3 Governance

Students pursuing Environmental Science graduate work at UTC are governed by the overall policies and procedures implemented by the UTC Graduate School and related program-specific requirements set forth by BGE. As such, students are instructed and expected to familiarize themselves with both sets of policies and procedures. The procedures and policies of the Graduate School are described

comprehensively and updated annually in a program-level policies and procedures that affect MS ESC students. A copy of the BGE Graduate Student Guidebook is found in [Appendix 0-A](#). To facilitate student familiarization with relevant policies and procedures, both the Graduate School and BGE have orientation sessions each semester for incoming graduate students. Students are instructed to direct any questions about policies and procedures to the MS ESC Program Director (Dr. Thomas Wilson) who will advise the student and/or seek clarification from the Graduate School as appropriate.

One BGE Graduate Faculty member is appointed each year to the UTC [Graduate Council](#) to represent the MS ESC program; this position is typically assumed by the MS ESC Program Director. The Graduate Council, which is comprised of one faculty representative from each graduate program at UTC, is responsible for providing and periodically revising basic educational philosophy for graduate programs, ensuring that general policies and policies approved for individual graduate programs are maintained, and reviewing proposed new graduate courses and changes to existing curricula, among other duties. As such, the MS ESC program maintains a voice in discussions of new and reviews of existing University-level policies and procedures.

0.3.4 Fees and Financial Assistance

A [Graduate Fee Schedule](#) for each academic year is published by the UTC Bursar's Office. For the current academic year, the in-state maintenance fee for full-time graduate enrollment of 9 credit hours is \$4,438/semester. This is a 7.6% increase from the last review period (6 years ago). The tuition fee for full-time graduate enrollment is an additional \$4,032/semester charged to out-of-state students. Graduate students (as well as undergraduate students) are charged other student fees (e.g., student activity fee, green fee, technology fee, etc.); currently, these fees total \$956/semester. In addition, students must pay any additional fees associated with courses in which they enroll, such as lab fees. Financial assistance in direct support of the pursuit of the MS ESC degree is available to students who serve as Graduate Teaching or Research Assistants.

In 2023-2024, BGE was awarded seven Graduate Teaching Assistants (GTAs) who were to be offered to qualified graduate students. This number decreased from 11 during the last review period. For the last two years, the department has self-funded an online GTA to cover a service course, Life on Earth, BIOL 1050L and provide an additional GTA to our graduate students. This releases faculty from teaching online labs and allows them to teach face-to-face. Two years ago, the College also paid for an additional online GTA, but this second online-GTA did not continue beyond 2022-2023.

GTA lines are funded by the graduate school and distributed to the colleges. The College allocates the GTAs to each program. These are awarded to students for one academic year, with possible renewal for a second academic year if the student remains academically eligible and performs well in assigned teaching duties. A full-time GTA appointment requires 20 hours/week of work preparing and teaching laboratory sections of introductory environmental science or biology courses. A part-time GTA appointment requires 10 hours/week of work. Students with GTAs also help organize and prepare lab classrooms for weekly lab activities; these duties are supervised weekly by lab coordinators in BGE (currently Professor Caitlin Jarvis and Dr. Brad Reynolds). GTAs may also provide proctoring and grading for the large introductory lecture classes. Students interested in GTA appointments apply to the MS ESC Program Director and applications are considered when a line becomes available. Applications are evaluated with a rubric that considers each applicant's academic preparation and performance and relevant experience. Attempts also are made to allocate GTA lines judiciously across Graduate Faculty advisors. GTAs are formally observed and evaluated by full-time faculty twice each semester (at midterm and near the end) and by course evaluations near the end of the semester.

Students may be appointed as Graduate Research Assistants (GRAs) if supported by the grants and contracts of their graduate advisors. GRAs play a fundamental role in funded research, and may participate in related literature reviews, lab or field-based research tasks, and/or preparation and

presentation of research results. Graduate advisors serve as the supervisors of GRAs supported by their research funding.

Graduate Assistants are provided with a salary on a regular periodic basis as compensation for the service provided each term of the appointment and are provided with a waiver of the associated maintenance fees. Full-time awards include a \$4,500 stipend and maintenance fee waiver (9 hours) per semester for the fall and spring semesters. The out-of-state tuition for full time graduate assistants is automatically waived for students' enrolled credit hours. One half-time graduate assistant awards include a \$2,250 stipend and maintenance fee waiver for 4.5 credit hours. For part-time graduate students, the out-of-state tuition is not fully waived. International students also have international tuition. It is compensated similar to out-of-state tuition. Full-time international GA students are waived international tuition, while part-time international GA students are not fully waived. Graduate assistantships awarded in the summer would have a prorated stipend and maintenance waiver. Students will be responsible for paying all other fees. This includes course fees beyond those fees that are customarily included in courses, for example differential tuition fees and online course fees. The minimum stipend amount is set by the university and must be adhered to for university-funded and externally funded GA positions. Only when an external funding source has, in writing, a stipend amount lower than the university amount will the lesser amount be allowed. Stipend amounts from external sources can be established at a higher dollar amount if reasonable and aligned with market and competition. GAs hired in the summer must register for the 12-week summer term or in each 6-week term

0.4 Trends and Factors Affecting the Program Mission

0.4.1 Enrollment

During the past five years, enrollment in the MS ESC program has ranged from 27-36 students, with an average semester enrollment of 32 students and a median of 36. Table 0.1 shows the enrollment over the last five years. Generally, more students are enrolled in fall semesters due to greater numbers of incoming students in the fall and graduations that occur during the academic year.

Table 0.1 MS ESC Enrollment

	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall2022
Total MS ESC	30	27	29	38	36
Average	32				
Median	36				

In total, 59 students have earned the MS ESC degree from UTC during the past five years, which is a 44% increase from the last self-study. The number of graduates produced by the program per academic year has fluctuated from 5 to 19 throughout the past five years, but these numbers have not followed any noticeable trend through time. On average, 12 students/year graduated from the MS ESC program during the past five years, which is four more than the previous review period. Of the 59 graduates since 2018, 46% completed theses, and 54% completed a non-thesis capstone. This distribution differs from that during the previous two five-year program review periods, during which approximately equal numbers of graduates completed theses and internships. Changes to admission procedures that require applicants to secure a faculty chair prior to applying may have impacted this distribution.

While most students enrolled in the MS ESC program during the past six years either graduated or are continuing to work toward the degree, 10 students were enrolled in the program at some time during the

past six years but did not complete the program. Reasons for not completing the program vary and are not always known.

The MS ESC program always has attracted students who earned their undergraduate degrees at UTC, likely due to some combination of their familiarity with the institution, the Department, its faculty, and the local area. UTC undergraduates also are recruited to UTC graduate programs through an annual UTC Graduate Recruitment Fair sponsored by the Graduate School. For Fall 2023, 58% of our students are women and 36% identify as representing racial and/or ethnic minority groups. The percentage of women aligns with our undergraduate student population. We have enrolled one international student, who completed the degree during the pandemic. At the program-level, we have not initiated a specific recruiting program to target students who represent minority groups; however, individual faculty members who are active in the MS ESC program have included targeted engagement of students from underrepresented groups in research as broader impacts associated with externally funded projects.

Historically, the number of Graduate Teaching Assistantship (GTA) lines available to MS ESC students by the Department have decreased from 11 in 2018 to 7 in Fall 2022. Of students enrolled in the program, about half have received financial support as current or past GTAs. About 20% of current students have served as GRAs. In addition, about 10% of current students have worked paid internships in partial fulfillment of the graduate program of study, two current students have been supported by other graduate assistantships, and one student's graduate education is supported via his military service.

Many graduates of the MS ESC program obtain jobs in environmental fields or continue their education in Ph.D. We have been able to follow the career and/or further educational paths of several students who have graduated from the program in the past six years. These graduates are mostly employed in a variety of environmental career sectors, including consulting, government, industry, and education (50% of graduates in each of these sectors) and non-profits (30% of graduates). About 10% of recent graduates are employed in non-environmental careers, and the remainder are in professional degree programs.

0.4.2 Faculty and Staff

As of Fall 2023, the Department has 35 full-time faculty members. There are two additional tenured faculty members with full-time administrative appointments, and a faculty member with dual appointment in Computer Science, all who have limited teaching responsibilities in BGE. In addition, the BGE Department Head is a tenured faculty member from another discipline (Chemistry). A detailed breakdown of the 35 full-time faculty is as follows:

- 21 Tenure Track (18 BES and 4 Geology)
- 11 Non-tenure Track (9 BES and 2 Geology)
- 3 Non-Tenure Track who are Visiting Faculty (all BES)

Twenty-nine of the full-time faculty are in the Divisions of Biology and Environmental Science and six of the full-time faculty are in the Division of Geology. Several of the non-tenure track faculty serve additional roles as lab coordinators, including the Anatomy/Physiology Lab Coordinator, the Microbiology Prep Lab Coordinator, and the Introductory Biology Lab Coordinator.

Three full-time staff members support the department: an administrative assistant (Wendy Salazar), an accounting specialist (Kelly Locke), and a faculty associate (Jessica Sanders). The administrative assistant provides general administrative support (communications, copy room, supplies, etc.) and processes travel for all faculty. The accounting specialist administers payroll, personnel paperwork, and manages accounts for state, gift, grant, and scholarships (50-60 separate accounts). The faculty associate is responsible for ordering, safety, equipment, and space.

In total, this is 38 full-time faculty and staff, with three additional tenured faculty who have limited teaching responsibilities. More detail on the faculty and support staff is included in **Section 4. Faculty**.

All members of the Department do not contribute equally to the MS ESC program given their qualifications, relevance of their expertise and research foci to environmental science, and contracted duties.

To be active in the MS ESC program, a faculty member must apply for [Graduate Faculty](#) status per the policy set forth by the UTC Graduate School. There are three categories of membership in the Graduate Faculty at UTC: Full, Associate, and Special. Full members may teach courses, direct theses, and serve on thesis committees, while Associate members may teach courses and serve on thesis committees, but not direct theses. Special membership can be given to faculty without a terminal degree, visiting or adjunct faculty, and professionals in the field to teach specific graduate courses or serve on specific thesis committees. All appointments must be renewed every five (for Full and Associate members) or three (for Special members) years.

Currently, the Graduate School lists 22 BGE faculty as having Graduate Faculty status: 19 Full, 2 Associate, and 1 Special. There are an additional 11 members with Special status who are from other programs at the university or outside of UTC but serving on committees.

0.4.3 Staffing and Consistent Department Leadership

In 2017, BGE had 30 full-time faculty members, 25 in the Divisions of Biology and Environmental Science and five in the Division of Geology. From 2007 to 2017, Biology and Environmental Science full-time faculty only increased from 17 to 25, representing about a 47% increase in faculty numbers. This was an overall student to faculty ratio of about 38:1 and a student to tenured/tenure-track faculty ratio of over 53:1.

As of Fall 2023, BGE has 35 full-time faculty, 29 in the Divisions of Biology and Environmental Science and six in the Division of Geology. This is a 40% increase over the last six years, which is better than the decade before. When looking at Full-Time Equivalency (FTE), the overall student to faculty ratio is about 24:1, but the student to tenured/tenure-track faculty ratio is 37:1. If the current searches are considered, the student to TT faculty ratio is a little better at 34:1. These ratios include undergraduate and graduate students. According to the [National Center for Education Statistics](#), the national public 4-year FTE ratio is 13.7 and the state of TN public 4-year FTE ratio is 13. Even with the increase in faculty that we have had since the last review, these numbers highlight the continuing problem. The Department needs additional TT and NTT faculty to teach courses and meet student demand.

BGE also needs several academic staff to assist full-time faculty with important tasks including animal care, large equipment maintenance, greenhouse management, teaching and learning garden management, and natural history collections management. We currently use lab fees to provide hourly pay for a few graduate students to support the natural history collections. We also enroll undergraduate students in individual studies to participate in animal care, teaching and learning garden management, and natural history collections management. In addition to the modest changes in the number of instructional positions in the department, the program has experienced turnover in personnel since its last program review:

- Four TT faculty retired. All these positions were searched during the last year of service for the retiring faculty member.
- One TT faculty member passed away. This occurred in Fall 2022, and we are in an active search to replace this position; it is currently filled with a visiting lecturer.
- Two TT faculty resigned. One of these positions is in active search, the second is filled with a visiting assistant professor.
- One staff member retired, and the replacement staff member (hired within a month) resigned after 18 months (about one and a half years) in the position. This was a 12-month staff position

dedicated to teaching introductory geology labs. This position was converted to a 9-month lecturer position and has been searched for and filled.

- The faculty associate/lab coordinator resigned to take another position on campus. The position was split into two positions: a 12-month faculty associate staff and a 9-month lab coordinator lecturer. The faculty associate position was immediately filled, and the lab coordinator is filled with a visiting lecturer.

The TT faculty hired over the review period increased capacity in cell and physiology and brought fresh expertise and interests; however, one of the new faculty members has since resigned. New TT faculty have added areas of expertise to the department that were previously unrepresented, including: evolutionary ecology of meiofauna, population genomics, biology and biodiversity of fishes, urban ecology using insects as a model, using chemical sedimentary rocks to investigate the geochemical composition of Earth surface environments, hydrology and aqueous geochemistry, and coupling GIS and remote sensing techniques with numerical models to better understand our physical environments and the impact of human-environment interactions.

In this review period, the department underwent changes in leadership. Department Head John Tucker was promoted to a 2-year interim appointment as Associate Dean in Fall 2018. At that time, Dr. Hope Klug was promoted to Department Head. Dr. Klug stepped down in December 2019. Dr. Tucker returned to lead the department in Spring 2020 but continued his role in the college office through June 2020. He subsequently served as BGE Department Head for an additional year. During this period, COVID occurred, and two external Department Head searches were conducted in 2020 and 2021. Both searches failed. In Summer 2021, Dr. Gretchen Potts joined the Department in the head role. She is a tenured Chemistry professor who has previous leadership experience as the Co-Director of the School of Professional Studies and the Program Director of Integrated Studies. The intent was for Dr. Potts to serve as interim Department Head for one year while a third (and hopefully final search) took place. The Dean hired an external search firm, but unfortunately, the search was unsuccessful. Dr. Potts agreed to continue in her role for an additional two years with service ending in Summer 2024. Since that time, Dr. Potts has agreed to extend her tenure as Department Head to Summer 2027.

0.4.4 New Application Software, REACH

In Fall 2021, the UTC Graduate School began phasing in a new fully online portal for applying for admission into all graduate programs at UTC. The previous system consisted of an online application form followed by email communication from the Graduate School explaining how to submit required materials such as transcripts, GRE scores, and CV. Applicants also had to arrange for the writers of letters of recommendation to email their letters directly to the Graduate School. The online application system used the RADIUS platform by Campus Management. Over the last 18 months, the graduate school has transitioned to a new application platform called REACH. There have been several growing pains with this program. Automated communication had issues, and student applications were sometimes lost in the system. Concerns were raised by the Graduate Council and the Council of Academic Department Heads. Problems have slowly been addressed, but a few issues remain. We worry that we have lost some potential students to other programs during the confusion.

The REACH system automatically emails faculty when new applications are available for review and allows faculty to view all materials and make their recommendations with comments explaining their reasoning electronically in the system. The Director can then see all the comments and make a program-level recommendation. If there is a need for discussion, this can be handled electronically or brought forward during a faculty meeting. Once a program-level recommendation is made, the Graduate School is automatically informed of the recommendation. This system has streamlined our faculty's review of applications; in most cases, we can recommend to the Graduate School within two weeks of receiving an application.

0.4.5 Reduction in Graduate Teaching Assistantships

At the time of the previous MS ESC Program Review, the program had eleven Graduate Teaching Assistantship (GTA) lines supported by CAS. Over the last few years, this has decreased first to 9.5 and now to 7 assistantships. The decrease in lines has certainly affected our ability to recruit students. The department has also funded an online GTA to teach online labs for one of our service courses, Life on Earth, BIOL 1050L. This is funded using online fees. Including the online labs, BGE offered 42 sections of lab in Fall 2023 and 41 sections of lab in Spring 24. The GTAs covered 26 lab sections in Fall 2023 and 28 lab sections in Spring 2024. The GTAs gain valuable teaching experience and help release some of our faculty to focus on more upper-level teaching responsibilities. The difference between sections and GTAs is covered by adjuncts or overloads by our NTT faculty.

0.4.6 Space and Facilities

Insufficient, poorly designed, and degraded space negatively impacted BGE's teaching, student learning, and research mission during the previous review period. Since the Holt Hall renovation, BGE has expanded into the entire building. The renovation began in May 2016 and was complete in Summer 2019. The increase in square footage was significant: 29,445 sq. ft. (pre-renovation) to 57,777 sq. ft. (after-renovation). The space was almost doubled between Holt and Grote Halls. Unfortunately, many of the labs were not redesigned (benches were not replaced, facilities were not upgraded). Holt Hall pipes (that were not replaced) continue to cause problems with blockages and low water pressure. Grote Hall, renovated in 2010, has consistent window leaks. There are also problems with humidity (constant leaking from HVAC) in the first-floor labs, which include Anatomy and Physiology. Our spaces are currently full, without any room for expansion. Overall, BGE's teaching, student learning, and research mission continues to be impacted by the building limitations that are an opportunity for improvement.

0.4.7 Budget, Carry-Over, and Start-up

As with previous reviews, the operating budget continues to negatively impact BGE's teaching, student learning, and research mission. Since the department merger in 2015, the budget has not changed significantly, just an increase of \$2,737. Per the [CPI Inflation Calculator](#) on the US Bureau of Labor and Statistics website, the fiscal year 2016 budget, applied July 1, 2015, has the same buying power as \$141,851.32, if applied July 1, 2022.

Two years ago, the UT Board of Trustees approved a lab fee increase that doubled the lab fee from \$25 per course to \$50 per course. This has helped immensely, and we have been able to apply the lab fees to cover salaries for student lab assistants for some of the upper-level labs in all disciplines. We also use lab fees to pay the graduate students who are helping with collections management. The current BGE operating budget is 9.4% of all CAS operating budgets and 5.3% of operating budgets under Academic Affairs. This does not include salaries, lab fees, or F&As. Table 0.2 shares a budget comparison from prior to the merger in 2015-2016 to 2022-2023. The University does not have a consistent policy in place to allow departments to carryover funds (unless they are restricted), which makes it difficult to plan for future purchases. Neither Academic Affairs nor the Vice Chancellor for Research have funds allocated for startup. Every faculty recruitment is difficult because we must negotiate with the Dean who has a shrinking budget. In the last few years, startups have been generous due to funds made available through offset of federal COVID support funds. Moving forward, this will be a persistent issue. BGE's budget and critical need for substantial increases in funding for department operations, support staff, and major equipment maintenance, repairs, and purchases, is presented in greater detail in **Part 6. Budget**.

Table 0.2 Budget Comparison and Other Factors

Year	2015-2016	2022-2023
BGE Majors (BS and MS)	996	881
FTE Faculty	33.41	37.06
BGE Degrees Awarded (BS and MS)	188	183
BGE Operating Budget	\$114,263	\$117,000
Percent of CAS Operating Budget	12%	9.4%
Percent of Academic Affairs Operating Budget	5.9%	5.3%

0.4.8 Effects of COVID

COVID followed the 4-year Holt Hall renovation that spread BGE faculty, labs, and classrooms among five campus buildings. The COVID pandemic that emerged in Fall 2019 and continued through 2021 occurred when BGE was already experiencing disruptions to program continuity, development, communication, and cohesiveness between faculty and students caused by the renovation. The COVID pandemic exacerbated these challenges and caused additional negative impacts to students, faculty, staff, and administrators at the department and institutional level.

The COVID period was characterized by constantly evolving societal, health, community, and university policies that created uncertainty for faculty, staff, students, and administrators. Like many other institutions, UTC had periods of mandatory masking, COVID testing, limited access, closure, and campus reintegration. Generally, UTC policies emphasized accommodation of students, faculty, and staff individual and family needs (such as child or elder care) and health during this period. The transition to online course delivery coupled with the expectation that faculty accommodate all student circumstances required considerable additional work effort by faculty, staff, and administrators and impacted other areas of responsibility, as well as faculty personal and family health in some instances. Several specific impacts of the COVID pandemic are described below:

- **Travel:** UTC adopted a travel ban for faculty and students, with very limited exceptions. This impacted faculty research, development, and presentation opportunities. Student field trips were also prohibited, which impacted student learning.
- **On Campus Access:** UTC prohibited faculty and students from being on campus, with limited exceptions for essential research activities.
- **Faculty Access Exemptions:** Faculty were required to request permission to access labs and offices to conduct research and other activities. This was a time-consuming process for faculty and department staff and administrators.
- **Student Access Exemptions:** Faculty had to complete a COVID-19 Student Access Exception Request Form justifying an exception for students, which was subject to approval by the Department Head, Dean, and Vice-Chancellor for research. This was a time-consuming process for faculty and department administrators.
- **Budget:** The BGE budget was frozen as part of a university wide budget freeze, and departments were required to hold back funds should there be a substantial enrollment decline, legislative pullback of funds, or other unanticipated budget shortfalls or necessary expenditures.
- **Student Orientation:** On-campus orientation sessions were cancelled. BGE Head Tucker, Associate Head Brock-Hon, and faculty member Craddock developed a script and recorded a video at the UTC TV studio to provide incoming students with an online orientation to the

department. The video replaced the traditional face-to-face orientation during the COVID situation.

- **Faculty and Staff Work from Home Agreements:** Faculty and staff were required to complete work from home agreements subject to approval by the BGE Head, CAS Dean, and Human Resources. This was a time-consuming process for faculty and department administrators.
- **Office Equipment:** Faculty were authorized to take certain UTC equipment home when campus closed (e.g., computers, printers, monitors, desk, chair) and BGE developed a system to track this equipment.
- **Faculty Searches:** Two nearly completed BGE searches to fill a new biology lecturer position and a new geology lecturer were put on hold in March 2020. Search committee members had already received OEI training, reviewed candidate materials, completed Zoom interviews, and selected candidates to invite for on campus interviews.
- **Student Awards Banquet Cancellation:** COVID prevented the department from holding its awards dinner in 2020 and 2021. Nonetheless, the department's Student Awards & Relations Committee identified student recipients for scholarship and recognition awards provided by the department and SGA. BGE faculty reviewed and approved awards and scholarships for 23 outstanding BGE students. Each student was sent an award letter from the head and a framed award certificate.
- **Purchasing:** COVID slowed down purchasing from many vendors. This was time-consuming for the BGE Faculty Associate and required that faculty provide more advance notice of purchase needs.
- **Teaching Lab Improvement:** Faculty were encouraged to request equipment to enhance teaching labs in conjunction with moving back into Holt Hall post renovation. This initiative was hindered by COVID as labs were shifted online and faculty were consumed with the challenges of moving and delivering their classes online.
- **Development:** Normal interactions with Development staff and potential donors did not occur during the year due to COVID. Nonetheless, the BGE Development Committee added a donation tab to the BGE website and obtained a list of over 3,000 alumni from the UTC Development Office. The BGE Newsletter Committee completed a 2020 departmental newsletter and coordinated with the Development Committee to send BGE alumni a link to the electronic newsletter, which included a link to the new clickable tab for donations.
- **Lab Setup and Startup Fund Expenditures:** COVID hampered new faculty expenditures of startup funds to establish research laboratories. The department encouraged several faculty with startup funds to spend their funds if feasible, rather than risk loss of those funds. The department also encouraged those faculty to request extensions if COVID or other factors outside of their control (unfinished labs related to Holt Hall renovation) hindered expenditure of startup funds. Several requests were made and approved by the BGE Head, CAS Dean, and Provost.
- **Online Course Delivery Challenges:** COVID made it very difficult for faculty to teach certain courses. Further, many faculty had no prior experience with online class delivery. When requested by faculty, BGE used bi-weekly funds to pay student teaching assistants to assist faculty with delivery of their courses.
- **Tenure and Promotion Year for Tenure Track Faculty:** Initial appointment letters for TT faculty specify a date by which faculty must apply for tenure and promotion to Associate Professor. Normally, no exceptions are allowed to this mandatory date. UTC Academic Affairs adopted a policy allowing TT faculty to extend this date up to two years to accommodate COVID related hardships. One-year extension requests were automatically approved, while requests for 2-year extensions underwent some review.
- **Course Learning Evaluations:** UTC faculty are evaluated by students in every course they teach. For the COVID years, UTC Academic Affairs suspended consideration of course learning evaluations by department heads in the annual Evaluation and Development by Objectives (EDO)

evaluation, and by Reappointment, Tenure, and Promotion (RTP) Committees and administrators making faculty reappointment, tenure, and promotion decisions.

- **Peer Evaluation of Faculty Instruction:** The Department RTP committee continued to implement the BGE Peer Evaluation of Instruction program for all faculty during their first two years of teaching, despite COVID. Tenured faculty attended virtual lectures and completed an evaluation form provided to new faculty. This may have been unfair, given that the university suspended student teaching evaluations during the pandemic, and the faculty undergoing review had little or no online teaching experience. BGE Bylaws require certain narrative ratings (Excellent or Very Good) during the 3-year period prior to tenure and promotion consideration, and new faculty being peer-reviewed may have been disadvantaged by online evaluations during COVID.
- **Faculty Travel Support Funds:** BGE policy requests that faculty submit internal Faculty Development Proposals, Scholarship, Engagement, the Arts, Research, Creativity, and Humanities (SEARCH) awards (with students), Center of Excellence in Applied Computational Science and Engineering (CEACSE) awards, CAS Faculty Achievement Award (FAA), and Research and Creative Activity (RCA) awards to augment BGE funds to support research and travel to present research findings at scientific meetings, as well as CAS Summer Collaborative Project Awards. In spring 2020, internal awards were halted due to COVID.
- **Shift from Face-to-Face to Online Teaching Modalities:** Most classes in BGE have historically been taught face-to-face. Not surprisingly, most faculty encountered challenges converting from face-to-face to online modalities in such a short timeframe. This change proved particularly challenging for several large enrollment introductory classes. As mentioned above, the department used bi-weekly funds to hire student teaching assistants to help faculty struggling to deliver classes. BGE also approved all requests to purchase classroom technology to support faculty teaching. Further, UTC's Walker Center for Teaching and Learning provided online and real-time phone support to faculty regarding online course delivery and use of Canvas and Zoom. The UTC Library provided microphones to record lectures. When faculty and students began on-campus reintegration, the library also provided remote microphones and equipment to amplify faculty voices constrained by masks and facilitate connectivity to recording devices.
- **Field Stations:** Due to COVID there was no activity regarding the Wisdom Street Wetland, Tennessee River Aquatic Field Station, the Volunteer Army Ammunition Plant (VAAP) upland site, and the VAAP wetland field sites.
- **Online Course Delivery Transition back to Face-to-Face:** In Fall 2021, we transitioned back to on-campus courses taught primarily face-to-face. The UTC course delivery policy evolved from purely online, to hybrid, to face-to-face. Some courses involved face-to-face instruction with simultaneous Zoom and recorded lectures to accommodate students that missed both deliveries with COVID-related absences. This was a very time-intensive period for faculty that demanded enhanced teaching effort and reduced the time available for student mentoring, research, and service.
- **Campus Reintegration Plan:** UTC required BGE and other departments to develop a Student and Faculty On-campus Reintegration Plan subject to UTC approval. Each classroom and lab had to be measured, and reduced capacities and seating locations were determined based on UTC Safety and Academic Affairs guidelines. BGE developed COVID Safety Protocols for all public spaces (halls, front office, classrooms). BGE also adopted BGE COVID Lab Protocols for teaching and research labs that included a Prohibition on Unsupervised Student Access. The BGE Student and Faculty On-campus Reintegration Plan and BGE COVID Lab Protocols are included in appendices [Appendix 0-B](#) and [Appendix 0-C](#), respectively.
- **BGE Travel and Photocopying Expenditures:** Due to COVID, BGE travel and photocopying expenditures were down approximately 75%, which relieved normal BGE budget shortfalls. In all other years, BGE has had to cover shortfalls from BGE gift funds or additional CAS funds.

- **Lab Fee Expenditures:** Lab fee money is essential to achieve the teaching mission of the department. During AY 2020/2021, BGE generated approximately \$90K in lab fees. This money was used to support the teaching of laboratory courses, including purchase of supplies, equipment, and instruments. The money was also used to cover other expenses related to teaching laboratories such as equipment maintenance contracts, equipment repairs, and hourly pay of student laboratory workers. Due to fewer face-to-face lab sections than normal, expenditures were lower. This was limited to the COVID pandemic years, as the department has always needed all lab fee funds to deliver its laboratory courses with no reserve for instrument maintenance and repair or significant upgrades or improvements.

While COVID impacts were overwhelmingly negative, there were a few short-term and long-term benefits. As noted above, BGE expenditures were lower in certain budget categories during the pandemic. These short savings ended with the campus reintegration of students and faculty. Long-term, the COVID pandemic required faculty to become knowledgeable and proficient with online and hybrid course modalities and electronic meetings. While the face-to-face modality will remain the predominate course delivery approach in the natural and physical sciences, BGE faculty are collectively more adept and accepting of alternate modalities. Electronic meetings, via Zoom or Teams, are much more common, although there remains an overall preference for face-to-face meetings when possible.

0.5 Previous Graduate Program Review, 2018

The Biology, Geology, and Environmental Science Department undergraduate and graduate programs were reviewed in Spring 2018 by Dr. Marta Wayne (University of Florida, Biology), Dr. Stephen MacAvoy (American University, Environmental Science), and Dr. Thomas Hickson (University of St. Thomas, Geology). The undergraduate and graduate program reviews were intertwined. Therefore, included is a summary of the reviewer comments for all programs. The reviewers identified strengths and shortcomings of the BGE programs and made several specific recommendations.

The reviewers' general comments for all the undergraduate programs included:

BGE has an exceptionally strong, caring, and productive faculty. Our overall impression is of a faculty that is deeply committed to their students and teaching, while fully embracing the teacher/scholar model. New lab and teaching spaces that will come online shortly will also be a strong asset to the program. We also believe that the merger between geology, biology and environmental science is a real strength, combining these natural science disciplines and allowing for far greater interdisciplinary synergies to flourish. If the faculty can work together to support each other across all three divisions and to reject silo-based thinking, the potential for growth in geology and environmental science may be significant.

The specific recommendations were that:

Geology and Biology faculty need to focus on how they are both very similar, natural science disciplines that strive for the same basic objective: to teach students how to be effective scientists that can address real societal problems and work toward the common good. They need to view the Environmental Science program as their shared responsibility and look for ways for all interested faculty to participate. The disproportionate numbers of Biology faculty can lead to a tyranny of the majority, which should be avoided at all costs. BGE needs to think of creative solutions, documented in their by-laws, to assure that Geology faculty have a strong voice.

The major strength of the Geology program is the incredibly hardworking, caring, passionate and dedicated faculty. They have been working under a very difficult teaching load for over a decade

at least, yet they continue to have a positive attitude and support their majors in myriad ways. They have created a program that prepares their majors for careers in geosciences and graduate school. They are a tight knit, very supportive group that exhibits remarkably little tension between them. They really seem to enjoy working together and this creates an esprit d 'corps' that impacts the entire department.

The senior capstone experience is another shining light in this program. It is well thought-out and provides an exceptional learning experience for their majors. This is evidenced by the success of their graduates, who seem to be more than prepared for careers.

Geology has been an exceptionally "good citizen" at the university. The department seeks to support university initiatives, goes out of its way to perform excellent assessment, and has maintained an exceptionally positive attitude during the merger into the BGE Department. Furthermore, Geology faculty have been excellent and conservative stewards of university resources.

Perhaps the single biggest weakness that impacts all aspects of the program is that faculty are significantly overloaded with teaching. As a result, faculty research programs have suffered. This has negative implications for student-faculty collaborative research engagement, creativity in course delivery, community outreach efforts, success in getting external funding, staying abreast of the current status of their field (which negative impacts teaching at all levels), and, perhaps most importantly, faculty morale.

Other weaknesses include:

- Lack of access to computer technology in the department, particularly in introductory courses. We do not feel that it is adequate to have Geology faculty use the SIM center, which is prohibitively far from their teaching and office spaces, has limited student access, and is not really designed for this type of use.
- A tendency to not "toot their own horn." Faculty need to get the word out about the exciting things they are doing and the relevance of their field.

The goals for the next five years recommended by the reviewers included:

1. Make a stronger effort to pursue community-based and interdisciplinary research and teaching experiences.
2. Consolidate Geology space to allow for some existing space to support research.
3. Teaching equity: Lower teaching load for Geology faculty by switching lab teaching to TAs (additional TAs needed on top of the 11 currently funded).
4. Incorporate more technology (such as GIS and modeling) into all undergraduate labs, particularly in Geology. GIS should be required in the graduate program.
5. Create two GA positions to care for the greenhouse and other infrastructure.
6. Eliminate faculty committee and advising requirements for MS students not on a thesis track. A single internship advisor would administer the internship (external, student driven learning) and receive teaching credit.
7. Eliminate the Learned Discourse. To earn an MS, students should be able to navigate an internship successfully or conduct independent thesis research.
8. Restructure the student fees. The fees right now are about 1/3 of the graduate TA stipend. Student morale would be improved if the fees were eliminated.
9. Consider offering a GIS certificate as part of the undergraduate program. Students from any division should be able to do this if they wish.
10. Consider developing more shared and flexible lab spaces in the remodeled building.

BGE has worked to address the 5-year goals.

1. BGE has expanded community-based and interdisciplinary research and teaching over the review period. We have faculty who have co-taught courses in the Honors College (Amazing Biology of Fishes with Alda and Klug) and within the department (Paleontology with Bramblett and Manning-Berg). On campus, we have research collaborations with several UTC disciplines, including mathematics, engineering, computer science, sociology, anthropology, political science/public service, and chemistry. Within the community, BGE collaborates in teaching and research with numerous entities, including the Chattanooga Audubon Society, Reflection Riding Arboretum and Nature Preserve, Lula Lake, TVA, EPB, Chattanooga Zoo, Tennessee Aquarium, Chattanooga Parks and Outdoor Recreation, City of Chattanooga, North Chickamauga Creek Conservancy, Raccoon Mountain Caverns, Great Smoky Mountains National Park, Hamilton County Schools, Highland Biological Station, and the Environmental Protection Agency.
2. Rather than consolidate Geology space, more space was identified for research. There are two additional labs on the first floor of Grote. In addition, the newest TT professor whose area of research is in structure and petrology, received research space on the 3rd floor of Holt Hall.
3. We have worked to lower the teaching load for Geology faculty, but results have been inconsistent. The Geology faculty has revised the curriculum (effective 2023-2024 catalog), which should promote student progression to graduation and reduce loads. We have also begun using lab fees to pay undergraduate students to help with lab preparation. Additionally, we have paid graduate students (per hour) to assist during labs.
4. GIS has been developed into a certificate on campus (IGTLab). It is also a major and a minor in the Geology program. A new introductory GIS course (GEOL 2100 - Introductory Geographic Information Systems and Remote Sensing) is now required for all Environmental Science and Geology majors. This replaced a Maps and Mapping course in the curriculum. We do not have the capacity in the upper-level GIS courses to accommodate this as a requirement for all graduate students, but many of the students do take the advanced courses. We would need to hire an additional GIS faculty member if we were to require the courses of all graduate students.
5. We have lost four graduate teaching assistant (GTA) positions over the review period, so we have not been able to convert GTA positions to help with infrastructure. We are using laboratory fees to pay graduate assistants per hour to help in those capacities.
6. The faculty committee for internship has been eliminated. There is not an overall internship advisor, but individual faculty serve as internship advisors.
7. Learned discourse has been eliminated.
8. Fees are controlled by the UTC administration and the UT-System Board. However, during the review period, there were significant changes to the out-of-state fees which benefited graduate students. Now, there is a discount for regional tuition credit, which applies to students who are residents of Catoosa, Dade, Fannin, Murray, Walker and Whitfield counties in Georgia and Jackson County in Alabama (counties around the borders of Tennessee).
9. We now offer a GIS minor. There is also a GIS certificate that is offered through the IGTLab (it is not an academic certificate).
10. We have two lab spaces that are shared in renovated Holt Hall. One was used by two faculty until most recently when one of the faculty resigned. The other space is being used by a new geology hire and will be available for expansion space for an additional faculty member.

1 Learning Outcomes

1.1 Program and Student Learning Outcomes

Our Program Learning Objectives were implemented in Fall 2016 to allow for better tracking of changes and improvement through assessment and to better reflect the program's emphasis. The Program Learning Objectives for the MS ESC program as listed in the current UTC Graduate Catalog:

1. Students are able to demonstrate knowledge of the natural world, within the context of key issues in environmental science (including human population increase, sustainability, resource depletion, urbanization, and environmental pollution).
2. Students are able to demonstrate and apply knowledge in the core areas of the environmental science graduate program: natural resource management, statistics, environmental law and policy, and environmental pollution.
3. Students are able to successfully defend their thesis, internship, or learned discourse, including giving a public presentation about their project and accurately answering audience questions.
4. Students are able to gather, evaluate, and synthesize relevant scientific literature.
5. Students are able to communicate scientific information effectively both in writing and orally.
6. Students are able to apply their knowledge towards addressing environmental problems, in a manner consistent with recognizing the unique role humans play in the environment.
7. Students are able to conduct themselves responsibly and recognize the importance of ethical professional behavior.

As an institution, UTC has been increasingly focused on the development and assessment of clear and measurable student learning outcomes (SLOs) at both program and course levels in recent years. The MS ESC SLOs were drafted during the 2014-2015 academic year and were first piloted during the 2015-2016 academic year. The currently assessed SLOs are as follows:

1. Students are able to demonstrate knowledge of the natural world, within the context of key issues in environmental science (including human population increase, sustainability, resource depletion, urbanization, and environmental pollution).
2. Students are able to demonstrate and apply knowledge in the core areas of the environmental science graduate program: natural resource management, statistics, environmental law and policy, and environmental pollution.
3. Students are able to successfully defend their thesis, internship, or learned discourse by giving an associated public presentation that reflects independent, inquiry-driven work and accurately answering related audience questions.
4. Students are able to gather, evaluate, and synthesize relevant scientific literature.
5. Students are able to communicate scientific information effectively both in writing and orally.
6. Students are able to apply their knowledge towards addressing environmental problems, in a manner consistent with recognizing the unique role humans play in the environment.
7. Students are able to conduct themselves responsibly and recognize the importance of ethical professional behavior.

The graduate committee developed an MS ESC Course Curriculum Map that lists the program SLOs and maps them to the courses that we offer. Faculty were asked to determine the level of each SLO associated with their course as: I – is Introduced and Assessed, R – SLO is Reinforced and Assessed, or C – Level of Competency is Assessed. A copy of the MS ESC Curriculum Map can be found in [Appendix 1-A](#). In 2022-2023, the BGE Undergraduate programs reviewed and refined their SLOs. After that process was complete, it was determined that the MS ESC SLOs should go through a similar review and update. The MS ESC graduate committee is proposing new graduate SLOs during the Fall 2023 so that they can be implemented in Spring 2024. The new design aligns with the undergraduate SLOs and reduces the number so that outcomes will be able to be assessed more regularly. The proposed SLOs are as follows:

1. **Core Knowledge.** Students demonstrate mastery of core areas of environmental science (e.g., ecology, natural resources, law and policy, ethics, etc.) as they apply to understanding the natural world and addressing environmental issues, including human population growth, resource depletion, urbanization, pollution, and sustainability.
2. **Resources and Tools.** Students use resources effectively within an environmental science context to collect information, including literature, established methodologies and technologies, laboratory, field equipment, and/or computational tools.
3. **Scientific/Research Process.** Students can critically address and solve problems in environmental science by developing questions and/or hypotheses, designing and conducting relevant investigations with empirical, theoretical, and/or conceptual tests, and critically analyzing and interpreting results.
4. **Communication and Engagement.** Students disseminate environmental science information effectively using various formats (i.e., oral, written) and engage with various audiences (i.e., scientific, general) as is essential to career development in the discipline.

1.2 Evaluation of Program and Student Learning Outcomes

1.2.1 Current Evaluation Methods

Since Fall 2015, we have been assessing select MS ESC SLOs each year through well-aligned course-level assessments. Our intention is to select a distinct set of MS ESC SLOs to assess each year, so that all SLOs are assessed every ~3 years in a regular rotation. The departmental Assessment Committee keeps a review schedule and determines which MS ESC SLOs will be assessed early each academic year. The Committee then reviews the collection of Course Mapping Worksheets submitted by faculty teaching graduate courses to determine appropriate courses for the assessment of the selected SLOs. A sample Course Mapping Worksheet is provided in [Appendix 1-B](#). Attempts are made to ensure that both core and elective courses are included in yearly assessments. Once the Committee selects a course, the instructor is notified and directed to prepare a brief report at the end of the semester that describes how the SLO was assessed and the outcome of that assessment; assessments are designed by instructors and can include responses to specific essay questions, performance on specific assignments, etc. If at least 70% of students (i.e., a healthy majority) successfully complete the assessment, then we consider the SLO to have been met effectively by the course. To date, we have assessed all the MS ESC SLOs learning outcomes. In all cases, the criteria for success have been met, so the instructors have not needed to take any follow-up measures. Table 1.1 shows the results of SLO assessments for 2021-2022 and 2022-2023.

Table 1.1 Results of assessment of MS ESC Student Learning Outcomes (SLOs) for 2021-2022 and 2022-2023.

SLO	Measures and Assessment
SLO1: Students are able to demonstrate knowledge of the natural world, within the context of key issues in environmental science (including human population increase, sustainability, resource depletion, urbanization, and environmental pollution).	Means of Assessment: Student performance on embedded coursework. Criteria for success (CFS): at least 70% correct answers on specific questions designed by instructors to evaluate specific SLOs. Courses Evaluated 2021-2022 Not assessed 2022-2023: ESC 5710 2023-2024: Not to be assessed Assessment data 2021-2022 Not assessed 2022-2023: 8 of 13 people scored greater than 70% on the presentation and job interview. However, two students did not present so the final score was 8 of 11 people scored greater than 70% on the combined presentation and interview. Follow-up actions planned: New SLOs are being developed for the 2023-2024 cycle.
SLO2: Students are able to demonstrate and apply knowledge in the core areas of the environmental science graduate program: natural resource management, statistics, environmental law and policy, and environmental pollution.	Means of Assessment: Student performance on embedded coursework. Criteria for success (CFS): at least 70% correct answers on specific questions designed by instructors to evaluate specific SLOs. Courses Evaluated 2021-2022: Not assessed 2022-2023: ESC 5040, ESC 5050, ESC 5120 2023-2024: Not to be assessed

	Assessment data 2021-2022 Not assessed 2022-2023: ESC 5050: Question 1: 100% got 4/6 points, Question 2: 12% got the question completely correct; 15/17 earned 70%; ESC 5450: 1 question, 82.5% correct; ESC 5120: Overall (2 questions): 91.% correct. Follow-up actions planned: New SLOs are being developed for the 2023-2024 cycle.
SLO3: Students are able to successfully defend their thesis, internship, or learned discourse by giving an associated public presentation that reflects independent, inquiry-driven work and accurately answering related audience questions.	Means of Assessment: Student performance on oral defense and thesis. Criteria for success (CFS): Successfully defend Master thesis/internship in front of a committee of at least three faculty members Courses Evaluated 2021-2022: Not assessed 2022-2023: ESC 5996, ESC 5999 2023-2024 Not to be assessed Assessment data 2021-2022: Not assessed 2022-2023: Two students out of three graduated, the third made progress. Follow-up actions planned: New SLOs are being developed for the 2023-2024 cycle.
SLO4: Students are able to gather, evaluate, and synthesize relevant scientific literature.	Means of Assessment: Student performance on embedded coursework. Criteria for success (CFS): at least 70% correct answers on specific questions designed by instructors to evaluate specific SLOs. Courses Evaluated 2021-2022: Not assessed

	2022-2023: Not assessed 2023-2024: Not to be assessed Assessment data 2021-2022 Not assessed 2021-2022 Not assessed Follow-up actions planned: New SLOs are being developed for the 2023-2024 cycle.
SLO5: Students are able to communicate scientific information effectively both in writing and orally.	Means of Assessment: Student performance on embedded coursework. Criteria for success (CFS): at least 70% correct answers on specific questions designed by instructors to evaluate specific SLOs. Courses Evaluated 2021-2022: ESC 5020, ESC 5080 2022-2023: Not assessed 2023-2024: Not to be assessed Assessment data 2021-2022: ESC 5020: Paper-average score was 93%, presentation-average score was 91%. ESC 5080: Oral exam: 83% correct, Written work (presenting taxonomic information 95% average, 2 assignments; responding to scientific questions 90% average; field lab notebook 100%). 2022-2023: Not assessed Follow-up actions planned: New SLOs are being developed for the 2023-2024 cycle.
SLO6: Students are able to apply their knowledge towards addressing environmental problems, in a manner consistent with recognizing the unique role humans play in the environment.	Means of Assessment: Student performance on embedded coursework. Criteria for success (CFS): at least 70% correct answers on specific questions designed by instructors to evaluate specific SLOs.

	Courses Evaluated 2021-2022: GEOL 5450, ESC 5140 2022-2023: Not assessed 2023-2024 Not to be assessed Assessment data 2021-2022: GEOL 5450 Two students total completed this assignment, and their average score was 94%, ESC 5140 100% earned score of at least 80% of the total possible points on both questions 2022-2023: Not assessed Follow-up actions planned: New SLOs are being developed for the 2023-2024 cycle.
SLO7: Students are able to conduct themselves responsibly and recognize the importance of ethical professional behavior.	Means of Assessment: Student performance on embedded coursework. Criteria for success (CFS): at least 70% correct answers on specific questions designed by instructors to evaluate specific SLOs. Courses Evaluated 2021-2022: ESC 5730 2022-2023: Not assessed 2023-202: Not to be assessed Assessment data 2021-2022: ESC 5730 The three poster presentations that earned 18.33/20 points (91.67%) on average 2022-2023: Not assessed Follow-up actions planned: New SLOs are being developed for the 2023-2024 cycle.

1.3 Use of Program and Student Learning Outcomes for Program Improvement

The current MS ESC SLOs represent the emphases of our program, are measurable, and can be incorporated in our core and elective courses at diverse levels and in multiple methods. The capstone experience that each student must complete to earn the MS ESC provides an assessment of competency in each of our SLOs. By developing a list of SLOs that are each focused on specific outcomes, requiring instructors to consider their course content and assessments within the context of these SLOs, and assessing each SLO on a regular basis, we hope to provide means to identify the strengths of our program, as well as areas in which we may need improvement. Since the implementation of the current MS ESC SLOs in Fall 2015, it has not been necessary to consider corrective actions because all assessments have indicated that the SLOs are being met. However, the MS ESC program is proposing changes to our current SLOs for Spring 2024.

1.4 Program Alignment with our Institutional Mission

1.4.1 University Mission

UTC's strategic plan was updated recently, dated 2021-2025, and can be reviewed at <https://www.utc.edu/chancellor/strategic-plan>. UTC's current vision is that "We engage students, inspire change and enrich community." The associated mission statement is

The University of Tennessee at Chattanooga is a driving force for achieving excellence by actively engaging students, faculty, and staff, embracing diversity and inclusion, inspiring positive change and enriching and sustaining our community.

1.4.2 MS ESC Program Mission

The current mission statement of the MS ESC program follows:

The Department of Biology, Geology, and Environmental Science at The University of Tennessee at Chattanooga offers two Master of Science degrees in environmental science. The mission of these programs is to meet the needs of academia, business, government and the non-profit sector for scholars and professionals in this interdisciplinary field. Toward this goal, the programs provide sound scientific and technical training coupled with an understanding of contemporary socioeconomic, political, and legal realities. Our faculty offer courses that emphasize the development of advanced critical thinking and effective advocacy and communication skills and engage students in research in a wide range of subdisciplines including biodiversity and systematics, conservation and restoration, ecology, environmental and human health, environmental policy and law, evolution and behavior, geospatial science, and molecular biology, cellular biology, and physiology.

The University mission is clear and aligns well with the MS ESC programs. For example, the University mission involves the active engagement of all members of the campus community. Students in the MS ESC program work closely with faculty on experiential projects both in the classroom and beyond the classroom while working on a thesis, or non-thesis discourse; this training is part of our mission. The University mission describes the importance of embracing diversity. In their scientific work, environmental scientists must understand and consider contemporary, socioeconomic, political, and legal realities; this understanding also is part of our mission. In addition, the University mission describes its goal to enrich the world at large. MS ESC students often explore environmental issues that are global in

scope through focus on region and/or local systems. As such, students are prepared to enrich their local community and the world as trained environmental professionals.

The MS ESC SLOs also echo many of the themes of our university mission. Inherently, by focusing on student abilities and activities, our SLOs require students to be engaged in their education and training. Our SLOs also acknowledge the importance of contribution to the greater community in the way our students are expected to apply their knowledge toward addressing environmental problems in a manner consistent with recognizing the unique role humans play in the environment (i.e., SLO 6). In addition, our SLOs presuppose an appreciation for and an acceptance of diversity in the way our students are expected to be able to conduct themselves responsibly and in the way they are expected to be able to recognize the importance of ethical professional behavior (i.e., SLO 7).

1.5 Assessment of Learning Outcomes Strengths, Weaknesses, and Recommendations for Change

1.5.1 Strengths

In summary, the strengths of the current method of assessment are that the current SLOs are more measurable and easier to measure than in past assessment efforts. As a direct result of the functionality of our current SLOs, learning outcomes can now be assessed more thoroughly and more consistently. They are likewise more representative of both our core and elective course offerings. This is yet another strength. The major strength of the current approach is in how our SLOs force our faculty to take a more active role in ensuring the quality of their own courses, in that they encourage our instructors to routinely contemplate both the nature and design of the classes they teach. Another strength is that it allows us to better track student progress by having more flexibility in the assessment process and by having an easier way to assess multiple courses by scope and extent.

1.5.2 Weaknesses

In terms of weaknesses, the MS ESC Program still needs a better way to track graduates of the program, as a means of aiding assessment. A means by which both graduates of the Program and the employers of said graduates could be surveyed (as far as overall levels of satisfaction with the program, in terms of how well the program performs that which it espouses to do) would likewise prove helpful.

1.5.3 Recommendations for Change

Current progress changes include an update to the SLOs to align with the undergraduate SLOs format. This will allow for easier tracking of SLOs over time. These new SLOs will first be assessed in Spring 2024. A formal exit survey should be conducted for all graduates. There are several requirements for graduation. The exit survey could be added as a requirement as well. This will help us track graduates. Another survey should be shared with local employers annually. A mechanism for this might be to share through internship supervisors, as many of our students are hired post-internship.

2 Curriculum

The graduate program in Environmental Science has two degree concentrations: The MS Environmental Science and the MS Environmental Science: Environmental Administration and Management. The MS Environmental Science has two tracks, Thesis Concentration and Non-Thesis Concentration. Each degree has a specific capstone experience to support the student's academic objectives, research interests, and career goals.

2.1 Curriculum Content and Organization is Reviewed and Improved

2.1.1 MS Environmental Science

To earn the Master of Science degree in environmental science, a student must successfully complete a total of 36 semester hours comprised of required core courses, elective courses, and academic credit associated with a thesis (for the Thesis concentration) or, internship, individual studies, and/or research experience (for the Non-Thesis concentration) with a cumulative minimum grade point average of 3.0. Core courses comprise 15 semester hours total. Example recent syllabi for these core courses are provided in [Appendix 2-A](#):

- ESC 5020 Mechanisms in the Environment (3 credits),
- ESC 5050 Natural Resources Conservation and Management (3 credits), formerly Biodiversity and Natural Resources Conservation,
- ESC 5120 Applied Statistics for Environmental Scientists (4 credits),
- ESC 5140 Environmental Law and Regulations (3 credits),
- ESC 5700 Graduate Seminar I (1 credit), and
- ESC 5710 Graduate Seminar II (1 credit).

Elective courses comprise either 12 or 15 semester hours, depending on the capstone experience that a student chooses to pursue in partial fulfillment of the degree. Specifically, students conducting a thesis must complete 12 semester hours of elective coursework, while students completing the non-thesis concentration must complete 15 semester hours of elective work. Many ESC graduate electives are cross-listed with analogous undergraduate sections of those courses; however, instructors must have distinct learning outcomes and assessments for graduate students enrolled in cross-listed courses. Example recent syllabi for these elective courses are provided in [Appendix 2-B](#). For more information, visit the [2023-2024 UTC Graduate Catalog](#).

2.1.2 MS Environmental Science, Environmental Administration and Management Concentration

To earn the Master of Science degree in environmental science with an Environmental Administration and Management Concentration, a student must complete 36 semester hours. Because of the diversity in backgrounds and interests of students accepted into this program, it has been structured into blocks where students have some flexibility in course selection beyond the core requirements. Students must take courses from the following four areas of focus:

- Fundamentals [10 credit hours],
- Basic Ecological Knowledge [4 credit hours minimum],
- Habitat Manipulation and Computational Skills [9 credit hours minimum], and
- Human Dimensions [6 credit hours minimum].

A grade-point average of 3.25 in graduate coursework must be maintained. Failure to meet this requirement will result in academic probation. A capstone project consisting of a grant proposal presented to the agency providing the internship and approved by the Program Director must be completed prior to

graduation. Sample syllabi for courses that fit in these categories are in Appendix [2-A](#) and [2-B](#). For more information, visit the [2023-2024 UTC Graduate Catalog](#).

2.1.3 Capstone Experience

The choice of each student's capstone experience should support his/her academic objectives, research interests, and career goals, and should be informed by communication with the graduate advisor. Thesis projects and internship experiences are each associated with six semester hours of academic credit (ESC 5999 Thesis and ESC 5996 Internship), while a learned discourse is associated with three semester hours of academic credit (registered as ESC 5997 Individual Studies). A thesis project involves independent original research focused on a specific issue that is relevant to environmental science; it is an appropriate capstone choice for students who want to gain applicable research experience. It is especially recommended that students who are considering future doctoral studies or a career involving research activities or oversight conduct a thesis project. An internship experience involves supervised environmental work with an appropriate sponsoring organization or business as a form of experiential learning that integrates academic knowledge with its practical application in a workplace setting. An internship is an appropriate choice for students who want to develop skills specialized for a particular type of environmental work and is especially recommended for students with specific career goals that do not require further graduate study. A learned discourse allows students to deeply explore a specific topic relevant to environmental science through independent and original review of relevant available literature; it is an appropriate choice for students who want to further their knowledge base in an environmental science topic without focus on development of applied research or specialized workplace skills. It is especially recommended that students who want to advance in an already established career consider a learned discourse for the capstone experience.

To initiate the capstone experience, each student must prepare a written proposal for the work approved by the graduate advisor and two other members of the UTC Graduate Faculty, who will serve as graduate advisory committee members. All capstone experiences culminate with the public defense of an associated written document.

2.1.4 Curriculum Review and Improvement

The BGE Graduate Faculty Committee meets on a regular basis to discuss the state of the MS ESC program and how it might be improved, as well as any changes being proposed or implemented at the University level. The Committee discusses such aspects as course requirements, length of time to complete the program, and graduation rates. Any proposed program curriculum changes are received and discussed by the Committee before being brought to the attention of all BGE Faculty for discussion and vote. If approved, the proposed changes are submitted in the form of a formal curriculum proposal electronically via *Curriculog*. Proposals are processed through a chain of approvals in *Curriculog* that includes the Department Head, Dean of the College, the Graduate Council Curriculum Chair, Graduate Council Chair, the Dean of the Graduate School, and the Vice Provost of Curriculum and New Programs.

Since our previous program review, we have made several changes to our overall graduate curriculum. First, we added a non-thesis track by dropping the learned discourse option and combining it with the independent study and internship options. These proposed changes took effect in 2019-2020 Graduate Catalog. These changes reflected an opportunity to provide our students greater flexibility in capstone opportunities, especially for the non-thesis students. They can now use independent study and internship credits for up to 6 hours to satisfy degree requirements.

Second, we added a new concentration titled Environmental Science Administration and Management, which took effect in 2021-2022 Graduate Catalog. This change reflected our acknowledgement that environmental science is inherently interdisciplinary and that most environmental problems, as well as

their solutions, are rooted in human dimensions that require action by administrators and managers, and this new program provides our students with these transferable skills.

Third, we created a Joint Undergraduate to Master's Program (JUMP), entitled TADPOLES (Transformative Academic Developmental Program on Learning Environmental Science), which took effect in 2023-2024 Undergraduate Catalog. This program allows qualifying juniors and seniors to enroll in three specific graduate courses where they earn credit for both the BS and MS degrees in Environmental Science simultaneously. This change reflected our acknowledgement that many talented undergraduate students are looking for opportunities to fast track their careers and that an accelerated MS degree in science was absent at UTC.

Fourth, we added a post-baccalaureate certificate program in Environmental Science. Specifically, the graduate certificate in Environmental Science is a stand-alone certificate intended as a post-bachelor's certificate or for graduate students enrolled in another program at the University of Tennessee at Chattanooga. The graduate certificate in Environmental Science will enable graduate students to develop their knowledge, skills, and abilities regarding mainstream Environmental Science (ESC). Our graduate certificate focuses on all core areas of ESC, including Natural Resources, Law, and Environmental Mechanisms. ESC students work with professionals in a variety of settings to provide expertise on emerging issues. ESC is essential as government agencies, non-government organizations, consulting firms, funding agencies, public education, and private industry increasingly require a broad and deep understanding of environmental issues. This 5-course, 15 credit hour graduate certificate in Environmental Science is beneficial to students that want to advance themselves in the workforce or for those who are enrolled in a graduate program who want to supplement their courses with this specialization or to those who already have an undergraduate or graduate degree and want to learn more about ESC to enhance their careers. It also provides the program with an opportunity to recruit from the certificate program to the MS ESC graduate program.

Fifth, we added a post-baccalaureate certificate program in Climate Science. The graduate certificate in Climate Science is a stand-alone certificate intended as a post-bachelor's certificate or for graduate students enrolled in another program at the University of Tennessee at Chattanooga. The graduate certificate in Climate Science will enable graduate students to develop their knowledge, skills, and abilities regarding mainstream Climate Science issues. Our graduate certificate encompasses the principal areas of climate science, and our students will work environmental leaders in a variety of settings to provide expertise on emerging issues. Understanding climate science is essential for our students to gain meaningful employment with government agencies, non-government organizations, consulting firms, funding agencies, public education, and private industry. This 21-credit hour graduate certificate in Climate Science is beneficial to students that want to advance themselves in the workforce or for those who are enrolled in a graduate program who want to supplement their courses with this specialization or to those who already have an undergraduate or graduate degree and want to learn more about Climate Science to enhance their careers. And, like the ESC certificate, it provides the program an opportunity to recruit from the certificate program to the MS ESC graduate program.

The current core courses of the MS ESC program were revised and updated in 2020. The core was developed by faculty to provide a solid foundation for environmental science, no matter the eventual career path of a program graduate. For example, a student who aspires to have a career in environmental law and policy needs some background in areas such as ecosystem management or toxicology, as that student will encounter policy issues dealing with those topics. Similarly, it benefits a student interested in conservation biology to be familiar with environmental regulations and policies. Although the core courses in the MS ESC program of study were updated in Fall 2020, we have added new graduate-level courses to the curriculum as electives, as faculty areas of focus and expertise allow. Examples of new graduate-level ESC electives that have been added to the curriculum in recent years include ESC 5400 Ecological and Environmental Census Techniques, ESC 5440 Amphibian Ecology and Conservation, ESC

5460 Global Change Biology, ESC 5770 Meiofauna Biodiversity, GEOL 5080 Earth Surface Processes, GEOL 5450 Hydrology, GEOL 5470 Applied Environmental Geochemistry, and GEOL 5490 Hydrologic Modeling. Faculty periodically offer special topics and/or graduate-sections of upper-level undergraduate courses under the BIOL 5400 Advanced Topics in Organismic Biology, ESC Special Topics, GEOL 5010 Special Topics. Examples of such topics have included Animal Behavior, Dendrology, Ornithology, Plant Taxonomy, Remote Sensing for Geoscientists (which now has its own course number), and Molecular Ecology. As new faculty have joined the Department, potential elective courses for MS ESC students have increased. Given the rapidly changing pace of environmental knowledge and emergence/attention of ‘new’ environmental issues and the opportunities posed by new hire expertise, we will continue to evaluate and adapt our curriculum to this ever-evolving field.

2.2 Course Scheduling and Progress Toward Degrees

The six fundamental/core classes that are applicable toward all MS degrees and graduate certificates are each offered once every year. ESC 5120 Applied Statistics for Environmental Scientists, ESC 5140 Environmental Law and Policy, and ESC 5900 Seminar I are offered in the fall. ESC 5020 Mechanisms in the Environment, ESC 5050 Natural Resources Conservation and Management, and ESC 5710 Seminar II are offered in the Spring. We have made a few adjustments due to sabbaticals but try to keep to a regular schedule so that students can plan. We have students who participate in international research during an entire semester. A regular schedule is critical to the continued progress toward degree. Enough elective courses are offered each semester so that students can complete that requirement. Many of our graduate-level electives consist of graduate sections of course that are also taught at the upper-level undergraduate level. The hiring of new NTT faculty to teach introductory-level courses and the use of Graduate Teaching Assistants (GTAs) to teach sections of introductory-level labs have made it more possible for TT faculty to consistently offer upper-level coursework. The frequent offering of affiliated graduate-sections of these courses has made it easier for graduate students to complete their elective course requirement.

2.3 Advanced Academic Content

Courses taught in the MS ESC program include SLOs that reflect higher-order thinking (as described in *Bloom's Taxonomy of Cognitive Behavior*), such as analysis, synthesis, and evaluation. For example, in ESC 5050 Natural Resource Management and Conservation, students must develop an ecosystem management plan; this involves evaluating the natural and cultural history of the ecosystem, communicating with stakeholders about their ideas and concerns for the ecosystem, evaluating information, and making management recommendations. Similarly, in ESC 5140 Environmental Law and Policy, students may engage in mock trial exercises based on actual environmental court cases. Students are assigned roles (e.g., appellant's attorney, appellee's attorney, appellate judges) and research the cases from the perspective of these roles and serve as advocates and judges in a mock appellate judicial proceeding.

While core courses in the MS ESC program are primarily offered only to graduate students, undergraduates enrolled in our new TADPOLES program allow those students to enroll in three core classes (ESC 5050 Natural Resource Management and Conservation, ESC 5140 Environmental Law and Policy, and ESC 5020 Mechanisms in the Environment). Most of the elective coursework consists of graduate sections of courses that also include cross-listed undergraduate sections or graduate electives from other programs on campus. University-level policy requires that instructors of these courses develop distinct SLOs for graduate students that reflect higher-order thinking with associated distinct assessments. For example, students enrolled in the graduate section of a cross-listed course might be expected to analyze, synthesize, and evaluate course information, while students enrolled in the undergraduate section might be expected to know, comprehend, and apply course information. Students enrolled in graduate-level sections also may be expected to attain some lower-level cognitive skills necessary to be able to fulfill higher cognitive behaviors. As assessments, graduate students are often required to conduct an

independent project not required of undergraduates, write a term paper of greater depth than undergraduates, prepare and lead learning modules, and answer different and/or additional questions on exams. Graduate work is graded with greater rigor than undergraduate work.

Faculty teaching in the MS ESC program had to provide separate syllabi for cross-listed graduate and undergraduate sections of courses including distinct assessments. Table 2.1 provides an example of how the SLOs and assessments compare in the cross-listed undergraduate/graduate course Earth Surface Processes, GEOL 4080 and GEOL 5090. Our syllabi undergo review at Departmental and University levels to ensure that graduate sections are more advanced than comparable undergraduate sections of cross-listed courses.

Table 2.1 Comparison GEOL 4080 and GEOL 5090 SLOs and Assessments

Area	GEOL 4080	GEOL 5090
SLOs	- Identify key landforms on Earth's surface using maps and other surficial information. - Discuss the processes that shape the surface of the Earth. - Formulate hypotheses about landform genesis and development, evaluate and synthesize information from observations and data collection, and effectively communicate the results to the public and their peers.	- Identify key landforms on Earth's surface using maps and other surficial information. - Be able to understand and discuss the processes that shape the surface of the Earth. - Design a research project, collect data, synthesize results, formulate preliminary conclusions, and present preliminary findings about a geomorphic feature or problem in Chattanooga
Assessments	- Three Exams (45%) - Activities and Labs (25%) - Thoughts on Readings (5%) - Project (15%) - ePortfolio (10%)	- Two Exams (25%) - Final Exam (15%) - Homework, Activities, includes labs (20%) - Project Presentation (7%) - Project Paper (13%) - Reading Reflections (10%) - ePortfolio (10%)

2.4 Alignment with Program Mastery and Student Learning Outcomes

The graduate committee developed a MS ESC Course Curriculum Map that lists the program SLOs and maps them to the courses that we offer. Faculty were asked to determine the level of each SLO associated with their course as: I – is Introduced and Assessed, R – SLO is Reinforced and Assessed, or C – Level of Competency is Assessed. A copy of the MS ESC Curriculum Map can be found in [Appendix 1-A](#).

Many of our courses reinforce or assess competency of the MS ESC SLOs by requiring students to apply knowledge of environmental science to real world problems (SLO's 1-3, 6), formulate research questions and answer those questions using appropriate methodological and analytical techniques (SLOs 3-4), communicate the information effectively (SLOs 3,5), and act in a responsible and ethical manner (SLO 7). Instructors can decide how to assess the SLOs associated with their courses; such assessments can include exams, writing assignments, class presentations, and projects. The preparation and successful defense of a thesis, internship, or learned discourse as required by our program provides an opportunity for us to evaluate whether all SLOs have been met.

2.5 Inclusion of Knowledge of Literature of the Discipline

The topics taught in our graduate-level courses are kept current by the faculty teaching them and reflect the contemporary state of knowledge in the field as described in the primary literature. As such, knowledge of literature of the discipline is incorporated into all MS ESC courses. In the case of graduate sections of cross-listed elective courses, additional work may be expected of students that increases their exposure to primary literature.

The capstone experiences required of students in the MS ESC program begin with the preparation of a written proposal for the work to be performed, and its approval by the graduate advisor and appropriate supervisor(s). Although different graduate advisors may have different specific formatting guidelines for proposals, all proposals must include background information as relevant to the experience gathered from the primary literature and include well-defined objectives to be addressed. The proposal also should detail the methodology for the project and discussion of how outcomes will be interpreted.

2.6 Engagement in Research and/or Professional Experience

To earn the MS ESC degree at UTC, students must complete a 36-hour program of study that includes core courses, electives, and a graduate capstone experience consisting of either a thesis or non-thesis project. This part of the program of study directly engages students in research and/or professional experiences. The choice of each student's capstone experience should support his/her academic objectives, research interests, and career goals, and should be informed by communication with the graduate advisor. Thesis projects are each associated with nine semester hours of academic credit (ESC 5999 Thesis), while non-thesis (ESC 5996 Internship, ESC 5997 Individuals Studies or ESC 5998 Research) is associated with six semester hours of academic credit.

The thesis option involves independent original research focused on a specific issue that is relevant to environmental science. It is the recommended capstone experience for students who want to gain applicable research experience and is especially recommended for students considering future doctoral studies. A thesis demonstrates broad knowledge of a topic, identifies a gap in the knowledge base, and attempts to fill that gap through appropriate study. Initiation of a thesis in partial fulfillment of the MS ESC degree requires acceptance of a thesis proposal by a three-person graduate advisory committee. A thesis proposal describes the thesis objectives, provides a preliminary review of pertinent literature, outlines the methodologies to be used, and details the relevance of the work to the field. Once a thesis proposal is approved, the student will work independently but with close guidance by the graduate advisor toward meeting the thesis objectives.

The non-thesis option provides an opportunity to acquire specialized technical/professional knowledge by working on an environmental project with an appropriate sponsoring organization or business. As a form of experiential learning, a non-thesis project integrates academic knowledge of environmental science with its practical application in a workplace setting. A non-thesis project is an appropriate capstone experience for students who want to develop skills specialized for a particular type of environmental work. It is especially recommended for students with specific career goals (e.g., natural resource management, environmental consulting) that do not require further graduate studies. Initiation of a non-thesis project in partial fulfillment of the MS ESC degree requires that a student identify a suitable opportunity and prepare a proposal for the experience and the graduate advisor and graduate program director agree on the scope and extent of the capstone. A non-thesis proposal is not required but it is encouraged. Non-thesis projects (e.g., internships) may be paid or unpaid. Once the non-thesis project is approved, the student will work independently but with close guidance by the workplace supervisor with oversight from the graduate advisor to complete 100 hours of work per credit hour toward meeting the project objectives. Students that intern with an external agency must document their experience via a series of formal periodic reports to the graduate advisor and have these endorsed by the workplace supervisor.

Thesis and non-thesis capstone experiences all culminate with the submission of a document (i.e., a thesis, internship report, or written discourse) approved by the graduate advisor. However, only the thesis option requires the successful public oral defense of the document. During the public part of the thesis defense, the students give a professional presentation that describes and justifies all aspects of the work. After the presentation, time is permitted for the audience to ask questions. During a private examination that immediately follows the public defense, the student is expected to field questions from the graduate advisory committee. These questions can range from ones specific to the presentation to questions about the broader research topic and related areas of environmental science. Questions also may focus on material covered in relevant graduate coursework. This part of the defense is intended to allow the graduate advisory committee to assess the student's understanding of the topic, comprehension of its relevance to the broader field, competency and professionalism as an environmental expert, and communication skills.

2.7 Evaluation of Distance Education Programs

At present, the MS ESC program and all coursework involved in it are mainly delivered in face-to-face learning, except during the COVID-19 pandemic. UTC has recently expanded its online and hybrid course and program offerings. Four graduate programs are offered by UTC fully online (Doctorate of Nursing Practice, Master of Science in Criminal Justice, Master of Science in Engineering Management, Professional Master of Business Administration) and two graduate programs are offered in hybrid mode (Doctorate in Learning and Leadership, Master of Science in Nursing Nurse Anesthesia Program). BGE offers some undergraduate courses fully online and a handful of cross-listed graduate courses are fully online (BIOL 4460/ESC 4460/ESC 5460 Global Change Biology) or are listed as a hybrid (BIOL 4310/ESC 5010R Behavioral Ecology). We have not been specifically asked to consider the potential for development of more online graduate courses. Due to the nature of the program requiring field work, we rely primarily on face-to-face learning. To ensure the quality of its online offerings, UTC participates in the Quality Matters program and faculty who teach online courses can complete training to apply the Quality Matters rubric.

2.8 Innovations that Advance Student Learning

The [Walker Center for Teaching and Learning](#) (WCTL) supports the strategic planning and academic initiatives of UTC to facilitate excellence in instruction by providing information, learning sessions, and consultation in the areas of teaching, learning, and technology integration. Faculty in the MS ESC programs are encouraged to engage in professional development opportunities sponsored by the Center. Some of the opportunities in which our faculty have participated in the past five years have included the UTC Instructional Excellence Conference, Think Achieve Faculty Fellows and WCTL Teaching Fellowship programs, and course redesign and technology training workshops.

2.9 Assessment of Curriculum Strengths, Weaknesses, and Recommendations for Change

Our graduate program is strong, as evidenced by our stable enrollment, graduation rates, post-graduation placement in environmentally based jobs, and student-authored peer-reviewed publications and professional presentations. While the physical journal holdings in the University library may be limited, the inter-library loan service allows students to access publications they need for their classes and major projects. The courses our graduate students take are rigorous and provide the students with a solid foundation of major concepts in environmental science, as well as enhancing methodological, analytical, and critical thinking skills. Course offerings are diverse enough and frequent enough that students can complete the classroom portion of the degree in a timely manner with some students earning a master's in just 12 months. Our faculty possess degrees appropriate to the discipline, and the diversity of research interests ensures that students can find advisors and committee members who align with their interests,

which facilitates expedient completion of the program and ensures students will gain the knowledge and competency in their specific area of interest.

While our program is strong, there are areas where it can be improved. One such deficiency is the number of teaching assistantships. We currently have funding for seven graduate assistantships which is a significant decrease since our last self-study (11 GTAs in 2017). The significant reduction in graduate assistantship support from the UTC Graduate School leads some applicants to other programs with guaranteed financial support. GTAs teach introductory biology and environmental science labs. Additional assistantships would give students the opportunity to teach upper-level laboratories, which could enhance their ability to enter a doctoral program or get hired into the workforce. The stipend is also barely adequate to meet student expenses, even with the accompanying tuition waiver. Increased stipends would help attract students and relieve economic burdens they face and make our program even more competitive.

Another shortcoming in our program is space. The space limitation applies to faculty research lab space and the lack of shared core facilities that could be utilized by a faculty member's students. While the recent Holt Hall renovation has helped alleviate some of the space concerns, there are still valid space concerns, especially related to the potential for future growth.

One final need is additional faculty to broaden the scope of our program. For example, we have many faculty whose interests and research have an ecological focus, but we only have two faculty with a background in environmental law or policy. One of the people is currently our Environmental Science Graduate Programs Director, who advises 11 of the program's current students. This deters students interested in careers related to environmental law and policy from entering our program. Similarly, we only have two people in the department qualified to teach courses in Geographic Information Systems and Remote Sensing. One of these is currently serving as our Environmental Science Graduate Programs Director. Training in these areas is extremely useful and marketable, and additional faculty with such expertise would allow us to expand our course offerings and research opportunities. Our undergraduate ESC degree requires an introductory GIS course, but at present, we do not have enough faculty to require a graduate GIS course. Many of our students are interested in wildlife and fisheries management because they have an interest in careers in wildlife conservation, however we lack the faculty to effectively mentor or attract those students. In turn, those potential students eventually apply to other programs to continue their education and that represents a revenue loss for UTC.

The most significant recommendations we can make are the construction of an up-to-date science building, substantial investment in research equipment, and an increase in the number and stipend for teaching assistantships. A new science building with state-of-the-art equipment would solve our department's space and equipment needs, enhance both our undergraduate and graduate programs through improvements in teaching and research ability, and attract new faculty. As previously stated, more and better paying assistantships would attract more students and make us more competitive with peer institutions.

We are also considering requiring a comprehensive examination for students to further demonstrate mastery of the discipline. We feel this change might appeal to many people, particularly those involved with environmental consulting, government agencies, and secondary education.

3 Student Experience

3.1 Peer Group Size

Enrollment in the MS ESC program has ranged from 27-38 students during fall semesters, with an average enrollment of 32 students during the past five years. This is the same as our last review in 2017-2018. Our enrollment continues to provide a critical mass of students necessary to develop appropriate peer groups. Students are a collegial and tightly knit group, with good working relationships. In total, 85 students were enrolled in the MS ESC program during the past five years (i.e., from fall 2018 through summer 2023). Of these students, 41 graduated from the program, (in an average of ~7 semesters), 25 exited the program without graduating, and 19 are still currently enrolled in the program along with 12 new students who entered the program in Fall 2023.

Reasons for leaving the program are not always known and are varied; in conversations with the Graduate Program Director and/or their graduate advisors, some students cited personal/family issues, financial constraints, or decisions to pursue employment opportunities or switch to other fields of graduate study. A greater study of exactly why students leave the program may be warranted in the future.

The UTC Graduate School allows students to take up to six years to complete the program, which also facilitates the enrollment of students with full-time employment. Most of the core courses in the MS ESC program and some electives are designed to accommodate students who work full-time by being scheduled in the evenings. The inclusion of non-traditional students, along with a mix of graduate students with varying science backgrounds (i.e. environmental science, biology, chemistry) and even the occasional non-science background graduate student (in years past, we have had philosophy and even English Expendituress), promotes and reinforces the interdisciplinary nature of the graduate program and ties together different peer groups.

The MS ESC program has attracted students who earned their undergraduate degrees at UTC, due to some combination of their familiarity with the institution, the Department, its faculty, and the local area. About 45% of the current MS ESC student body earned their undergraduate degrees from UTC, the vast majority as Biology or Environmental Science majors. The remaining 55% earned their undergraduate degrees primarily from other institutions in Tennessee or other states in the southeastern U.S. (typically Austin Peay State University, Berry College, Clemson University, Covenant College, Dalton State College, Maryville College, Tennessee Wesleyan University, University of Tennessee at Knoxville). The percentage of current graduate students who have earned their undergraduate degrees from UTC is high for our program. Our previous program review self-study described that ~45% of MS ESC students had earned undergraduate degrees from UTC. Observably, once students enter the MS ESC program, their associations with their peers are not influenced by whether they attended UTC as undergraduates, as all students seem to interact in a collegial manner.

There has been some pressure to grow the size of the MS ESC program. Increased graduate enrollment across campus is a primary goal listed in the UTC Graduate School Strategic Plan. While the program has historically been at or near capacity due to faculty advisement loads and space/resource limitations, steps have been taken to recruit new students and increase overall enrollment. The Graduate Director has worked hard on recruiting, through tabling and by reaching out to those institutions that typically supply new graduate students to our program. It should be noted that the expertise and interests of some BGE faculty members do not align well with the MS ESC program (even given the interdisciplinary nature of environmental science), and this has also worked to limit overall enrollment to some degree. In recent years, a non-thesis coursework option was added to increase enrollment without significantly impacting faculty advising workloads. The non-thesis option still requires 36 hours with six of those being experiential and to date, it has not significantly increased overall enrollment. Nor has it significantly decreased faculty advising workloads, as properly advising non-thesis students still requires a significant time investment if done properly. It has facilitated the movement of students through the MS ESC

Program in a timelier fashion, which has impacted total overall enrollment due to some students graduating faster, thereby making the prompt replacement of those students even more crucial.

Despite the program currently being at or near capacity, increased MS ESC enrollment could have the added benefits of making it more feasible to offer new graduate level only course options and increasing the likelihood the program would receive additional Graduate Teaching Assistants. At the very least, increasing enrollment would prevent the loss of Graduate Teaching Assistants in the future. Our Graduate Director and Department Head have continued to advocate for GTAs to support our students.

With the completion of the Holt Hall renovations in 2019, we can provide more space for graduate students to meet, work, and converse. We now have dedicated student spaces in Holt Hall, one of which is a limited access graduate student lounge (Holt 209) and the other office for the graduate teaching assistants (Holt 210).

Uneven advisement loads continue to be an important factor to consider. The Graduate Director continues to carry most of the advisement burden for the program along with two to three other key individuals. In short, a wider range of faculty needs to recruit and advise graduate students. One idea that the program may consider helping alleviate this issue is to raise admission standards for students, which could improve the efficiency with which students complete the program. However, a more selective program could potentially disrupt overall enrollment in the short term. We have revised our admission process to require applicants to identify an advisor before being accepted into the graduate program to help students start on their capstone experiences earlier in their program of study. In the past, many students completed their core and elective coursework prior to making considerable progress on a thesis or internship or some other experiential venture. The change in admission procedures requiring applicants to secure a faculty chair prior to applying may have unintentionally made it more difficult for prospective students to be admitted to the program, but eventually should prove to be better for the student, by allowing for a smoother completion of the program. Certainly, non-thesis students must identify an advisor prior to admission. We also have updated the MS ESC Graduate Program Guidebook ([Appendix 0-A](#)) to help ensure that policies, procedures, requirements, and deadlines are clear to our students. Beyond this, students are always referred to the UTC Graduate Catalog, and encouraged to be familiar with its contents.

3.2 Opportunities to Evaluate Curriculum and Faculty Quality

Each semester, students are given the opportunity to evaluate their learning in their courses, except contract courses such as thesis, dissertation, independent study, clinical, co-op, exchange, and student teaching. The Office of Accreditation and Assessment (OAA) administers the course learning evaluations using online survey software. Additional questions may be added by departments. The questions in each area are shared in Table 3.1.

Table 3.1: Course Learning Evaluations

Focus Area	Questions
Course Learning Outcomes	1. I have read and understand the course learning outcomes in the syllabus and/or in Canvas. 2. The course content addresses the course learning outcomes. 3. The course structure (organization) helps me in achieving the course learning outcomes. 4. I believe that I am achieving the course learning outcomes.
Student Contributions to Learning	1. I keep up with all course readings and the work assigned. 2. How much time outside of class do you work each week? 3. How many classes did you miss? 4. In this class, did you use any of the following resources (Choose all that apply)?
Course Content and Delivery	1. The course encourages my use of critical thinking skills. 2. The way this course is delivered encourages me to be actively engaged. 3. Please mark all types of pedagogy that were used in the course. 4. Please list components of this course not listed above that assisted with your learning.
Course Instruction	1. The instructor assists students with achieving the course learning outcomes. 2. The instructor provides constructive feedback on graded coursework. 3. The instructor responds to questions and emails within the time frame stated in the syllabus.
Course Changes and Improvements	1. What are the strengths of this course? 2. What changes, in any, would you make to the course that would aid in your learning?

Course learning evaluations are opened to students three weeks prior to the last day of regular classes (and close before final exams begin). Students are emailed with instructions on how to access course evaluations through the student MyMocsNet portal. They have until the end of the last day of classes to complete their ratings.

After final grades are due, course learning evaluation results are available to faculty. Results are only available for classes with five or more responses or at least a 50% response rate.

These data are reported by faculty in their annual performance reports and are used to improve course instruction for following semesters. In their performance reports, BGE faculty must report and reflect upon these results, and are recommended to make comments on how they plan to address strengths and/or weaknesses in the course based on the evaluations. Data are compared with College of Arts and Sciences and university results. These data are also summarized for courses and instructors and made available to students through their MyMocsNet portal. Course learning evaluations results for 2018-2023 are reported in **Section 4.1.3**.

3.3 Professional Development Opportunities

3.3.1 Student Presentations

The MS ESC program encourages students to join professional organizations and attend meetings and conferences. The BGE Department supports this travel by covering the cost of registration up to \$250. The UTC Graduate School will award \$500 for travel each semester to support graduate students presenting results of their research at regional and national-level meetings. This funding is almost guaranteed if the students show the abstract acceptance. The application can be found [here](#). Individual faculty also regularly encourage MS ESC students to apply for travel awards provided by professional organizations to which they belong. Our graduate students have been successful in past years in obtaining grants from the UTC Scholarship, Engagement of the Arts, Research, Creativity, and Humanities Award Program (SEARCH). This annual funding can support traditional research, field travel, and conference travel for its dissemination in professional venues. In total, MS ESC students have received 18 SEARCH Awards since 2018.

3.3.2 Student Publications

Many of our thesis-track students give oral or poster presentations of their work at professional conferences during their time in the program, and some publish and/or co-author refereed articles based on their graduate studies. The Office of Research and Sponsored Programs at UTC has sponsored an annual campus-wide event, [UTC Spring Research and Creative Arts Conference](#), to showcase research on campus; many of our students participate in this event. During the current review period, graduate students gave 91 academic and scientific presentations at professional conferences and through opportunities provided on campus. They also published 38 peer reviewed publications. This is a mixture of both thesis and non-thesis students. These data are reported in [Appendix 4-M](#) and [Appendix 4-N](#). While we are pleased with the high activity of our students in presenting their research, we would like to see more students generate refereed publications from their work.

3.3.3 Student Clubs

[Graduate Student Association \(GSA\)](#) serves as the official voice of the graduate and professional students at UTC. In addition to advocating for this population of students, GSA supports professional development and sponsors activities to engage members. There are also a variety of student organizations on campus. More information on campus student clubs can be found on the [MocSync Portal](#). BGE supports a wide array of student clubs and organizations, and these groups help expose students to professional and career opportunities appropriate to the field. Participation also ensures that students are exposed to diverse perspectives and experiences through extracurricular activities, but it is mainly undergraduates that take advantage of these opportunities. A handful of graduate students have benefited from at least one BGE student club over the last few years. BGE Clubs that would be relevant to the graduate students include:

- **ASPRS Chapter:** The University of Tennessee at Chattanooga (UTC) Chapter of the American Society of Photogrammetry and Remote Sensing (ASPRS) is an administrative sub-unit of the Mid-South Region. The purpose of the Chapter is to function in support of the Region and Society as outlined in Article II of the Society Bylaws. This chapter provides the students of BGE and UTC with the opportunities: (1) to advance scientific knowledge in the various disciplines of photogrammetry and remote sensing including, but not limited to, aerial surveying and mapping, photo interpretation, spatial information management, and the related sciences in furtherance of the public welfare and in the interests of those who practice in the profession and those who use its services and products; (2) to encourage public programs relating to photogrammetric and remote sensing endeavors such as mapping, charting, cadastral surveying, and resource and environmental surveys and studies, working with governmental and private organizations in furthering such programs; (3) to foster understanding and cooperation and to

expedite the exchange of knowledge and ideas among the members of the Society and with those of other national and international organizations with similar or related interests; (4) to contribute to the education of the general public about the nature of, and benefits to be realized from, the products and services provided by the profession; (5) to further the national and international recognition and understanding of the profession and its various disciplines; (6) to establish and maintain a code of ethics for the profession; (7) to establish and apply standards for competence and performance for the various disciplines represented in the Society as appropriate to the welfare of the general public; (8) to hold meetings for the exchange of scientific and technical information and for the exhibit of products and services; (9) to encourage, publish and distribute books, periodicals, treatises and other scholarly and practical works applicable to the disciplines in the Society; (10) to encourage and support education programs essential to the development and maintenance of the profession; and (11) to recognize and honor the leaders of the profession.

- Association of Southeastern Biologists, Geological Society of America: Students in the program are encouraged to become student members of the Association of Southeastern Biologists (ASB) or Geological Society of America (GSA), depending on their disciplinary area. Annually, our department sends 8-12 students (graduate and undergraduate) to ASB and GSA meetings. At meetings, students may attend career, diversity, or workshop-like luncheons, meet with professionals working in their respective fields of interest, interact with and learn about prospective employers, and meet potential graduate school mentors. Even more, many students gain the confidence to talk with other professionals and this reinforces their confidence and future interview ability.
- Ecological Decisions for a Global Environment (EDGE): EDGE promotes sustainable living on the UTC campus and greater Chattanooga area. The club fosters interactions among faculty, students, environmental professionals, and the community to promote discussions on management, conservation, and sustainability. EDGE is open to all majors and meets every other Tuesday during the fall and spring semesters. EDGE hosts events like Compost-O-Ween, where every fall, pumpkins are collected from the general community for composting. EDGE also hosts litter clean-ups throughout Chattanooga and surrounding areas. EDGE promotes sustainability on campus through supporting recycling, composting, and clean energy. EDGE is a voting member of the Environmental Task Force responsible for dispersal of Green Fee Funds.
- GIS Club: The purpose of University of Tennessee at Chattanooga (UTC) Geographical Information Systems (GIS) Club is to engage the students of UTC to accomplish the following geospatial technology related activities: (1) to advance scientific knowledge in the various disciplines of GIS and remote sensing including, but not limited to, digital mapping, image/photo interpretation, spatial information management/analysis, and the related sciences in furtherance of the public welfare and in the interests of those who practice in the profession and those who use its services and products; (2) to encourage public programs relating to GIS and remote sensing endeavors such as mapping, charting, cadastral surveying, and resource and environmental surveys and studies, working with governmental and private organizations in furthering such programs; (3) to foster understanding and cooperation and to expedite the exchange of knowledge and ideas among the members of the club and with those of other national and international organizations with similar or related interests; (4) to serve the members and the public as a central source of information, reference, and consultation on the disciplines represented in the club; (5) to contribute to the education of the general public about the nature of, and benefits to be realized from, the products and services provided by the geospatial profession; (6) to further the national and international recognition and understanding of the geospatial profession and its various disciplines; (7) to establish and maintain a code of ethics for the profession; (8) to hold meetings for the exchange of scientific and technical information and for the exhibit of products and services related to different state of the art geospatial technologies; (9) to encourage, publish and distribute books, periodicals, treatises and

other scholarly and practical works applicable to the disciplines in the campus student community; (10) to recognize and honor the leaders of the profession.

- **Wildlife Zoology Club:** The Wildlife Zoology Club helps ensure that graduate students (at least those that are interested) are exposed to professional and career opportunities appropriate to the field. Participation in the Wildlife Club likewise helps ensure that interested graduate students are exposed to diverse perspectives and experiences through extracurricular activities.
- **The UTC Wildlife Zoology Club (WZC)** was established as a departmental and UTC club in 2012. The club has been quite popular and successful throughout the years and has exposed interested students to a wide variety of experiences such as service projects at wildlife rehab facilities, birdhouse builds, behind the scenes field trips at zoos, a wetland restoration project, departmental service projects, and community outreach initiatives. The club has likewise been active in hosting wildlife-related speakers. The most notable feature of the UTC WZC is that it is now an official student chapter of the internationally known Wildlife Society, which is perhaps the oldest and most important wildlife organization in existence. All officers must be paying members of the Wildlife Society. For three years, the Club operated under the guidance of The Wildlife Society as a probationary chapter (20-21, 21-22, 22-23). To be an official student chapter, the WZC was required to meet all Wildlife Society deadlines, submit the necessary financial and annual reports, and host a speaker that was also a member of the Wildlife Society each year. Across the last three years, the WZC hosted Jamie Feddersen, Tennessee Wildlife Resources Agency Certified Wildlife Biologist, who talked about mallards and migratory gamebirds, Jeremy Hooper, Tennessee Department of Environment and Conservation, who talked about urban coyotes, and Erin Patrick, Wildlife Society Tennessee Chapter President and Knoxville District Supervisor of USDA Wildlife Services, who talked about her experiences in the field and a variety of career opportunities through the US Department of Agriculture. Soon, the WZC will host Tish Gailmard, American Red Wolf SAFE Education Task Force and Reflection Riding Arboretum, who will speak about red wolves. The most notable task completed by the WZC in the last year was their participation in the annual Wildlife Society Southeastern Conclave at Cleveland State Community College. Colleges and universities from across the southeast competed in quiz bowl and other wildlife-focused events. This was the first Conclave for the UTC WZC and an important networking event. The WZC Conclave team was entirely female and comprised mostly of Environmental Science majors. The team had a respectable showing in telemetry, archery, and rifle. The WZC continues to be an important avenue through which graduate students interested in wildlife-related careers can make contacts, learn about employment opportunities, and network, while gaining exposure to diverse individuals and perspectives. It would be beneficial for all involved if our graduate students were even more active with this important departmental organization.
- **Women in Natural Sciences (WINS):** WINS student organization supports women who are pursuing careers in the natural sciences through a variety of educational, mentoring, networking, and community-building opportunities. Led by student officers and advised by BGE faculty, WINS delivers programming and participates in outreach activities each semester that promote the achievements of women scientists and highlight the challenges and rewards associated with being a woman in science. Examples include topical monthly meetings, tabling events during Women's History Month, movie screenings, and participation in relevant Chattanooga community events. During the 2023-24 academic year, WINS is planning to sponsor a symposium during Women's History Month at the Association of Southeastern Biologists meeting in Chattanooga that will feature UTC women scientists describing their current research in biology and how it has been inspired by the past work of women in the field. Through this symposium, WINS aims to elevate the significant and diverse contributions of women in the biological sciences to a broad audience.

3.3.4. Internships

Students in the MS ESC program who are engaged in internships for their capstone experiences are typically placed in positions at agencies and in firms that provide real career advancement potential. While the specific skill set that a student will learn and practice varies for different internship settings, these positions all require students to practice effective communication. Sometimes, internship experiences turn into full time jobs for recent graduates of the MS ESC Program, and this is always a positive and encouraging outcome.

3.3.5 Seminar

Most of our students are required to take a two-semester seminar sequence as part of their core course requirements (i.e., ESC 5700 Seminar I, ESC 5710 Seminar II). The focus of this sequence is to engage students in discussions of effective research and scientific communication skills, as well as scientific responsibilities and ethics, toward advancing their professional development. There are also two major assignments in the seminar sequence where students are required to build a dossier for a potential job, evaluate their academic path, and develop a strategy to be hired in those types of positions. During the spring semester, seminar students practice interview skills, develop a cover letter with an objectives statement, write a professional CV, draft letters of reference, and this all culminates in a mock job interview, professional presentation, and being able to successfully answer questions from a mock interview panel. Those pursuing the MS in Environmental Science are required to take these courses; those in the MS in ESC: Environmental Management and Administration are not required to take Seminar I and Seminar II. Even so, they are encouraged to attend, at least for the first few weeks. This is when a lot of procedural information is addressed, which always proves to be important for all graduate students associated with ESC.

3.4 Scholarly Enrichment Opportunities

As described in the previous section (see Section 3.3), we encourage students in the MS ESC to join professional organizations and attend their meetings and conferences as opportunities for scholarly enrichment. On campus, the Graduate Program encourages students, both graduate and undergraduate, to attend routinely scheduled graduate defenses. This is accomplished in part through the requirement that defending graduate students give notice of their defense and advertise their defense well in advance of the actual date. Also, any department sponsored talks are shared through social media, on televisions in the buildings, and through email. Students of all levels are encouraged to attend.

3.5 Diverse Perspectives and Experiences

A core component of the BGE strategic plan is to expand and enhance diversity and inclusivity in the sciences. We have identified three broad areas to focus our efforts: 1) increase and maintain diversity and inclusivity within our department, 2) expand and enhance cultural and intellectual diversity, and 3) implement training and policies to prevent bias and discrimination. The following highlights some of the department's achievements to date in these areas.

3.5.1 Increase and Maintain Diversity and Inclusivity within our Department

The BGE department has tried to recruit and retain diverse faculty, staff, and students who offer different perspectives and help create a more inclusive environment. The BGE department consists of 38 full-time faculty and staff members. Of the staff, all three (3) are women. BGE faculty members consist of 21 women and 17 men and of those individuals, five (5) women and three (3) men represent members of the BIPOC community. Recently, the BGE department participated in the Institute of Teaching and Mentoring (ITM) conference with Academic Affairs. The ITM Conference hosts the largest gathering of underrepresented doctoral scholars. Additionally, BGE members have participated in outreach and

speaking engagements at local middle and high schools to build connections with local students and have mentored undergraduate students through the TRIO program.

In 2021, the BGE department implemented a climate survey with the aim to “...identify, challenge, and eliminate practices that are barriers to full inclusivity and equity in our learning community.” The survey was administered and reviewed by Dr. Alex Zelin (formerly in UTC Psychology). A total of 200 students participated in the survey and the majority identified as female, women, white, heterosexual, and not having a disability. Findings from the survey showed that students had an overall favorable view of the department as a welcoming place for diverse students. The BGE climate was perceived as welcoming, supportive, inclusive, and accepting of people with multiple identities. Areas of improvement, as indicated by the students, included increasing hiring of diverse faculty and the inclusion of diverse researchers through assignments and research presentations. The DEI committee has used the findings from the survey to evaluate and adjust current conditions.

3.5.2 Expand and Enhance Cultural and Intellectual Diversity

The BGE department has also created faculty committees that focus on informal education activities and public engagement that expose students to diverse perspectives and cultivate an inclusive, welcoming environment. The Diversity, Equity, and Inclusion (DEI) Committee aims to organize and promote meaningful action in BGE to ensure equity, inclusion, and participation of our Black, Indigenous, and people of color (BIPOC) students, faculty, staff, and other colleagues. The DEI Committee and the Social Media Committee have implemented diversity awareness campaigns that highlight the scientific contributions of individuals from diverse backgrounds. For example, the ‘This is What a Scientist Looks Like’ series uses the Holt Hall hypersign televisions to highlight diverse scientists in various fields in biology, geology, and environmental science.

During the 2020-21 academic year, the DEI committee coordinated a DEI seminar series with the aim of introducing students to diverse research interests and perspectives in the areas of Indigenous science education, Black studies, evolutionary ecology, geology, and urban ecology. The department hosted six seminar speakers virtually.

Table 3.2 Guest speakers and areas of expertise for the 2020-21 DEI Seminar Series

Speaker	Institution	Area of Expertise	Seminar Topic
Dr. Stephanie Masta	Purdue University	Indigenous education	Inclusivity in the classroom
Dr. Michelle Thompson	City College of New York	Black Studies	Diversity and inclusion for BIPOC in Higher Education
Dr. Elaine Swafford	Chattanooga Girls Leadership Academy	Educational consultant	
Dr. Henry Bart	Tulane University	Evolutionary ecology	
Dr. Gregory L. Easson	University of Mississippi	Geology & Geological Engineering	Diversity in Geosciences
Dr. Chris Schell	University of California - Berkeley	Urban Ecology	The ecological and evolutionary consequences of systemic racism in urban environments

3.5.3 Implement Training and Policies to Prevent Bias and Discrimination

Due to the passage of the Tennessee Divisive Concepts Act, higher education institutions in Tennessee can no longer require diversity statements in job applications nor require bias training. However, the BGE department has created opportunities for interested faculty to participate in cultural competence sessions to help individuals understand and respect the perspectives and experiences of others. For example, monthly brown bag lunch sessions serve to facilitate discussion among faculty members on ways to engage with local community members. The department has invited experts from various groups on campus to faculty meetings to learn about the diverse needs of our students (i.e., Center of Women and Gender Studies, Disability Resource Center).

3.5.4 Works in Progress

To date, the BGE department has identified the following tasks for the upcoming years to cultivate a welcoming and inclusive environment:

1. Consider the revision of departmental bylaws to emphasize the importance of collegiality,
2. Coordinate a Black History movie night with Multicultural Affairs and the Africana Studies Program,
3. Organize a seminar series featuring diverse scientists and researchers in areas of biology, geology, and environmental science, and
4. Administer a follow-up climate survey to assess progress.

3.5.5 Diversity in Recruitment

Students currently enrolled in the MS ESC program include many from historically underrepresented groups in the natural sciences. At present, 60% of our students are women and 20% identify as representing racial and/or ethnic minority groups. At the program-level, we have not initiated a recruiting

program to target students who represent minority groups; however, individual faculty members who are active in the MS ESC program have included the targeted engagement of students from underrepresented groups in research as broader impacts associated with externally funded projects. However, our program-level recruitment of a more diverse group of graduate students could be improved.

3.5.6 Diverse Opportunities in Internships and Research

MS ESC students conducting theses are engaged in research projects and acquire credentials suitable for entering a terminal degree program at another institution. In addition, thesis students are well prepared for entry into the work force, particularly into positions requiring laboratory or field skills. Students who opt for the non-thesis track and work internships for their capstone experiences also are well prepared for employment in the field upon graduation (again, as evidenced by those internships sometimes leading to full-time employment opportunities).

The MS ESC faculty collaborate with local, national, and international partners, providing MS ESC students with a broad range of projects, educational opportunities, and networking both locally and abroad. Local collaborations include work with the City of Chattanooga, Chattanooga Zoo, Cherokee National Forest, Erlanger Hospital, North Chickamauga Creek Conservancy, Reflection Riding Arboretum and Nature Center, Tennessee Aquarium, Cumberland Trails Conference, Tennessee Valley Authority, Tennessee Department of Environment and Conservation, Tennessee Wildlife Resources Agency, and Tennessee River Gorge Trust. The friendly relationship between our program, government agencies, and local organizations has been beneficial and has supported numerous thesis projects and internship experiences and even non-thesis experiential learning opportunities. Our Graduate Faculty members also collaborate with researchers at a wide range of universities in Tennessee and other states. Several BGE Graduate Faculty members have international collaborations, including collaborations in Australia, Chile, England, France, Italy, India, Vietnam, and Switzerland.

3.6 Academic Support Services

Students enrolled in the MS ESC program at UTC have access to various campus resources to support

UTC has a state-of-the-art library that provides access to 400,000+ print and online materials, relevant databases, and discipline-specific journals. All items are available to current UTC students, faculty, and staff for check out and many resources can be accessed online from home via the library catalog, which can be searched from their homepage at <https://www.utc.edu/library>. The library provides access to information in every format available from books, e-books, audiobooks, and journals to online databases, digital image collections, CDs, and DVDs. Inter Library Loan (ILL) is effective at getting resources not owned by UTC. Articles are usually shared within 24 hours in PDF format. Book and other hard copy documents arrive within 3-7 days. The Library Studio can help with various technological needs. The space has an audio suite, video/photography suite, 3-D printing, and media tables. Students and faculty can also check-out equipment such as professional cameras, GoPro's, camcorders, camera lenses, external microphones, gimbals, stabilizers, recorders, recording cubes, lighting, backgrounds, tripods, music and recording gear, presentation gear (projector, speakers, screens), power stations, and portable disk drives. The library provides access to small and large study rooms, a computer classroom that can be reserved for instructional purposes, presentation rooms, and conference rooms. Chapel Cowden, one of the library faculty, is assigned as our liaison. She regularly visits the department and reaches out about resources available for the sciences. She can also provide instruction and research support. The library also offers a program called Affordable Course Materials Initiative (ACMI). This yearly grant support helps faculty identify electronic resources to use for their classes. The library will either purchase e-materials to be linked online or help faculty find other available OER resources for their program of study. The library faculty will also meet with graduate students to help direct them in literature searching, solving research questions, and reference management. The library also houses a Graduate Student Lounge exclusively for

use by graduate students. Holt Hall also houses a graduate student lounge for MS ESC students' exclusive use, as mentioned previously.

The Center for Wellbeing supports the personal and academic growth of our students by cultivating a well and safe campus community. The center encourages life-long wellbeing by promoting healthy coping skills, a culture of care, risk reduction and wellness. Focus areas include mental health awareness, suicide prevention, substance abuse education, sexual assault, dating violence and stalking prevention, support for students in recovery, and physical health, sexual health, and nutrition.

The Counseling Center is available to university students for a wide range of services. The Center provides free counseling to students who need help with anxiety, depression, adjustment issues, relationship problems, substance abuse, crisis intervention, trauma, and academic concerns. Intake meetings with staff are available by appointment or on a walk-in basis. The center provides individual and group sessions to provide the help that students need with their issues. These sessions focus on helping the student gain the skills and abilities needed to better cope with the issues they might be facing. The Center also provides crisis services to assist students with traumatic events, thoughts of suicide, thoughts of harming others, and psychotic episodes. Additionally, the center provides psychiatric support, including referrals for psychiatric services and medications, and medication management. Through the center, students have access to free mental health apps such as Sanvello and What's Up. The UTC Counseling Center occasionally partners with local organizations to bring Emotional Support Animals to campus for special events.

The Disability Resource Center (DRC) provides access and accommodations for students with documented disabilities across all courses and majors. These accommodations ensure that students with disabilities have the same level of access to the courses that they are taking. The DRC provides a range of services, including assistive technology and classroom, exam, and housing accommodations. Students can make a request for services at any time during the academic year. The DRC also directs the MOSAIC program, which is designed to aid and support students with Autism Spectrum Disorders.

The Center for Leadership and Career Development provides UTC students and alumni with the confidence and skills to find their purpose, thrive in their career, and contribute to their communities. They offer programs such as 'What can I do with my major?' and job search engines such as 'Handshake' for alumni and students. The Career Development Alliance is a community of members from across UTC with a vested interest or connection to career services at UTC. The Alliance connects these members to work as resources for each other, sharing ideas, best practices and working to develop better career services development for all UTC students. Finally, they hold events for career success, such as 'tips for a successful career' event.

[Information Technology](#) (IT) manages access for all students to UTC's online services (MyMocsNet, UTCLearn) and email accounts (MocsMail+) and provides technological support. IT also provides free software (O365) for students to install on their computers. Software options also include the popular statistics packages SPSS and SAS, which often are used by MS ESC graduate students conducting empirical research. The bibliography management program Endnote also is available to current UTC students at no cost. Endnote is popular among MS ESC graduate students writing theses because UTC thesis standards require that bibliography management software be used.

The Interdisciplinary Geospatial Technology Lab (the IGT Lab) provides UTC and the surrounding community expertise and support in spatial thinking, GIS data collection and management, spatial analysis, cartography, and GIS application development, along with consultation and project management services. The Lab also connects faculty and graduate students with community partnerships that provide students unique real-world GIS learning opportunities through internships, applied research and sponsored projects, and its partners with GIS and cartography support.

3.7 Assessment of Student Experience Strengths, Weaknesses, and Recommendations for Change

The MS ESC Program has multiple strengths related to student experience. The ESC Graduate Program is more versatile than ever, and more likely to be competitive with similar programs, given that we now offer an Environmental Administration and Management Degree, and not one but two new certificate programs (one in Environmental Science and another in Climate Science). JUMP (TADPOLES) is also a promising change.

- The program has experienced stable enrollment during the review period, with an average semester enrollment of 32 students during the past five years.
- Most core courses in the MS ESC program and some electives are designed to accommodate students who work full-time by being scheduled in the evenings.
- Student enrollment includes a healthy mix of UTC graduates, graduates from other universities, non-traditional (working) and traditional students (full time), and gender diversity.
- Enrolled students come from various academic backgrounds, complementing the interdisciplinary nature of the program and the environmental science discipline.
- Students must secure a graduate mentor prior to acceptance into the program. This is helping student progression in the program.
- Teaching quality is high as measured by student evaluations, peer mentoring, and institutional faculty review processes (EDO, Reappointment, Tenure, Promotion, and Peer Mentoring). These same processes provide mechanisms to address any teaching problems that might exist.
- UTC has several funding programs (Graduate Student Association and SEARCH Awards) to support graduate student research, travel, training, and presentation of research. The department also supports graduate students (travel, research, publication fees, etc.) ad hoc.
- UTC has strong and easily accessible programs for students with disabilities or needing counseling.
- Program faculty strongly encourage students to present and publish research results, and many students do so.
- Graduates are well prepared for success in employment or additional graduate study, as evidenced by actual job placement and admission into graduate programs.
- The recent Holt Hall renovation has allowed for more spaces dedicated to ESC Graduate Students.

Weaknesses of the program and recommendations for change include the following:

- On average, about five students per year have left the program during the past five years. The department is considering conducting exit interviews of students that leave the program to determine what things can be done to increase retention.
- Program size is constrained by the number of faculty mentoring graduate students. Increasing program enrollment could increase the likelihood the program would receive additional university funded graduate assistantships or at the very least prevent additional loss of such assistantships, and support offering of additional dedicated graduate courses. Additional faculty need to take the initiative and recruit and advise more graduate students if they are going to retain the graduate faculty designation.
- Minority and international student enrollment are low. The program is considering target recruiting to increase minority and international enrollment.

4 Faculty

4.1 Faculty Credentials and Quality of Teaching

The UTC Faculty Handbook, the CAS Bylaws and the BGE Bylaws govern our faculty. These documents can be found in [Appendix 4-A](#), [Appendix 4-B](#), and [Appendix 4-C](#), respectively.

4.1.1 Full-time Faculty Credentials

In Fall 2023, the Department has 35 full-time faculty members. There are two additional tenured faculty members with full-time administrative appointments and a faculty member with dual appointment in Computer Science, all who have limited teaching responsibilities in BGE. In addition, the BGE Department Head is a tenured faculty member from another discipline (Chemistry). A detailed breakdown of the 35 full-time faculty is as follows:

- 21 Tenure Track (TT): 18 BES and 4 Geology
- 11 Non-tenure Track (NTT): 9 BES and 2 Geology
- 3 Non-Tenure Track Who are Visiting Faculty: all BES

Twenty-nine of the full-time faculty are in the Divisions of Biology and Environmental Science and six of the full-time faculty are in the Division of Geology. Several of the NTT faculty also serve additional roles as lab coordinators, including the Anatomy/Physiology Lab Coordinator, the Microbiology Prep Lab Coordinator, and the Introductory Biology Lab Coordinator. Among the full-time faculty, 26 possess terminal academic degrees, including 24 PhD's, one EdD, and one JD/LLM. Current full-time faculty credentials are in [Appendix 4-D](#). Credentials for administrators with tenure in BGE are listed in [Appendix 4-E](#). Credentials for full-time faculty who have left the department (retired, resigned, passed away) during the self-study are shared in [Appendix 4-F](#). The educational backgrounds of our faculty represent a broad spectrum, with graduate degrees deriving from institutions across the country and the world.

The Department is in a transitional faculty phase due to the loss of a faculty member to death and two faculty resignations. These were all tenure track faculty. Two of these lines have been temporarily filled with visiting NTT faculty. Two of the open lines are under active searches (Assistant Professor of Applied Freshwater Fish Biology and Assistant Professor of Hydrogeology). The third position was vacated in Summer 2023, and the Department Hiring and Planning Committee is evaluating research and teaching trends to recommend the replacement focus area.

In Summer 2023, Dr. Cheryl Murphy, who served as the Faculty Associate/Introductory Biology Lab Coordinator, left the department to work as the UTC Director of Research Integrity. The position vacancy allowed it to be evaluated and split into two positions. The Faculty Associate was filled with a 12-month staff member who handles ordering, safety, equipment, and space. The Introductory Biology Lab Coordinator position was converted to an NTT faculty line. This happened in July 2023 and due to the short time to the start of the semester, it was filled with a Visiting Lecturer.

The research and teaching interests of our faculty are diverse, allowing the department to serve a wide range of student programs of study in Biology, Geology, and Environmental Science. A detail of faculty expertise can be found in Table 4.1

- Conservation and restoration ecology,
- Ecology, evolution, and behavior,
- Environment and human health,
- Environmental and natural resource law and policy,
- Geographic Information Systems (GIS),
- Human impacts on insect physiology and behavior,

- Microbiology,
- Molecular and cellular biology,
- Organismal biology, and
- Systematics and biodiversity

Table 4.1 Broad areas of expertise among current BGE full-time faculty.

Area of Expertise	NTT Faculty	TT Faculty
Conservation and Restoration Ecology	Reynolds	Aborn, J. Barbosa, Boyd, Craddock, Gaudin, Shaw, Tucker, Wilson
Ecology, Evolution, and Behavior	Caskey, Chapman, Feely, Miles	Aborn, Beasley, Boyd, Chatzimanolis, Craddock, Gaudin, Hayes, Klug, Leasi, Shaw, Wilson
Environmental and Human Health	Adams, Farnsley, Sharma	Giles, Hossain, Leasi, Richards, Spratt, Tucker, Wilson
Environmental & Natural Resources Law, Land Use Planning and Regulation		Richards, Tucker, Wilson
Geology	Bramblett, Ludwig, Shirmeen	Brock-Hon, Gaudin, Hossain, Manning-Berg, Taylor
Geospatial Services	Shirmeen	Hossain, Wilson
Microbiology	N. Barbosa	Giles, Spratt
Molecular Biology and Cell Physiology	Sharma	J. Barbosa, Ferdoush, Giles, Leasi, Spratt
Organismal Biology	Bramblett, Caskey, Chapman, Jarvis, Kinnear	Aborn, J. Barbosa, Boyd, Chatzimanolis, Craddock, Gaudin, Hayes, Klug, Leasi, Shaw, Spratt, Wilson
Systematics and Biodiversity	Bramblett, Caskey	Chatzimanolis, Craddock, Gaudin, Leasi, Shaw, Wilson

We have four faculty members working primarily in Environmental Sciences, including the areas of toxicology, environmental law and policy, human impacts on insect physiology and behavior, and Geographic Information Systems, and many other faculty's research and teaching crosses over into both Biology and Environmental Science. One of our faculty members regularly teaches courses in biostatistics. Three of our faculty members are microbiologists, one faculty member is a developmental biologist, and two have expertise in paleontology. We have four botanists with interests in floristics, Chestnut tree restoration, plant ecology, plant physiology, and higher plant systematics. We have seven faculty members that study animal systems, including insects, amphibians and reptiles, birds, fish, and mammals. We have three faculty members with interests in behavioral ecology. Several members of our faculty are knowledgeable about molecular biology and proficient in employing molecular techniques in their research. Specifically, four of our faculty members employ molecular tools such as: PCR and DNA sequencing to address questions of evolution and biogeography in plants; conservation genetics to facilitate restoration ecology; the identification and functional characterization of genes to determine their influences on nuclear functions such as DNA replication, chromosome segregation and gene expression; and integrating the study of molecular Biology with histological techniques and developmental questions.

In the Geology Division, tenured/tenure-track faculty research and teaching emphases cover the areas of Geology including mineralogy, sedimentology, petrology, structural geology, geomorphology, geobiology, and environmental geology with applications to local, regional, national, and global problems. Faculty research at the local and regional levels focus on the geomorphic development and genesis of landforms across the Cumberland Plateau, the preservation of microbes in silicious rocks of the region, and

monitoring of surface water quality via GIS and remote sensing. In addition to local and regional interests, faculty study arid soil-geomorphology of landforms developed in the southwestern USA. Extraordinary field trips to the Spanish Pyrenees, and Scotland extend our teaching and learning, and research interests to include these areas along with trips to the Desert Southwestern US. Primarily, the faculty in Geology emphasize collaborative research with students in broad areas of geoscience.

BGE faculty members, both NTT and TT, collaborate with local, national, and international partners, providing students with a broad range of projects, educational opportunities, and networking. Local collaborations include organizations such as the Tennessee Aquarium, Erlanger Hospital, Reflection Riding Arboretum and Nature Center, Chattanooga Zoo, Tennessee River Gorge Trust, City of Chattanooga, Electric Power Board, Raccoon Mountain Caverns, and North Chickamauga Creek Conservancy. Our faculty members collaborate with researchers at a wide range of universities in Tennessee and other states. Several BGE faculty members have international collaborations, including collaborations in Argentina, Australia, Canada, Chile, England, France, Germany, Italy, and Switzerland. BGE faculty members have given seminars and conference presentations, participated in workshops, and served on PhD committees in numerous countries.

NTT faculty serve critical roles as lab coordinators in all divisions. NTT faculty also teach large sections of service courses and introductory courses in Biology, Geology, and Environmental Science. They design and teach upper-level classes that fit their educational expertise. Several of the NTT faculty also mentor students through individual studies, internships, and field research.

All faculty participate in departmental and university governance and in departmental, college, and university service activities. New since our last self-study, the College of Arts and Sciences Advising Center (Hub) was created that provides two advisors to conduct academic advising for Biology and Environmental Science students. BES faculty serve primarily as career advisors for students, although many continue to provide some academic advising. Due to the small volume of Geology majors, the Geology faculty serve as both academic and career advisors to students.

4.1.2 Part-Time Faculty Credentials

Twenty part-time faculty members have taught courses for the Department over the past five years. Seventeen of the part-time faculty taught in the Division of Biology and Environmental Science and three taught in the Division of Geology. Among the BES part-time faculty, were three graduate students with 18 hours completed in the discipline. They were supervised by the Faculty Associate while they were listed as secondary instructors. Among the part-time faculty (not including graduate students), five possess a PhD and 12 possess a MS degree. These part-time faculty play a critical role in sustaining high-demand course offerings for introductory, general education courses such as Principles of Biology, Introduction to Environmental Science I, Conservation of Biodiversity, Geology of the National Parks, and Physical Geology. Meeting the enrollment demand aids in the timely graduation of our BGE students as well as other majors across campus. Part-time faculty also serve to alleviate student credit hour production for our full-time faculty, which allows those faculty to advance the Biology, Geology, and Environmental Sciences programs through faculty development, research, career advisement, and new course development. [Appendix 4-G](#) has a listing of the part-time faculty, their credentials and the specific courses taught during the time of the self-study.

4.1.3 Faculty credentials and courses in which they teach

4.1.3.1 *Biology*

Our faculty are well prepared to teach cross-listed graduate courses in Biology. These are courses that are offered at the undergraduate level and then cross-listed with a graduate course in Biology. The diverse backgrounds of our graduate faculty allow for a diverse offering of elective Biology courses. Some

examples include Limnology and Reservoir Ecology, Herpetology, Biogeography, Toxicology, Amphibian Ecology and Conservation, and Ichthyology.

4.1.3.2 *Environmental Science*

Our faculty are well prepared to graduate courses in Environmental Science. These include the core courses in the graduate curriculum as well as cross-listed courses from the undergraduate curriculum.

- *Core Courses:* The graduate curriculum includes six core courses (not required by all tracks). Of the six core courses, two are taught by the graduate director (Wilson), Seminar I and Seminar II. The four remaining courses are taught by faculty with expertise in the core content, Mechanisms in the Environment (Richards), Natural Resources Conservation Management (Aborn), Applied Statistics for Environmental Scientists (Schorr, Klug), and Environmental Law and Policy (Tucker)
- *Elective courses:* The diverse backgrounds of our tenure-track, non-tenure-track and adjunct faculty allow for a diverse offering of elective Environmental Science courses. Most of the courses are cross listed with Biology and Environmental Science. Some examples include Environmental Survey Methods, Animal Behavior, Animal Physiology, Behavioral Ecology, Dendrology, Ecology and Management of GSMNP, Entomology, Global Change Biology, Limnology and Reservoir Ecology, Marine Ecology, Microbial Ecology, Mycology, Parasitology, Plant Morphology, Wildlife Administration and Policy, Molecular Ecology and Evolution, Plant Physiology, Advanced Applications of Remote Sensing and GIS, Remote Sensing and Image Analysis, and Geographic Information Systems.

4.1.3.3 *Geology*

In the Division of Geology, our faculty are well prepared to teach cross-listed graduate courses in Geology. These are courses that are offered at the undergraduate level in geology and then cross-listed with a graduate course in Geology. The diverse backgrounds of our graduate faculty allow for a diverse offering of elective Geology courses. Some examples include Earth Surface Processes, Hydrology, Applied Environmental Geochemistry, Hydrologic Modeling, GIS for Geoscientists, Remote Sensing for Geoscientists and Geologic Field Experience.

4.1.4 *Quality of Teaching*

While the BGE Department has high academic standards, MS ESC students evaluate our courses very favorably. Courses (and faculty) at the university are evaluated by students in each class they teach during the academic year on the following evaluation items. Table 4.2 contains the questions for the course learning evaluations that address quality of teaching.

Table 4.2 Course Learning Evaluation Questions that Address Quality of Teaching

Focus Area	Questions
Course Learning Outcomes	Q1: I have read and understand the course learning outcomes in the syllabus and/or in Canvas. Q2: The course content addresses the course learning outcomes. Q3: The course structure (organization helps me in achieve the course learning outcomes. Q4: I believe that I am achieving the course learning outcomes.
Course Content and Delivery	Q5: The course encourages my use of critical thinking skills. Q6: The way this course is delivered encourages me to be actively engaged.
Student Contributions to Learning	Q7: I keep up with all assigned readings in the course.
Course Instruction	Q8: The instructor assists students with achieving the course learning outcomes. Q9: The instructor provides constructive feedback on graded coursework. Q10: The instructor responds to questions and emails within the time frame stated in the syllabus.

Students rate each criterion on a seven-point scale (1=Strongly Disagree, 2=Disagree, 3=Somewhat Disagree, 4= Neither Agree nor Disagree, 5= Somewhat Agree, 6=Agree, 7=Strongly Agree). Table 4.3 contains the reported average responses to the evaluation criteria for all graduate courses offered during semesters from 2018-2023. The MS ESC averages include ratings from a number of graduate courses including ESC 5020 Mechanisms in the Environment, ESC 5800 Limnology & Reservoir Ecology, 5120 Applied Statistics ESC 5700 Graduate Seminar, ESC 5140 Environmental Law & Regulations, 5460 Global Change Biology, 5160 Remote Sensing, ESC 5030 Microbial Ecology). The mean score of BGE faculty teaching MS ESC courses is 6.0 or greater for all evaluation items. For all evaluation items, student ratings of BGE faculty teaching MS ESC courses specifically are within 1.59% better than the average of the College and University-wide ratings.

Table 4.3 Mean scores of student responses to course learning evaluation criteria for MS ESC courses, 2018-2023 for MS ESC, CAS; and the University as a whole. Score: 0 = lowest; 7 = highest.

Question	MS ESC	CAS	UTC
Q1: I have read and understand the course learning outcomes in the syllabus and/or in Canvas.	6.5	6.56	6.59
Q2: The course content addresses the course learning outcomes.	6.56	6.51	6.53
Q3: The course structure (organization helps me in achieve the course learning outcomes.	6.36	6.22	6.26
Q4: I believe that I am achieve the course learning outcomes.	6.40	6.21	6.29
Q5: The course encourages my use of critical thinking skills.	6.49	6.35	6.38
Q6: The way this course is delivered encourages me to be actively engaged	6.20	6.07	6.13
Q7: I keep up with all assigned readings in the course.	6.54	6.38	6.42
Q8: The instructor assists students with achieving the course learning outcomes.	6.52	6.33	6.39
Q9: The instructor provides constructive feedback on graded coursework.	6.27	6.07	6.15
Q10: The instructor responds to questions and emails within the time frame stated in the syllabus.	6.42	6.27	6.35
Mean Score (Questions 1-10)	6.44	6.30	6.35

As indicated by student evaluations of its faculty, MS ESC faculty have a reputation for their commitment to student success and academic rigor. BGE faculty also are committed to student success, as demonstrated by the very high scores in all evaluation questions. The lowest overall rating (which is still a relatively high score) for departmental faculty was for “The way this course is delivered encourages me to be actively engaged.” This aspect could have been affected by the remote teaching that occurred during the COVID-19 pandemic. Not only was face-to-face instruction halted, but the social dynamic of the students was altered post-pandemic. Regardless, the quality of instruction of individual BGE faculty can be continuously developed through the annual Faculty Evaluation and Development by Objectives (EDO) process, in which every faculty member annually reviews student evaluations and works to adjust his or her teaching methods accordingly. The EDO and other processes for reviewing and improving faculty teaching performance are discussed in greater detail in **Section 4.6**.

4.2 Faculty Number, Workload Expectations, and Teaching Needs

4.2.1 Faculty Number

The Department includes 35 full-time faculty. There are three additional tenured faculty who have administrative appointments and teach on a limited basis. Of the 35 full-time teaching faculty in BGE, 18 are tenured, four are tenure-track, and 14 are non-tenure track faculty. Our NTT faculty number includes nine lecturers, one visiting biology lecturer, one visiting biology assistant professor, one visiting biology lab coordinator, and one geology lab teaching specialist. There are part-time faculty affiliated with BGE, who teach courses on a semesterly contract basis. In addition to the current faculty, seven additional full-time TT faculty members taught courses in BGE during the reporting period (i.e., in the past five years). These include four tenured faculty members who retired, two tenure-track faculty members who left for positions at other institutions, and one faculty member who passed away.

4.2.2 Faculty Workload Expectations

Chapter 3 of the UTC Faculty Handbook establishes general criteria and expectations for faculty performance in three broad areas: Instructional and Advisement Activities, Research, Scholarly, and Creative Activities, and Professional Service Activities. Section 2.10 of the UTC Faculty Handbook states

that faculty course loads should be consistent with UTC and departmental policies. Advising and counseling students is part of the teaching obligation. Although the UTC Faculty Handbook does not include a specific workload policy, a campus workload policy is currently under development by Academic Affairs. At the time of our last self-study, the College had a working document related to workload, however, this document is no longer in place.

Nearly all graduate-level courses offered by BGE are taught by full-time tenure-track faculty, who also teach some lower-division undergraduate courses. BGE has endeavored to reduce teaching loads for graduate faculty and others involved in research via several mechanisms. These include the use of Graduate Teaching Assistants (GTAs) to teach laboratories in our introductory biology and environmental science sequences and the consideration of double-lecture sections (i.e., dividing large groups of students into two sections that meet at the same time in the same room, in essence giving those who teach large numbers of student credit for twice the number of contact hours). In addition, UTC offers opportunities to earn partial reductions in course loads by providing research fellowships through the [UTC Office of Research and Sponsored Programs](#). However, it is difficult for our faculty to take advantage of course releases without negatively impacting the degree progress of our large number of undergraduates. To diversify our graduate course offerings and provide release time for faculty active with graduate student research without impacting our large undergraduate programs, we need more full-time faculty and GTA lines.

Regarding teaching, research, service expectations, the BGE Bylaws provide guidance for both tenure and promotion for TT faculty and promotion of NTT faculty. These guidelines are also used in the annual evaluation process, EDO.

4.2.2.1. Teaching workload guidance and expectations

The UTC Faculty Handbook states that course loads should be consistent with UTC and departmental policies, and that mentoring students is considered to be an integral part of the teaching obligation. Historically, advising students was a major responsibility of BGE faculty but with the creation of a college-wide advising center (the Hub), faculty responsibility has shifted away from traditional advising and more towards professional and career mentoring. The current strategy recognizes that teaching efforts may vary among tenured and tenure-track and even non-tenure track faculty within each Department and that teaching responsibilities may change over time for individual faculty as their contributions to research, scholarship, creative activity, and service vary. As such, differential work assignments may be assigned that take into account factors including external funding that serves the mission of the University and requires active administrative or scholarly involvement; administrative duties at the Department, College, or University level that are beyond those typically expected of faculty; a high level of research, scholarship, and/or creative activity; active supervision of theses and student-led research/creative activity that may be considered an intensive form of non-classroom teaching; instruction in a variety of courses that requires unusual preparation time; laboratory and/or program coordination duties; and/or instruction of large classes without grading (or other) assistance. The Department Head must notify or otherwise consult with the Dean of the College to ensure that resources are available to cover what may result in additional instructional costs associated with variable work assignments that involve reduced teaching loads.

In BGE, the departmental teaching workload model largely follows historical precedent by allowing for reasonable ranges of faculty effort while still offering a robust course schedule as determined by the Department Head. Load is typically assigned as follows:

- TT Faculty (who are graduate faculty): Three course preps, an example would be a core graduate lecture course and a cross-listed graduate lecture/lab combination of 24 students.
- NTT Faculty: 12 contact hours, an example would be a double lecture of 120 students, a single lecture of 60 students and a lab of 24 students.

NTT faculty consistently teach more than 12 contact hours and are compensated at an additional rate of \$1,000 per contact hour over 12. We could not serve our majors and other students on campus without this extra service from the NTT faculty. For TT faculty, the BGE Bylaws detail that teaching loads of more than three preps, 10 contact hours, would be considered as having a greater than average teaching load. The BGE Bylaws acknowledge the diverse strengths of its faculty and the varied needs of its programs and thus recognize that faculty in BGE will differ in their work assignments and the relative amount of professional effort devoted to teaching, research, and service.

Per the BGE Bylaws, the minimum teaching and advising expectations for TT tenure and promotion include the following:

Teaching, Advising, and Mentoring – In BGE, evidence of having “achieved a reputation as an accomplished teacher” means the candidate must become an effective teacher at UTC. In BGE, having “achieved and maintained a reputation as an accomplished teacher” means that the candidate has an established and respected reputation as an effective teacher at UTC. BGE considers faculty performance in the classroom, student advising, and research mentoring in the evaluation of teaching performance.

Teaching – A faculty member, at a minimum, must meet the following teaching requirements to be considered for tenure and/or promotion:

- (i) Student evaluation results with median scores of 5.0 or greater for all Course Content and Delivery and Course Instruction questions (scale of 0-7 with 7 being best) on average during the three (3) years prior to tenure consideration.
- (ii) A majority of peer-evaluation ratings of “very good” or “excellent” during the last two semesters of peer evaluations.
- (iii) Evidence of responding positively to reasonable criticisms offered through student and peer evaluations, by showing a willingness to change and improve.

To demonstrate excellence in teaching, a candidate for tenure and/or promotion must also provide additional evidence of teaching commitment and success. Evidence of excellence in teaching can be demonstrated by some combination of the following: regular student teaching evaluations with median scores greater than six (6); nomination and/or receipt of teaching awards; high quality teaching materials; evidence of updating and developing new courses; unsolicited positive feedback from former students; use or development of innovative teaching methods (e.g., flipped classrooms; experiential learning; recitation section); participation in teaching development workshops or fellowships; authorship on lab manuals; authorship on a textbook; other comparable activities.

Candidates applying for promotion to Professor must also provide evidence demonstrating that they have maintained an established and respected reputation as a teacher.

Advising – A faculty member, at a minimum, must meet the following advising requirements to be considered for tenure and/or promotion:

- (i) Offering sufficient opportunities for student advising, based on CAS and Departmental expectations for availability.
- (ii) A record of maintaining regular, posted office hours.

To demonstrate excellence in advising, a candidate for tenure and/or promotion must also provide additional evidence of advising commitment and success. Evidence of excellence in advising can be demonstrated by some combination of the following: service on advising-related committees; nomination or receipt of CAS, University, or external advising award(s); other comparable activities.

Research Mentoring – A faculty member, at a minimum, must meet the following research mentoring requirements to be considered for tenure and/or promotion:

- (i) Meaningful involvement of an average of one (1) undergraduate or graduate student in research per semester after the first year of employment at UTC. This may include any student participating in an independent study/research course (BIOL/ESC/GEOL 4995, 4997, 4998; GEOL 4800, 4900; ESC 5997, 5998, 5999) and/or involved in the experimental design, collection of data, analysis or manuscript preparation, or curatorial/data archiving work.
- (ii) Complete at least three (3) of the following activities: serving as committee chair for an undergraduate honors student or a graduate student; serving as a committee member for an undergraduate honors student or a graduate student; sponsoring student presentations at meetings; sponsoring grant proposal submissions by students; awards for faculty sponsored student presentations at meetings; student publications in student or in regional, national or international peer reviewed journals; supervising additional students in meaningful research activities beyond the minimum listed above; other comparable activities.

Per the BGE Bylaws, the minimum teaching and advising expectations for NTT promotion include the following:

Teaching and Advising: In order to align Departmental and UTC policy, BGE considers faculty performance in the classroom and student advising in the evaluation of lecturer teaching performance. In BGE, evidence of having “achieved a reputation as an accomplished teacher” means the candidate must become an effective teacher at UTC. In BGE, having “achieved and maintained a reputation as an accomplished teacher” means that the candidate has an established a respected reputation as an effective teacher at UTC. BGE considers faculty performance in the classroom and student advising in the evaluation of teaching performance.

Teaching – A lecturer, at a minimum, must meet the following teaching requirements to be considered for promotion:

- (i) Evidence of effective teaching through: a. Student evaluation results with median scores of 5.0 or greater for all Course Content and Delivery and Course Instruction questions (scale of 0-7 with 7 being best) on average during the three (3) years prior to promotion consideration; and, or b. Multiple indicators of effective teaching. These indicators of teaching quality may include but are not limited to: student assessments, in-class activities, syllabi, learning outcome assessments, evidence of student learning, evidence of efforts to enhance teaching quality, and additional peer observations of teaching approved by the NTTRP Committee. The candidate should provide commentary explaining how these materials demonstrate effective teaching. The NTTRP Committee will determine if the commentary and evidence provided by the candidate demonstrate the ability and commitment to teach effectively.
- (ii) A majority of peer-evaluation ratings of “very good” or “excellent” during the last two

semesters of peer evaluations.

- (iii) Evidence of responding positively to reasonable criticisms, offered through any of the following: student evaluations, peer evaluations, the NTTRP Committee, and the EDO process, by showing a willingness to change and improve.

Candidates applying for promotion to Senior Lecturer must also provide additional evidence demonstrating that they have maintained an established and respected reputation as a teacher

In BGE, the diverse strengths of our faculty and the varied needs of our programs are recognized and valued. TT and NTT faculty have differences in their defined teaching load and expectations, but the overall result is support for our students and excellence in teaching.

4.2.2.2. Research workload guidance and expectations

The College of Arts and Sciences Bylaws provide for each academic department to establish expectations for research, scholarship, or creative activities. Faculty are evaluated each year in the EDO process against these expectations. While the BGE Bylaws do not describe a specific faculty research workload policy, the Bylaws do describe that tenured faculty members in the disciplines in which TT faculty members work will recommend the standards, degrees of emphasis, and the appropriate types of research required for tenure. For tenure and promotion, the minimum research expectations include the following:

Research and Scholarly Competence: In BGE, evidence of having “achieved a good record in research, scholarly, or creative activities” means the tenure and promotion candidate must establish an independent and externally recognized research program that involves students at UTC. In BGE, having “achieved and maintained a good record in research, scholarly, or creative activities” means the promotion candidate has established an independent and nationally or internationally recognized research program that involves students at UTC. To be considered for tenure and/or promotion, at a minimum, the following criteria must be met:

- (i) Ongoing research activity: A candidate for tenure and/or promotion must provide evidence of ongoing and productive research activity. The Department values and encourages collaboration. However, all candidates for tenure and/or promotion must develop and successfully lead their own research program, regardless of whether their research program involves collaboration.
- (ii) Three (3) full-length peer-reviewed original research papers published in discipline-appropriate journals (i.e., journals related to the candidate’s area of expertise) and/or maps published by a government agency. One paper or map may be in press at the time of the candidate’s review. For papers, at least one (1) must be published in a national or international journal. A peer-reviewed book chapter may be substituted for one of the three required papers or maps.
- (iii) Externally-funded research grant submissions. A candidate for tenure and/or promotion should be lead PI or co-PI on at least two externally submitted grant pre-proposals or full proposals. If co-PI, a substantial portion of the grant activities and budget must focus on the candidate’s research program. Note: funding of these grants is not a minimum requirement for tenure or promotion consideration.
- (iv) Three (3) presentations given by the tenure or promotion candidate at professional meetings or institutions other than UTC, one of which must be national or international if funding is available.

To demonstrate excellence in research, a candidate for tenure and/or promotion must also provide additional evidence of research commitment and success. Evidence of excellence in research can be demonstrated by some combination of the following: presentations at a conference or academic institution other than UTC beyond the minimum requirement stated above; peer-reviewed full-length publications in discipline-appropriate journals, peer-reviewed maps published by a government agency, and/or book chapters in a research book or volume beyond the minimum requirement stated above; editor or co-editor of a scholarly book (not professional editing for service) or an invited special feature or proceedings in a peer-reviewed journal; author or co-author of a research-based book (does not include lab manuals); book review in a peer-reviewed journal; PI on a funded grant from an in-house (intramural) competition (e.g. Faculty Development Grant); author of short publication in a regional, national or international journal (e.g., research note, short commentary, or species list); plenary presentations at scientific conferences; PI or co-PI on a funded research grant; peer-reviewed conference proceedings; other examples of scholarly productivity (e.g. technical report of a finished research project submitted to a granting agency).

When demonstrating excellence in research, it is the candidate's responsibility to provide evidence of the level of quality, effort, peer review, and potential impact of the activities listed above to the RTP Committee and Department Head. Candidates applying for promotion to Professor must additionally describe and provide evidence that they have achieved a national or international reputation as a scholar in their field.

The Department recognizes that some faculty members may have relatively large teaching or service assignments that affect their ability to be research active. Thus, it is important that the Department allow for some flexibility in tenure and promotion expectations for research. The Department will consider the following alternatives to the stated minimum requirements for research above:

- (i) Tenure-track faculty members with higher than average teaching or service loads (e.g., >10 contact hours, >3 preps per semester, and/or more than double the Delaware norm for student credit hours or large administrative assignments) will not be deemed ineligible for tenure or promotion if they fail to meet the minimum requirements outlined above.
- (ii) A tenure-track faculty member who does not seek external funding to sustain a research program can substitute a grant submission with one (1) additional full-length research publication in a peer-reviewed journal or one (1) additional peer-reviewed map published by a government agency (resulting in an expectation of 4 papers or maps).

While NTT do not have research expectations for annual evaluation and promotion, several of our NTT do participate in research and mentorship. We do not have NTT promotion guidelines related to research in the BGE Bylaws.

4.2.2.3. Service workload guidance and expectations

The College of Arts and Sciences Bylaws provide for each academic department to establish expectations for research, scholarship, or creative activities. Faculty are evaluated each year in the EDO process against these expectations. While the BGE Bylaws do not describe a specific faculty service workload policy, for tenure and promotion, the minimum service expectations include the following:

Service: In BGE, having “achieved a significant record of effective participation in professional activities other than teaching and research” or “achieved and maintained a significant record of

effective participation in professional activities other than teaching and research” involves providing service that supports the University mission as an engaged metropolitan university and the research mission of the Department. Candidates for tenure and promotion are expected to actively participate in Departmental committees as assigned by the Department Head as well as provide service to the University, community, and their profession. At a minimum, candidates for tenure and/or promotion should meet the following requirements:

- (i) Departmental service: Tenure-track faculty members are expected to actively serve on the Departmental committees that they are assigned to each year; the actual number of committee assignments will depend on Departmental needs and number of faculty in the Department.
- (ii) University and Discipline-Appropriate Community Service: Each faculty member will provide service to UTC and the community/region as appropriate given their professional expertise. Candidates for tenure or promotion are expected to participate in a minimum of two (2) University or discipline-appropriate community service activities on average per year. Examples of potential University and community service include, but are not limited to, the following: active participation in university committees; participation in university events; workshops for UTC students; participation in outreach or volunteer programs with community organizations; mentoring of K-12 students, or discipline relevant presentations at local K-12 schools; submission of grants for community/university service activities; serving as a judge for school, local and regional science fairs; participation in outreach or volunteer programs associated with local schools; other comparable activities.
- (iii) Professional Service: Candidates for tenure or promotion are expected to participate in a minimum of two (2) professional activities on average per year. Examples of professional activities include, but are not limited to the following: participation in professional organizations; membership on a committee or leadership for a professional organization; leadership position in a student (e.g., EDGE) or campus-based scientific organization (e.g., adviser for UTC chapter of Sigma Xi); participation in a professional development activity at a scientific meeting or a regionally or nationally recognized program (e.g., mentoring activity at a professional meeting, attending workshops sponsored by professional organizations, NSF or various regional and national laboratories); reviewer for an academic journal; reviewer for a granting agency; editorial position for an academic journal; host or co-host of a professional meeting or workshop; other comparable examples.

To demonstrate excellence in service, a candidate for tenure and/or promotion must provide additional evidence of service that substantially exceeds the minimum requirements listed above. Additionally, candidates for promotion to Professor are expected to demonstrate leadership in relation to service (e.g., effectively serving as the chair of committees, leading outreach activities, serving on editorial boards, successfully holding an administrative appointment) to demonstrate excellence in service.

NTT Faculty also have service expectations for annual review and promotion in the BGE Bylaws.

Service: In BGE, having “achieved a significant record of effective participation in professional activities other than teaching” or “achieved and maintained a significant record of effective participation in professional activities other than teaching” involves providing service that supports the University’s mission as an engaged metropolitan university and the mission of the Department. Candidates for promotion are expected to actively participate in Departmental

committees as assigned by the Department Head as well as provide service to the University and their profession. At a minimum, candidates for promotion should meet the following requirements:

- (i) **Departmental Service:** Non-tenure-track faculty members are expected to actively serve on the Departmental committees that they are assigned to each year; the actual number of committee assignments will depend on Departmental needs and number of faculty in the Department.

Some lecturers have lab coordination duties. These lab coordination duties are varied and diverse, requiring substantial time dedicated to activities other than teaching and advising. As such, lab coordination duties are recognized as service to the department. Lab coordinators must provide a description of his/her lab coordination duties and evidence of effective execution of those duties.

- (ii) **University and Discipline-Appropriate Community Service:** Each faculty member will provide service to UTC and the community/region as appropriate given their professional expertise. Candidates for promotion are expected to participate in a minimum of two (2) University or discipline-appropriate community service activities on average per year. Examples of potential University and community serve include, but are not limited to, the following: active participation in university committees; participation in university events; workshops for UTC students; participation in outreach or volunteer programs with community organizations; mentoring of K-12 students, or discipline relevant presentations at local K-12 schools; submission of grants for community/university service activities; serving as a judge for school, local and regional science fairs; participation in outreach or volunteer programs associated with local schools; other comparable activities.
- (iii) **Professional Service:** Candidates for promotion are expected to participate in professional activities annually. Examples of professional activities include, but are not limited to the following: participation in professional organizations; membership on a committee or leadership for a professional organization; leadership position in a student (e.g., EDGE) or campus-based scientific organization (e.g., adviser for UTC chapter of Sigma Xi); participation in a professional development activity at a scientific meeting or a regionally or nationally recognized program (e.g., mentoring activity at a professional meeting; attending workshops sponsored by professional organizations).

Candidates applying for promotion to Senior Lecturer must also provide additional evidence demonstrating that they have maintained an established record of effective participation in service activities

4.2.2.4. Additional faculty obligations and expectations

University faculty have additional obligations and expectations that do not clearly fall within one of the above areas. These include participation in commencement as per the UTC Faculty Handbook and confirmation to the BGE Bylaws statement on collegiality as follows:

Collegiality: This criterion expands upon the UTC Handbook criterion requiring “demonstrated ability to relate appropriately to students and professional colleagues.”

In BGE, collegiality consists of a shared decision-making process and a set of values which regards members of the Department and other University constituencies as essential for the success of the Department, CAS, and University. Central to collegiality is the foundation of academic freedom –

the respect for differing opinions and points of view – which welcomes diversity and actively sponsors its opinions. Collegiality between faculty and staff, regardless of rank or status, incorporates mutual respect for similarities and for differences in background, expertise, judgments, assignment responsibilities and visions for the department. Collegiality also consists of an ability to relate with students and a respect for similar and different opinions of students.

In BGE, the candidate for tenure and promotion must be a good citizen of the Department, CAS, and University, must interact in a collegial and professional manner with colleagues, staff, and students, and must serve as a good role model for students and a good representative of UTC. In turn, members of the RTP Committee are expected to be collegial to candidates for tenure and promotion and promote an environment in which different forms of collegiality can be expressed freely. The department supports a vision that differing viewpoints are valuable and essential to promoting academic freedom.

BGE policy conforms with the CAS vision that collegiality (or the lack thereof) impacts the assessment of performance. For this reason, the departmental faculty is mindful of the statement on collegiality in the CAS Bylaws.

The Department will assess collegiality based on:

- (i) Evaluation of the candidate's Statement of Collegiality in tenure/promotion documents.
- (ii) Evidence that a candidate receiving criticisms regarding collegiality during an annual review has appropriately responded to those criticisms. In the event that concerns are expressed about a candidate's collegiality, the RTP Committee chair must submit these concerns in writing to the candidate and Department Head as part of the candidate's annual review for reappointment. The candidate should arrange a meeting with the Department Head and/or chair of the RTP Committee to discuss the concerns. The candidate is also encouraged to write a response to written criticisms regarding a perceived lack or absence of collegiality, to be submitted to the RTP Committee chair and Department Head. The candidate should also address how s/he addressed these perceived concerns in his/her subsequent annual review or as part of Statement of Collegiality in a tenure or promotion application.

In BGE, the absence or lack of collegiality is defined as substantial evidence of sustained, intentional actions and statements that are detrimental to or interfere with the teaching, scholarly, and service goals of the Department, CAS, or University as well as the physical or mental well-being of students, faculty, and staff. The absence or lack of collegiality shall not be based on civil disagreements over academic issues or personality conflicts that do not result in disruptions to departmental, college, or university activities or are not detrimental to the physical or mental well-being of students, faculty, and staff.

NTT promotion expectations also include collegiality guidelines.

Collegiality: This criterion expands upon the UTC Handbook criterion requiring “demonstrated ability to relate appropriately to students and professional colleagues.”

In BGE, collegiality consists of a shared decision-making process and a set of values which regards members of the Department and other University constituencies as essential for the success of the Department, CAS, and University. Central to collegiality is the foundation of academic freedom – the respect for differing opinions and points of view – which welcomes diversity and actively

sponsors its opinions. Collegiality between faculty and staff, regardless of rank or status, incorporates mutual respect for similarities and for differences in background, expertise, judgments, assignment responsibilities and visions for the department. Collegiality also consists of an ability to relate with students and a respect for similar and different opinions of students.

In BGE, the candidate for promotion must be a good citizen of the Department, CAS, and University, must interact in a collegial and professional manner with colleagues, staff, and students, and must serve as a good role model for students and a good representative of UTC. In turn, members of the Non-Tenure-Track Reappointment and Promotion Committee are expected to be collegial to candidates for promotion and promote an environment in which different forms of collegiality can be expressed freely. The Department supports a vision that differing viewpoints are valuable and essential to promoting academic freedom.

BGE policy conforms with the CAS vision that collegiality (or the lack thereof) impacts the assessment of performance. For this reason, the departmental faculty is mindful of the statement on collegiality in the CAS Bylaws.

The Department will assess collegiality based on:

- (i) Evaluation of the candidate's Statement of Collegiality in reappointment/promotion documents.
- (ii) Evidence that a candidate receiving criticisms regarding collegiality during an annual review has appropriately responded to those criticisms. In the event that concerns are expressed about a candidate's collegiality, the Non-Tenure-Track Reappointment and Promotion Committee chair must submit these concerns in writing to the candidate and Department Head as part of the candidate's review for reappointment. The candidate should arrange a meeting with the Department Head and/or chair of the Non-Tenure-Track Reappointment and Promotion Committee to discuss the concerns. The candidate is also encouraged to write a response to written criticisms regarding a perceived lack or absence of collegiality, to be submitted to the Non-Tenure-Track Reappointment and Promotion Committee chair and Department Head. The candidate should also address how s/he addressed these perceived concerns in his/her subsequent annual review.

In BGE, the absence or lack of collegiality is defined as substantial evidence of sustained, intentional actions and statements that are detrimental to or interfere with the teaching, scholarly, and service goals of the Department, CAS, or University as well as the physical or mental well-being of students, faculty, and staff. The absence or lack of collegiality shall not be based on civil disagreements over academic issues or personality conflicts that do not result in disruptions to departmental, college, or university activities or are not detrimental to the physical or mental well-being of students, faculty, and staff.

4.2.3. Faculty course workloads across the Department

In BGE, all TT faculty are expected to establish productive research programs, and the standard teaching assignment for these faculty focuses on contact hours and the number of course preparations, with the goal of assigning TT faculty approximately nine contact hours and no more than three course preps. The BGE Bylaws specifically states that teaching assignments of more than these contact hours and/or course preps would constitute a heavier than typical teaching load for TT faculty. BGE has treated preps for two different meetings of the same lab course as two separate preps. Thus, a semester assignment for one TT faculty member might involve one lecture section (48 students enrolled) of a course plus two separate lab meetings of the same course. Another TT faculty member might be assigned one lecture course, one related lab course, and one unrelated lab course, while another TT faculty member might be assigned

three distinct three-hour lecture courses. Understanding that not all courses and labs require identical effort, the BGE associate head tasked with course scheduling consults with faculty members on a semesterly basis, considers their preferences, and seeks to assign teaching loads equitably. Given the variation in credit hours and contact hours associated with lecture and lab courses, the actual contact hour load for TT faculty in BGE generally varies between seven and 10 contact hours. Some of these faculty may be assigned a lighter load one semester that is offset with a heavier load another semester.

BGE uses a different approach to assign course loads to NTT faculty, given the focus of their positions on teaching and service but without the research expectations. Specifically, the standard course load assignment for NTT faculty focuses on contact hours, with the goal of assigning these faculty approximately 12 contact hours per semester. For example, a semester assignment for one NTT faculty member might involve two 3-hour lecture sections and three 2-hour lab sections. Another NTT faculty member might be assigned three 3-hour lecture sections and one 3-hour lab section, while another NTT faculty member might be assigned four 3-hour lecture sections. The College sets enrollment levels at which large introductory-level courses are considered double sections, and these levels are accounted for when assigning NTT course loads. The BGE associate heads who are tasked with course scheduling consult with NTT faculty members on a semesterly basis, consider their preferences, and seek to assign teaching loads equitably. This is all in consultation with the department head. Given the variation in credit hours and contact hours associated with lecture and lab courses, the actual contact hour load for NTT faculty in BGE generally varies between eleven and thirteen contact hours. Using the approaches described for both TT and NTT faculty, BGE has been able to offer the courses required for students to progress through degree programs, provide modest research releases to faculty, and conform to UTC workload policies.

All graduate courses in BGE are taught by TT faculty, who also teach some lower-division undergraduate courses. The bulk of the lower division courses are taught by NTT faculty. The department has endeavored to reduce teaching loads for faculty and others involved in research via several mechanisms. These include the use of graduate teaching assistants to teach laboratories in our introductory Biology and Environmental Science sequences and the use of double lecture sections (i.e., dividing large groups of students into two sections that meet at the same time in the same room, in essence giving those who teach large numbers of students credit for twice the number of contact hours). In addition, the institution offers opportunities to receive partial reductions in course loads by providing research fellowships through the UTC Office of Research and Sponsored Programs.

4.2.4. Department teaching needs

The total annual Student Credit Hour production (SCH) by BGE fluctuated during the five-year reporting period, averaging 11,444.6 total SCH per year with a minimum SCH production of 11,112 in 2022-23 and a maximum SCH production of 11,691 in 2021-22. The average annual student credit hour (SCH) production per full-time faculty member in BGE was 351.7 with an overall decrease of about 13% during the reporting period (Table 4.4). The Department experienced about a 13% overall increase in its number of full-time faculty during the reporting period, from 30 full-time faculty in Fall 2018 to 35 full-time faculty in Fall 2022 and gained one TT faculty line during this time. The hiring of lecturers during the past five years has prevented increases in teaching load for tenure-track faculty (Table 4.5), especially in the case of introductory-level general education courses. While adjunct faculty continue to contribute substantially to instruction in BGE (Table 4.6), the number of adjunct faculty teaching in BGE decreased 45% during the reporting period, from 20 adjunct faculty in 2018-19 to 11 adjunct faculty in 2022-23. In addition, adjunct faculty alleviate less SCHs in BGE per full-time faculty member than do adjuncts across the College or University (Table 4.6).

The SCH per full-time faculty member in BGE was greater than the SCH values for the university and usually greater or similar to the SCH values for faculty across the College during all five years of the reporting period (Table 4.4). The SCH for TT faculty in BGE also was greater than the SCH value for the

university throughout the reporting period, but usually less than or similar to the value for CAS. With adjuncts included the SCH per instructor in BGE was substantially greater than the SCH values for both the university and CAS during all five years of the reporting period (Table 4.6). This suggests that adjuncts are alleviating more instructional needs across the college and university than in BGE, while our full-time faculty loads continue to be greater than those for both CAS and the university. Importantly, it has been challenging to find and hire quality adjuncts to teach in BGE given the low compensation offered to adjuncts in CAS.

Table 4.4 Student Credit Hours/Full-time Faculty Member/Academic Year

Area	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
UTC	323.0	309.4	313.5	300.4	298.0
CAS	358.1	344.1	348.5	329.9	328.2
BGE	376.1	349.8	351.4	354.3	326.8

Table 4.5 Student Credit Hours/TT Faculty Member/Academic Year

Area	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
UTC	441.2	449.3	458.8	436.3	438.7
CAS	513.3	510.4	520.8	493.9	500.7
BGE	490.5	501.9	483.1	487.1	463.0

Table 4.6 Student Credit Hours/Faculty Member/Academic Year (Adjuncts included)

Area	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
UTC	156.4	171.8	164.6	185.1	172.9
CAS	186.7	200.2	185.9	202.3	188.4
BGE	225.6	296.0	289.9	307.7	284.9

Despite our efforts to reduce teaching workloads for faculty involved in graduate student research and advisement, our faculty have remained among the most prolific at UTC in the production of SCH. To reflect the teaching workload of BGE Graduate Faculty, Table 4.7 compares the graduate SCH output of both the department and the college. When describing the SCH of Graduate Faculty, it is important to note that the SCH for the many hours spent advising thesis, internship, and/or learned discourse projects is not inflated beyond the very few credits of these capstone experiences for which students are required to register. As such, a faculty member that advises a single student in 6 total credit hours of ESC 5999 Thesis generates a total of 6 SCH for that experience. It also is important to note that the Department's overall SCH production is created/maintained with the teaching support provided by lecturers and GTAs. However, the heavy undergraduate load is a continuing challenge, along with limited graduate program resources. These metrics also should be interpreted as identifying potential for growth of the graduate program.

Table 4.7 Total Student Credit Hour (SCH) Production and SCH per Full-time Graduate Faculty per Semester for all CAS Graduate Faculty and BGE Graduate Faculty.

	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022
CAS Graduate SCH	1522	1575	1717	1855	1744
SCH/CAS Graduate Faculty	12.5	12.9	14.1	15.2	14.3
BGE Graduate SCH	238	196	244	330	300
SCH/BGE Graduate Faculty	8.8	7.3	9.0	12.2	11.1

4.2.5 Faculty Advisor Workloads

Graduate faculty in BGE advise a diversity of graduate capstone experiences, including thesis projects, internships, and other non-thesis options. Graduate student matriculation into the program has ranged from 27 to 38 students per year between 2018 and 2023. The graduate student/graduate faculty ratio has decreased slightly since our last self-study review period. In our last review, we averaged about two graduate students per BGE graduate faculty (UTC Graduate Faculty status), and currently our average is 1.2 graduate students/graduate faculty member. Some of the factors that contribute to this decline are faculty retirements, faculty changing career paths or leaving UTC, and faculty passing away. However, the distribution of graduate students across graduate faculty advisors is uneven, given the variation in Graduate Faculty expertise and research focus. Since the last self-study, our graduate program has advised 111 students across 16 current graduate faculty members. Most of the graduate advising has fallen to the ESC Graduate Director, who has advised 40 students. Three of the graduate faculty carry the burden of advising the majority of the graduate students. This is a weakness that needs to be addressed moving forward.

4.3 Faculty Diversity

In Fall 2022, the BGE faculty consisted of more female faculty than male faculty, which demonstrates a shift toward a female-dominated department over the past five years (Table 4.8). For both full-time and part-time faculty, BGE has greater percentages of female to male faculty than the College of Arts and Sciences and the university. However, our TT faculty remain male-dominated, with about 60% male and 40% female, while our NTT faculty are about 85% female and 15% male. The gender disparity of TT faculty in BGE has improved substantially since 2016, when just 26% of our TT faculty were female faculty. While the percentage of full-time faculty that are female faculty in BGE is greater than the percentage of faculty that are female faculty in both CAS and the university, the percentage of TT faculty that are female in both BGE and CAS remains lower than for the university, which reports that 46% of TT faculty are female.

Most BGE faculty members are Caucasian, and as a whole the full-time BGE faculty represent less racial and ethnic diversity than faculty in CAS and the university (Table 4.9). Specifically, numerous ethnicities are represented in the CAS and UTC faculty, whereas BGE faculty are comprised of three ethnic groups (Caucasian, Black, and Asian). Among the full-time BGE faculty, the percentage of Caucasian individuals is slightly greater than the percentage of faculty who are Caucasian in CAS and UTC. Among the part-time BGE faculty, the percentage of Caucasian individuals is similar to the percentage in CAS but greater than the percentage in the university as a whole.

The department recognizes the gender, racial, and ethnic disparities apparent in Tables 4.7 and 4.8 and is committed to increasing diversity among faculty, particularly through the recruitment and retention of women and people of under-represented groups.

Although the percentage of full-time female faculty in BGE is relatively high when compared with percentages of female faculty in CAS and the university, the percentage of full members of the graduate

faculty in BGE who are female is relatively low at 35% (7 females out of 20 full graduate faculty). One female faculty teaches a core course in the MS Environmental Science program (Applied Statistics for Environmental Scientists), which is 25% of the graduate core courses not taught by the Graduate Director (Seminar I and Seminar II).

Table 4.8 Gender of BGE, CAS and UTC faculty in Fall 2022.

	Full Time Faculty		Part Time Faculty	
	N	%	N	%
UTC				
Male	262	50.4	115	44.1%
Female	258	49.6%	146	55.9%
Unknown	0	0.0%	0	0.0%
Total	520	100.0%	261	100.0%
CAS				
Male	141	52.4%	59	46.8%
Female	128	47.6%	67	53.2%
Unknown	0	0.0%	0	0.0%
Total	269	100.0%	126	100.0%
BGE				
Male	19	54.3%	4	36.4%
Female	16	45.8%	7	63.6%
Unknown	0	0.0%	0	0.0%
Total	35	100.0%	11	100.0%

Table 4.9 Ethnic backgrounds of BGE, CAS and UTC faculty in Fall 2022.

	Full-Time Faculty		Part Time Faculty	
	N	%	N	%
UTC				
American Indian or Alaskan Native	1	0.2%	1	0.4%
Asian or Pacific Islander	44	8.5%	9	3.4%
Black or African American	34	6.5%	16	6.1%
Hispanic/Latino	11	2.1%	6	2.3%
Non-resident Alien	26	5.0%	1	0.4%
Unknown	5	1.0%	2	1.9%
White	399	76.7%	226	86.5%
Total	520	100.0%	261	100.0%
CAS				
American Indian or Alaskan Native	1	0.4%	1	0.8%
Asian or Pacific Islander	18	6.7%	6	4.8%
Black or African American	18	6.7%	4	3.2%
Hispanic/Latino	9	3.3%	1	0.8%
Non-resident Alien	7	2.6%	0	0.0%
Unknown	2	0.7%	1	0.8%
White	214	79.6%	113	89.6%
Total	269	100.0%	126	100.0%
BGE				
American Indian or Alaskan Native	0	0.0%	0	0.0%
Asian or Pacific Islander	3	8.6%	0	0.0%
Black or African American	2	5.7%	1	9.1%
Hispanic/Latino	1	2.9%	0	0.0%
Non-resident Alien	0	0.0%	0	0.0%
Unknown	0	0.0%	0	0.0%
White	39	82.8%	10	90.9%
Total	35	100.0%	11	100.0%

4.4 Faculty Professional Development

Academic Affairs also requires all newly hired faculty to participate in the Teaching and Learning Institute, which is a semester long pedagogy workshop. Faculty must participate in the workshop within their first year of employment and are given a one course release to accommodate the increased work expectation. BGE faculty engage in a diversity of professional development activities, including programs arranged and led by the UTC Walker Center for Teaching and Learning. Our faculty have attended, participated in, or led professional development workshops on topics ranging from research skills (e.g., bird banding, genomics, computational, geospatial, and hydrology), faculty mentoring networks, and development of online course initiatives, to grant-writing workshops (e.g., NIH regional seminar), teaching creativity, IRB/IACUC training, and diversity and human resources training (e.g., SafeZone). Our faculty develop new course proposals reviewed by the departmental curriculum committee. Several faculty members have received ThinkAchieve funding to support innovative teaching methods. Finally,

several faculty members have engaged in fund raising efforts with UTC Advancement. Over the last year, we have been working on raising funds for faculty instruction.

BGE faculty have submitted many grant proposals to internal programs and private, state, and federal funding programs. Between 2018-2019 and 2022-2023, our faculty secured \$1.3 million in extramural funding (Table 4.10) and applied for over \$9.5 million in funding. Our faculty have contributed to or led more than 100 publications in peer reviewed journals, ranging from regional journals to international journals. They have published numerous book chapters, project reports, education guides, and books ([Appendix 4-I](#)). Faculty regularly present their research at regional, national, and international scientific meetings ([Appendix 4-J](#)).

Table 4.10 External Grant Awards/Fiscal Year, number of BGE support is in parathesis

Area	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
BGE	\$71,979 (4)	\$478K (8)	\$142K (6)	\$336K (5)	\$ 347K (6)
CAS	\$7841K	\$1.3M	\$1.1M	\$2.2M	\$1.2M
UTC	\$11.3 M	\$11.4M*	\$ 13.7M**	\$14.0M***	\$14.2M

*\$21.2M with CARES Act Funds due to COVID

**\$56.9M with HEERF Funds due to COVID

***15.2M with HEERF Funds due to COVID

Our faculty engage in a diverse range of service activities. BGE faculty regularly serve on departmental, college, and university committees. Our faculty serve on three to four departmental committees annually. Professionally, our faculty regularly review manuscripts for peer-reviewed journals and participate in professional societies. Some of our faculty serve as editors for scientific journals such as *Global Journal of Environmental Science & Management*, *Journal of Mammalogy*, *Journal of Mammalian Evolution*, *Journal of Medical & Biological Sciences*, *Journal of Paleontology*, *Remote Sensing*, and *Proceedings of the Royal Society*

One faculty member has served as president of a professional society, and others have served as program chairs for regional and national conferences (Association of Southeastern Biologists and Geological Society of America). Two Geology faculty are active in regional and national organizations, serving as chairs of major committees and as division panelists. Some of our faculty members regularly review grant proposals, both internal and external (NSF) to the university. Our faculty also engage in service in the community, including activities with local nature centers, serving as science fair judges, service as board members, mentoring K-12 students, making presentations at local schools, and conducting interviews with local TV and radio stations.

A full list of faculty activities, including faculty development, scholarly activity, and service, is provided in [Appendix 4-K](#).

4.5 Faculty Engagement in Planning, Evaluation, and Improvement Processes that Measure and Advance Student Success

The Department engages in numerous activities that advance student success. Some examples include:

- *Student learning outcomes*: In our graduate-level courses, we assess program-level Student Learning Outcomes (SLOs) each year. The MS ESC SLOs, revised in 2023, represent the outcomes of our program, are measurable, and can be incorporated in our core and elective courses in different levels and ways. The capstone experience that each student must complete to earn the MS ESC degree provides an assessment of competency in each of our SLOs. The MS

ESC program is committed to making appropriate changes to our curriculum and course content should the need arise. (**see Section 1 Learning Outcomes**).

- *Orientation:* The MS ESC Graduate Program Director organizes and runs a formal graduate student orientation at the beginning of each academic year. In the spring semester, when fewer students begin the program, the Director meets individually with incoming MS ESC students to describe University- and program-level policies and procedures. The laboratory coordinators for introductory biology and introductory environmental science hold training sessions for GTAs; these students also must complete University-level orientation sponsored by the Graduate School.
- *Advisement:* Students in the MS ESC program must identify an advisor during the process of applying to the program. Graduate faculty members meet regularly with the graduate student who they advise. Early in their programs of study, MS ESC students form committees consisting of the advisor and two other members of the UTC Graduate Faculty. The role of graduate advisory committees is to advise students on project goals, methods, and outcomes. The committee formally assesses student progress at two stages: proposal and defense. Proposals are presented and discussed during meetings between students and their committees. All thesis, internship, and learned discourse oral defenses are open to the public and are attended by the members of the graduate advisory committee, as well as the Graduate Program Director and/or the BGE Department Head. In addition to advising student capstone experiences, graduate advisors frequently discuss career and/or further academic paths with the MS ESC students who they advise.
- *Graduate student research:* The graduate faculty engage graduate students in research, relying on resources from external grants and internal programs including the Office of Research and Sponsored Programs, and the Graduate School. Many of the presentations and peer-reviewed publications generated by our faculty include student contributors. A detailed list of graduate students engaged in research can be found in [Appendix 4-L](#), a detailed list of graduate student presentations can be found in [Appendix 4-M](#), and a detailed list of graduate student papers can be found in [Appendix 4-N](#). Many of our students present at the UTC Research and Creative Activity Conference, a campus-wide event offering opportunities to make oral and poster research presentations, held annually during the spring semester. In addition, several of our laboratory courses are inquiry based, exposing a large portion of our non-thesis students to research.
- *Course development and improvement:* Many of our faculty have participated in professional activities aimed at improving instruction, including workshops and seminars sponsored by the UTC Walker Center for Teaching and Learning. Several of our faculty have been awarded small grants from the UTC ThinkAchieve program. These grants are used to develop activities that improve critical thinking skills and problem-solving. Curricular improvements include the addition of new courses as well as numerous program strengthening and streamlining efforts outlined in **Section 2 Curriculum**.
- *Scholarships and Awards:* The Department offers two graduate student awards, MS ESC Outstanding Research Award (student must be close to defending) and MS ESC Graduate Student Support Award. Recipients are selected by the full-time faculty and recognitions are honored at a yearly department awards banquet where they are introduced by faculty.

4.6 Faculty Evaluation System and Faculty Improvement

UTC's Faculty Handbook addresses faculty appointment, evaluation, promotion, tenure, and termination in Chapter 3 for TT Faculty and in Chapter 4 for NTT Faculty ([Appendix 4-A](#)).

4.6.1 Tenure Track Faculty

For TT faculty, two distinct review processes occur each year:

1. Annual reappointment, until such time as the faculty member is tenured, or is terminated, and

2. Annual evaluation and development by objectives (EDO), which occurs for all full-time faculty, regardless of appointment classification. Documents generated through the EDO process are included in the dossier submitted for annual reappointment.

The criteria for reappointment, tenure and promotion, and annual review (EDO) are found in the Faculty Handbook ([Appendix 4-A](#)), the CAS Bylaws ([Appendix 4-B](#)) and the BGE Bylaws ([Appendix 4-C](#)).

4.6.1.1 TT Faculty Reappointment

Annual reappointment requires that the faculty member submit a dossier to the department's Rank, Tenure, and Promotion (RTP) Committee, composed of all tenured faculty in the Department. The RTP Committee reviews the dossier, and the Department Head, after consulting with the RTP Committee, makes a recommendation to the next administrative level. The dossier should address the Criteria for Reappointment (UTC Faculty Handbook 3.10.4), which are similar to the Criteria for Appointment (UTC Faculty Handbook 3.2.1), and the Criteria for Tenure (UTC Faculty Handbook 3.10.4). The BGE Bylaws have more specific criteria which can be found in Section VI of the BGE Bylaws ([Appendix 4-C](#)).

4.6.1.2 TT Faculty Annual Evaluation and Development by Objectives (EDO)

EDO requires that each faculty member develop annual Individual Objectives regarding Teaching, Research, and Service with the advice of the Department Head. At the end of the review period, the faculty member submits an Individual Performance Report to the Department Head. The Department Head reviews the Individual Objectives and Individual Performance Report and evaluates the faculty member's performance based on one of four metrics:

- Exceeds Expectations for Rank,
- Meets Expectations for Rank,
- Needs Improvement for Rank, or is
- Unsatisfactory for Rank.

Each college and department establish standards for performance evaluation. The standards must be approved by the dean and Provost. The EDO process for TT faculty is detailed in the Faculty Handbook, 3.4. An additional review process, called Enhanced Post-Tenure Review (EPPR) is required of any tenured faculty member who receives "Unsatisfactory for Rank." All tenured faculty members are subject to Post-Tenure Review (PTR) every six years. PTR does not substitute for the EDO process.

The department has a peer review program for new TT faculty. Each semester tenured faculty observe and provide feedback to new faculty about their teaching. This process lasts for several years. This has proven to be a useful mechanism for new teachers. [Appendix 4-H](#) contains the department's Peer Evaluation of Instruction form.

4.6.2 Nontenure Track Faculty Reappointment and EDO

For NTT faculty, reappointment is an administrative process that is linked with need and availability of funding. Lectures receive annual reappointment through the administrative process. Teaching appointments of Associate Lecturers may be made for a term of up to three years. Teaching appointments for Senior Lectures may be made for a term of up to five years. This is determined by the provost's office in consultation with the dean of the college and the Department Head.

Like TT faculty, NTT are subject to the EDO annual review process, which occurs for all full-time faculty, regardless of appointment classification. The scope of a non-tenure-track faculty member's evaluation will be determined by the assigned duties specified in the faculty member's appointment letter, and the standards for evaluation should be consistent with the relevant standards of performance for teaching, research, and service as defined at UTC. Reporting of evaluation results should be consistent within the academic department and the college and are subject to the approval of the dean (UTC Faculty Handbook 4.4). NTT Faculty develop annual Individual Objectives regarding Teaching and Service with

the advice of the Department Head. At the end of the review period, the faculty member submits an Individual Performance Report to the Department Head. The Department Head reviews the Individual Objectives and Individual Performance Report and evaluates the faculty member's performance based on one of four metrics:

- Exceeds Expectations for Rank,
- Meets Expectations for Rank,
- Needs Improvement for Rank, or is
- Unsatisfactory for Rank.

Each college and department establish standards for performance evaluation. The standards must be approved by the dean and Provost. There is not a process in the Handbook that addresses the situation of an NTT faculty earning "Unsatisfactory for Rank."

The department has a peer review program for new NTT faculty. Each semester members of the NTTRP observe and provide feedback to new faculty about their teaching. This process lasts for several years. This has proven to be a useful mechanism for new teachers. [Appendix 4-H](#) contains the department's Peer Evaluation of Instruction form.

4.7 Assessment of Faculty Strengths, Weaknesses and Recommendations for Change

4.7.1 Faculty Strengths

The areas of expertise of the Department of Biology, Geology, and Environmental Sciences are diverse, allowing us to offer a diverse curriculum and contribute to a positive student experience. Our greatest strengths are our faculty accomplishments, our positive impact on student success, and our faculty awards.

4.7.1.1 Faculty Accomplishments

The BGE faculty have amassed an outstanding record in all three areas of faculty responsibility over the past five years. The Department has been among the leaders at this institution in establishing high academic standards. The graduate students have bestowed favorable ratings on the quality of our teaching. Course learning evaluations of BGE faculty are consistently strong and in line with evaluation results for other faculty in the College of Arts and Sciences and the university.

The faculty have amassed a strong record of scholarly activity during the past five years. Between 2018-2019 and 2022-2023, BGE faculty accounted for 21% of the extramural funding generated by the College of Arts and Sciences. This number was as high as 37% in 2019-2020. During the five-year review period several BGE faculty were supported by significant and competitive external programs, including the National Science Foundation CAREER, Population and Ecology Core, IRES, and REU programs and the National Institutes of Health R15 program. Departmental faculty have published more than 260 papers and book chapters in refereed journals of regional, national, and international scope and edited volumes, government reports, and pedagogical works. The departmental faculty also have been active attendees and presenters at regional, national, and international meetings, even during the height of the COVID pandemic, presenting virtually. In line with the university mission, the department has a strong record of professional, departmental, college, and university service. We also have been engaged in the community in numerous ways, including outreach activities with local wildlife centers, collaborations with local health care facilities, and the creation of a community garden.

4.7.1.2 Impact on Student Success

The strengths of our faculty benefit our graduate students. Local, regional, national, and international collaborations provide a strong professional network for MS ESC students, increasing their likelihood of success. Many of the presentations and peer-reviewed publications generated by our faculty include

student contributors, but also, our students have been first author on presentations and publications. See Appendices [4-I](#), [4-K](#), [4-M](#), [4-N](#).

Many of our MS ESC students have been successful in securing internal funding from sources including the UTC Provost Student Research Award (PRSA), The Graduate School, and URaCE Scholarship, Engagement, the Arts, Research, and Creative Activity (SEARCH) Award. Two MS ESC students earned National Science Foundation Graduate Research Fellowships (GRFP) during the reporting period. Several students in our program have progressed to PhD programs while many others have been successful in securing jobs in the field of environmental sciences.

4.7.1.3 Faculty Award

As a measure of the esteem in which the faculty of this department are held by the university administration, the department has among the highest number of named professorships of any department on campus, including nine UC Foundation Professors, two Guerry Fellows, one Professorship dedicated to research in Chestnut Biology (Davenport), and two Professorships dedicated to outstanding teaching (Collins Professorship and the Wilson Professorship). The departmental faculty also have earned institutional awards over the years for outstanding teaching, advising, and research.

4.7.2 Weaknesses and Needs

There remain serious challenges that must be faced by the Department. Our greatest need is for more resources, including more funding and equipment for instruction and research, additional tenure-track faculty lines that would increase opportunities for student research mentoring, and funding for more support personnel (e.g., lab managers, museum collection managers, a greenhouse manager, more advisors, and more office help). Although faculty diversity has improved since our previous program review, we need to continue efforts to attract more women and under-represented minority applicants during future hires of tenure-track faculty who will contribute actively to the graduate program and to retain those faculty.

4.7.2.1 Faculty workloads and new hires

The overall 12% decrease in undergraduate student enrollment in BGE from 2018-19 to 2022-23 has alleviated some of the demand on our faculty and resources. However, enrollment in our undergraduate ESC program has grown by nearly 40%, which has created increased demands for faculty and resources in this area. This impacts graduate faculty time and resources. Across the Department, our student credit hours are consistently higher than the university average, and many faculty are consistently teaching larger sections of undergraduate lecture courses than they previously taught. In addition, several of our faculty have received teaching load reductions due to high scholarly activity, successful grant writing, and administrative roles within the department and the university. To accommodate these reductions in faculty availability, many NTT faculty take on teaching overloads, and some of our TT faculty regularly teach undergraduate core courses at the expense of more specialized, upper-level undergraduate or graduate courses. We regularly hire adjuncts to cover courses typically offered by TT faculty with teaching load reductions or omit them from the schedule. Because of low pay levels set by the institution for adjunct instructors, and the difficulty of finding individuals with the expertise and willingness to teach advanced upper-level courses, the department faces ongoing problems in recruiting and retaining qualified adjunct faculty. Low pay for full-time faculty poses recruitment and retention difficulties, especially when starting salaries for NTT faculty are \$40K for MS degrees and \$45K for PhD degrees and TT faculty are mid-\$60K.

4.7.2.2 Faculty Diversity

Although gender and ethnic diversity have improved overall in the last five years (due to recent hires), the department continues to face challenges in increasing diversity and in increasing the number of tenure-track positions held by women. The merger of Biology and Environmental Science with Geology during the previous review period continues to pose challenges associated with historical differences in

expectations for promotion and tenure between the formerly separate departments. These challenges include differences in teaching loads and measures of scholarly activity.

4.7.2.3 Equipment and Research Space

Across the department, faculty continue to be limited by equipment resources that could increase research capacities, as well as limited funding for the maintenance of existing equipment. Faculty in the Geology program, which continues to be housed in Grote Hall, are especially impacted by research space limitations, and continue to utilize storage closets, classrooms, and teaching lab spaces for conducting research. As Geology faculty engage in research with graduate faculty, more resources are needed, including space and equipment. The lack of stable funding to purchase, repair, and replace equipment negatively impacts BGE faculty engaged in formal and informal teaching research activities and student learning. While the renovation of Holt Hall included a dedicated computer lab for teaching, computational resources continue to be limited in most teaching labs, which can limit opportunities for students to develop quantitative and computations skill sets.

4.7.2.4 Faculty Involvement in Graduate Teaching and Advising

Some faculty that regularly participate in the graduate program (e.g., by advising graduate students) do not regularly teach graduate level courses. This challenge is due in part to the need for faculty to teach undergraduate courses in Biology, Geology, and Environmental Science. We need to evaluate how we offer graduate elective courses to address this issue. We should examine our graduate core courses and associated teaching schedule to increase the presence of our female faculty in the graduate program's core curriculum. The addition of a non-thesis course-based track to our graduate program has allowed for a modest increase in program size while controlling faculty advisement loads. Continued increases in our graduate enrollment would make it easier to justify additional graduate teaching assignments.

Concerns with faculty involvement also extend to advising load. MS ESC graduate advising is unevenly distributed among the graduate faculty. Advising for non-thesis students is mainly covered by the Graduate Program Director. This weakness needs to be addressed. Since our last review, 16 of our current graduate faculty advised 111 students, but the advising load ranged from 1 to 40 students advised over the review period. To alleviate this disparity, faculty are encouraged to develop a Student Centered yet Community Focused approach that includes graduate students in their teaching, research, and service.

4.7.2.5 Program Size

Graduate student credit hours increased by 55% between Fall 2018 and Fall 2022, and the number of student credit hours per graduate faculty member has also increased by 55% during the same period. These increases could result from increased enrollments, potentially facilitated by the addition of a non-thesis track to our graduate curriculum. While they also illustrate increased teaching demands on our graduate faculty, we continue to face two major impediments to graduate student recruitment. First, our graduate faculty contribute to teaching in our large undergraduate programs in Biology, Geology, and Environmental Sciences, which limits their capacity to supervise graduate student theses, internships, and mentored research experiences, which are not included in faculty teaching loads. Second, the Graduate School offers a limited number of graduate teaching assistantships, and this number has decreased substantially during the reporting period. Additionally, these assistantships do not provide a living wage to our graduate students, especially given the increased cost-of-living in Chattanooga during the past five years. This leaves some prospective students no choice but to accept positions at other universities with higher student assistantships.

4.7.3 Recommendations for change

Our goal is to grow the MS program in Environmental Science. Growing this program will require the following investments from the university. The department continues to be challenged by faculty, infrastructure, and other resources. To help address these challenges, we make the following recommendations:

- Increased number and size of graduate student assistantships, in line with universities of comparable size
- Increased faculty salaries, including graduate faculty (tenure-track) and the instructors and adjuncts that relieve graduate faculty of other duties
- 1-2 additional tenure-track lines, which will increase capacity to accept students
- 1-2 support staff, in areas of molecular biology lab management, animal care, and natural history collections management
- Inclusion of graduate student advisement (thesis, internship, mentored research experiences) in faculty workloads
- Explore reasons why some graduate faculty chose to advise non-thesis students and why others do not. The load needs to be better distributed, so learning more about the problem is essential to finding a solution.
- Investment in modern academic and research facilities. These changes will facilitate greater involvement of graduate faculty in the recruitment and advising of graduate students and ultimately, growth in the MS ESC program.
- Internally, we need to evaluate how we offer graduate courses, seeking ways to increase inclusion of faculty with diverse interests in the curriculum. Although several recent faculty hires have improved diversity among our faculty, the department needs to continue efforts to recruit more women and members of under-represented groups in future hires and to increase their presence within the graduate program.

5 Graduate Learning Resources

5.1 Evaluation and Improvement of Equipment and Facilities

The department is in both Holt and Grote Halls. The square footage space is 40,014 ft² for Holt Hall and 11,753 ft² for Grote Hall, for a combined total of 51,767 ft². In Holt Hall, this includes all offices, storage, research labs, and teaching labs. In Grote Hall, this includes all offices, storage, research labs, anatomy/physiology labs, and geology classrooms/labs. Academic Affairs controls all general use classrooms in both buildings and though we use the rooms frequently, there are other disciplines who teach in those classrooms.

5.1.1 Instructional Equipment

A detailed list of current departmental equipment that initially cost at least \$1,500 is provided in [Appendix 5-A](#). Of note, current major equipment includes:

- Confocal microscope
- Scanning electron microscope
- Environmental controlled growth chambers
- Fluorescence and gas exchange system package
- Two Tuttnauer steam sterilizers (autoclaves), one of which was purchased in Fall 2023
- Microarray scanning system
- Microplate reader
- X-ray fluorescence Spectrometer
- Seismometer
- Large cutting saws
- Thin-section machine
- Shaker Separation Table, purchased in 2023
- Frantz Magnetic Barrier Laboratory Separator, purchased in 2023
- Multiple petrographic microscopes
- Teaching microscopes
 - 209 compound microscopes
 - 94 stereoscopes
 - ~20 polarizing microscopes
- Water Filtration Systems (all Millipore Sigma)
 - Direct-Q 5 UV
 - Elix Essential 5
 - Milli-Q Direct 8
 - Direct-Q 3 UV, replaced September 2023

5.1.2 Process for Evaluating Equipment Needs

Equipment needs are evaluated annually. The Equipment Committee maintains a ranked equipment needs list of items that play critical roles in teaching and/or research labs. A detailed ranked equipment list for the department is provided in [Appendix 5-B](#). Faculty may request that new items be added to the list at any time, but the ranking of the list occurs one time per year in the early spring. All new items placed on the list are added to the bottom. However, if the Equipment Committee agrees that the justification for needing the equipment warrants moving that item up in the rankings, then that item will gain a better ranking than older items on the list that have lesser documented need. For a new item to be added to the list a faculty member fills out a form and submits the request to the committee chair. The following information must be included on the form:

- Details of the item(s) requested

- Cost for the item(s).
- Justification for the requested items must be included
- The category of the equipment needed
 - To maintain course instructional integrity
 - To meet existing infrastructure deficiencies
 - To meet continuing student/faculty research objectives
 - Some estimation of the annual number of students to be impacted by the purchase of the equipment,
 - If in support of teaching labs, a listing of the course number affected.

Once the committee ranks the list for a given year, it is shared with the Department Head, who shares it with the rest of the faculty, asking for their comments. When funds become available the Department Head uses the list to select items to purchase that are most highly ranked first, unless upper-level administrators or potential donors indicate a preference to fund purchase of lower ranked items.

5.1.3 Service contracts and repairs

The department currently holds a service contract with OmniScientific. This company provides troubleshooting and repairs for scientific equipment, especially the two autoclaves. They also perform preventative maintenance on the autoclaves. The service contract is renewed yearly and is \$30,000 annually. In addition to the agreement with OmniScientific, the department also holds a service contract with MilliporeSigma to service our four distilled water filtration systems. The cost this year was approximately \$7750, which is a decrease from last year as the system that was replaced would fall under warranty. Otherwise, the cost is around \$10,300 annually. Other equipment is serviced annually or quarterly depending on the needs, these include the growth chambers, balances, pipets, and microscopes. Our BioSafety cabinets and Ductless Fume Hoods get certified yearly by Steris (Controlled Environment Certification Services). Additionally, several pieces of equipment are regularly in need of repairs and preventative maintenance. These services are not contracted and are paid per visit. The primary pieces of equipment that get regular visits from a local repair company are -40 and -80-degree Celsius freezers, scientific refrigerators, walk-in coolers, and any HVAC systems connected to greenhouses or other outbuildings. All visits are covered by the department budget, either state operating, lab fees, or gift funds.

5.1.4 Teaching Labs

Functional and well-equipped teaching labs are essential for the teaching needs of our faculty and Graduate Teaching Assistants (GTAs). The needs of teaching labs are evaluated annually, and lab fees are used to support the purchase of lab supplies. A high volume of students passes through introductory 1000-level labs each year, totaling more 1200 students in Biology, 300 students in Environmental Sciences, and 600 students in Geology. BGE has five rooms devoted to introductory labs, including three for Biology, one for Environmental Science, and one for Geology. The lab fees generated each year for all three divisions are more than \$170K. Details on lab fees can be found in **Section 6 Budget**. The fire code seating limit in individual lab sections is 24 students for Biology and Environmental Science, and 30 for Geology. The department typically runs about 92 individual introductory lab sections per year. Approximately 2,200 students enroll in these lab sections each year. Below, we provide details on the major Biology, Geology, and Environmental Science labs and their associated resources.

5.1.5 Introductory Biology, Environmental Science and Geology Labs

All introductory Biology labs have a compound microscope, with a camera and small monitor that sits on top of the microscope. This microscope was purchased for those students that are visually impaired and cannot see through the ocular lenses of a regular microscope. This allows the students to still learn how to

use a microscope and see the specimens. A second microscope equipped with a camera and monitor was purchased in the Fall of 2023.

- Principles of Biology I (BIOL 1110L), Holt 216 and 223: In each of the Principles of Biology I lab, every student has their own microscope to use (24 in each room). Mounted televisions are connected to computers that allow instructors to show required videos, give presentations and share pictures of microscope slide specimens.
- Principles of Biology II (BIOL 1120L), Holt 224: There are 24 microscopes available for the students to use, which means that there is one microscope per student. Mounted televisions are connected to computers that allow instructors to show required videos, give presentations and share pictures of microscope slide specimens. When the microscope with the camera is not in use for a visually impaired student, instructors can use this scope to show students microscope slide specimens.
- Introduction to Environmental Science (ESC 1500L and 1510L), Holt 225: The lab is kept well stocked with glassware and supplies for specific lab activities, in part due to the introduction of lab fees years ago. For example, the ESC lab is well stocked with microscopes (12 compound microscopes and 12 dissecting scopes, making it possible to have a microscope at each individual table). The ESC lab also has digital balances, functionally replacing the triple-beam balances that had been previously used for so many years (it should be noted that Dr. Reynolds adds digital balances every so often when he places orders, with the ultimate goal being to have a balance on each lab table, 12 total). Dr. Reynolds, it should additionally be noted, occasionally adds new lab activities to the 1500L and the 1510L curriculums. The Department has been excellent at ordering supplies in support of these new labs. Mounted televisions are also connected to a computer that allows instructors to show required videos, give presentations, and share pictures of microscope slide specimens.
- Physical Geology (GEOL 1110L) and Earth and the Environment (GEOL 1105L), Grote 206: These labs share the same room, so scheduling is strategic to avoid conflict. Equipment available in the lab includes three mounted televisions and a projection screen that allow videos, presentations, timers, and other images to be shown from the computer. Rock and mineral hand sample boxes and Brunton compasses are kept in this room, in addition to basic lab supplies. In the storage room between Grote 206 and 208, there are supplies such as a topo box to project topographic contour lines on sand than can be changed in real time, several shelves of additional rock, mineral, and fossil samples, some glassware, and other lab supplies such as laminated handouts.
- Historical Geology (GEOL 1120L), Grote 208: This is a multi-use room that is used for both lecture and lab. Equipment available includes projector and document with Vivi wireless connection, sample storage cabinets, mineral, rock, and sand samples, fossil specimens, and two petrographic microscopes (one with a camera and screen).

5.1.6 Service Labs, Anatomy, Physiology, and Microbiology

Functional Human Anatomy (BIOL 2060), Human Physiology (BIOL 2080), and Microbiology and Health (BIOL 2100) are service labs taught by the department. These serve more than 450 students each year, most of which are pre-nursing and health and human performance majors. Anatomy lab is taught in Grote 109 and the Physiology lab is taught in Grote 108. The teaching equipment in the lab includes a computer that projects to TV monitors placed around the room. There is a raised platform with a computer, document camera and attached microscope. The primary equipment for the labs includes:

- Two 45 cubic foot double door refrigerators for specimen storage
- Dissecting pans and tools
- Histology materials
 - o 15 light microscopes

- o Prepared slides of selected tissue types
- o Hanging skeletons
 - Three real bone
 - One plastic
- o Eight real bone disarticulated skeletons
- o 11 real bon skulls
- o Five bone cast/plastic skulls
- o Somso and 3B Models
 - Arm muscles
 - Leg muscles
 - Torso muscles
 - Oral cavity
 - Thoracic cavity
 - Nasal cavity
 - Abdominal cavity
 - Human reproductive system (male and female)
 - Circulatory system
 - Respiratory system
 - Digestive system
 - Urinary System
 - Eye
 - Brain
 - Ear
 - Head and neck, new November 2023
 - Torso with head, new November 2023
- o Histology models
 - Bone
 - Muscle
 - Epithelium
 - Nervous tissue

Microbiology lab is taught in Holt 330. This location is used for both BIOL 2100 and the upper-level majors' course, Principles of Microbiology, BIOL 4220. The teaching equipment includes a computer that is linked to a projection screen with a document camera attached. Microbiology labs include physical lab space for both teaching and research and dedicated spaces for the Microbiology Preparation Lab and Autoclave room. Supplies include:

- 10+ types of bacterial growth media, most of which come in dehydrated form
- UV Sterilizers for Eye Protection
- Lab coats
- Plastic petri dishes
- Incubators
- Multiple refrigerators
- Biosafety Cabinet
- Two Tuttnauer steam sterilizers (autoclaves), one of which was purchased in Fall 2023
- Materials used by Microbiology Preparation Lab to produce bacterial cultures:
 - o Balance
 - o Three hot plates/mixers
 - o Two peristaltic pumps dispensers
 - o One pH meter
 - o Two Bunsen burners

- o One Dishwasher
- o Loops and needs for inoculation
- o Glassware
 - Erlenmeyer flasks ranging in size from 125 ml to 2.0 liters
 - Test tubes of various sizes
 - Graduated cylinders
 - Beakers of different sizes

From 2012 to present, the microbiology prep lab of BGE has been functioning under the supervision of a lab coordinator who is also in a full faculty teaching position. The lab coordinator reports to the Biology, Geology, and Environmental Science (BGE) Department Head and oversees the day-to-day operations of the Microbiology Preparation Laboratory. This ensures faculty have access to media, cultures, and equipment necessary to meet the laboratory competencies of their courses in a safe, clean, and organized environment. The Microbiology Prep Lab and the coordinator are responsible for the preparation of microbiology teaching laboratories, including BIOL 2100L, BIOL 4200L, BIOL 4430L, and BIOL 4530L. The coordinator is responsible for the supervision, training, and evaluation of student laboratory assistants; supervises the ordering of all laboratory supplies; maintains the inventory files and ensures that all prep room chemicals are properly stored and documented; maintains stock cultures for microbiological samples; ensures that all biological specimens, equipment, and other materials are properly stored; ensures that all chemical and biological waste is properly collected, stored, and removed for disposal and ensures that all laboratory equipment and instruments are properly maintained. The coordinator, along with an average of two student assistants per semester, ensures that all labs meet applicable safety regulations and that the faculty have the materials and equipment needed to teach their courses.

5.1.7 Upper-Level Biology, Environmental Science, and Geology Labs

Upper-level and core Biology and Environmental Science labs are typically scheduled in all-purpose lab rooms in Holt Hall, equipped with lab benches and relevant equipment (e.g., scopes, slides, specimens). MS ESC students would use these spaces if they were enrolled in elective courses that are cross-listed with undergraduate courses. Biology and Environmental Science has dedicated teaching labs, some of which are also used for research. Upper-level Geology lectures and labs are taught in Grote 210 and 208, which are multi-purpose rooms that hold up to 30 students. Details of the lab space available primarily for teaching Biology, Geology, and Environmental Science lab classes is provided in Table 5.1

Table 5.1 Current use of teaching lab space for Biology and Environmental Science.

Teaching Laboratory Space/Room	Current Use		Classes Taught
	Teaching	Research	
Holt 110	X	X	Mudroom used for storage of field equipment
Holt 112	X	X	Plant Morphology
			Plant Taxonomy
Holt 120	X	X	Cellular Biology
			Genetics
Holt 123	X		Animal Behavior
			Ichthyology
			Intro to Soil Resources
			Limnology and Reservoir Ecology
			Ornithology

			Wildlife Education and Rehabilitation
Holt 216	X		Principles of Biology I
Holt 223	X		Principles of Biology I
Holt 224	X		Principles of Biology II
Holt 225	X		Introduction to Environmental Science I
			Introduction to Environmental Science II
Holt 228	X		Entomology
			Human Development and Disease
			Meiofauna Biodiversity
			Parasitology
			Pollinator Biology
Holt 230	X		Air and Water Pollution
Holt 318	X		Ecology
			Plant Ecology
			Toxicology
Holt 321	X		Ant Ecology
			Comparative Vertebrate Zoology
			Dendrology
			Histology
			History of Evolutionary Thought
			Mycology
Holt 330	X		Microbiology and Health
			Principles of Microbiology
Holt 331	X		Bioremediation
Grote 106	X		Rock storage room
Grote 107	X	X	Rock prep and thin section lab
Grote 108	X		Human Physiology
			Introduction to Animal Physiology
Grote 109	X		Functional Human Anatomy
Grote 206	X		Earth and the Environment
			Oceanography
			Physical Geology
Grote 208	X		Earth Surface Processes Geology
			Historical Geology
			Paleontology
			Sedimentology and Stratigraphy
Grote 209	X	X	Research Design

			Senior Research Project
Grote 210	X		Hydrology
			Mineralogy
			Petrology
Multidisciplinary Research 102	X		Geographic Information Systems (ESC)
			Remote Sensing & Imagery Analysis (ESC)

5.1.8 Research Labs

Biology, Geology, and Environmental Science faculty also have dedicated research space, some of which is also used for teaching. Worth noting is that Holt 313-317 are not managed by BGE, but by the Institutional Animal Use and Care Committee (IACUC) and the Vice Chancellor for Research. Only faculty who have assigned space have access to the rooms. The BGE Department Head and Faculty Associate (who have sub-masters for the building) do not have access. Details of the lab space available primarily for Biology, Geology, and Environmental Science research are provided in Table 5.2.

Table 5.2 Current use of research lab space for Biology, Geology, and Environmental Science

Research Laboratory Space/Room	Lab Name	Faculty: <i>Field of Research</i>
Fortwood Greenhouse	The Fortwood Street Greenhouse and Nursery	Dr. Hill Craddock: Chestnut breeding (with The American Chestnut Foundation), Dendrology, Mycology, Campus Landscape Committee/Tree Care, Linda Collins Arboretum, MS and DHON student research space
Holt Greenhouse	Holt Green House	Available to all faculty who need use of a greenhouse, used primarily by Dr. Jose Barbosa who cultivates the Teaching and Learning Garden
Grote 107	Rock Prep and Thin Section Lab	All Geology Faculty
Grote 110	Plant Ecology Lab	Dr. Jennifer Boyd: Plant Ecology, Ecophysiology, Species Rarity
Grote 111	Geological and Environmental Remote Sensing Lab	Dr. Azad Hossain: Geological and Environmental Remote Sensing Laboratory (GERSLab)
Grote 112	Evolutionary Ecology Lab	Dr. Hope Klug: Evolutionary and Behavior Ecology, Fish Behavior and Conservation
Grote 113	Biogeochemistry Lab	Dr. Ashley Manning-Berg: Sedimentology, Geobiology, and Low-Temp Geochemistry (Carbonate, Chert, Microbial Decomposition, Water Chemistry, and Microplastics) and Future use by new assistant professor (search underway)

Holt 101	Ichthyology Collection	Dr. Francesca Leasi. Microscopic invertebrates collection and future use by new assistant professor (search underway)
Holt 101A	Ichthyology Collection	Future use by new assistant professor (search underway)
Holt 102	Amphibian/Reptile Conservancy	Dr. Tom Wilson: Amphibian and Reptile Conservation Ecology
Holt 102A	Fungi Collection	Dr. Hill Craddock: Mycology
Holt 103	Insect Collection	Dr. Stylianos Chatzimanolis: Beetle Systematics & Paleontomology
Holt 104	Mammalogy Collection	Dr. Tim Gaudin: Mammalian Systematics, Paleontology, Biogeography and Comparative Anatomy
Holt 107	Spring Wildflower Pilgrimage HQ	Dr. Joey Shaw: Public Outreach and Education, Botany, Field Botany.
Holt 107A	Ornithology Lab/Collection	Dr. David Aborn: Avian Ecology & Management
Holt 112	Jane Holden Teaching Lab	Dr. Joey Shaw: Botany, Field Botany, MS student space to spread specimens.
Holt 114A	Plant Molecular Biology/Yeast Genetics	Dr. Jose Barbosa, Biochemistry and Molecular Biology of Plants and Yeast Genetics
Holt 115	Plant Molecular Biology/Yeast Genetics	Dr. Jose Barbosa, Biochemistry and Molecular Biology of Plants and Yeast Genetics
Holt 116	Herbarium	Dr. Joey Shaw: Botany, Field Botany, MS student research, supporting regional resource
Holt 117	Field equipment storage room	Dr. Tom Wilson [Herpetology] and Dr. Tim Gaudin [Mammalogy] - site to store dry equipment for field research
Holt 120A	Genetics Research Lab	Dr. Jannatul Ferdoush: Molecular Biology and Genetics
Holt 201	Systematic Entomology Lab	Dr. Stylianos Chatzimanolis: Beetle Systematics & Paleontomology
Holt 227A	Mammalogy Research Lab	Dr. Tim Gaudin: Mammalian Systematics, Paleontology, Biogeography and Comparative Anatomy
Holt 301	Radioactive Materials Lab	Dr. Henry Spratt: Microbial Ecology
Holt 304	Microbiology Research	Dr. David Giles: Microbial Pathogenesis
Holt 305	Microbial Ecology Lab	Dr. Henry Spratt: Microbial Ecology and Clinical Microbiology
Holt 305C	Autoclave room	Dr. Henry Spratt: Microbial Ecology and Clinical Microbiology; Dr. David Giles: Microbial Pathogenesis; Dr. Jose Barbosa: Molecular Biology; Dr. Jannatul Ferdoush: Molecular Biology
Holt 305D	Microbiology Prep room	Dr. Henry Spratt: Microbial Ecology and Clinical Microbiology

Holt 306	Herpetology/Team Salamander	Dr. Wilson: Student Centered Group Focused on Monitoring Amphibian and Reptile Populations
Holt 308	Integrative Ecology Lab	Dr. DeAnna Beasley: Urban ecology, insect ecology, public science
Holt 309	Behavioral Ecology Lab	Dr. Loren Hayes: Animal social systems
Holt 317 A, B, C	Animal Facilities	IACUC Space, Dr. Wilson: Turtle Survival Alliance
Holt 318A	Environmental Toxicology Research Lab	Dr. Sean Richards: Toxicology
Holt 320	Mammalogy Preparation Lab	Dr. Tim Gaudin: Mammalogy - site of specimen prep for mammals, houses dermestid beetle colony for cleaning skeletons
Holt 323	Molecular Genetics Research Lab	Dr. Francesca Leasi. Meiofauna Biodiversity and Environmental DNA Studies and expansion space available for a new hire.
Holt 324	Rock Preparation Lab	Dr. Jennifer Taylor: Structural Geology, Petrology, and Geochronology and expansion space available for a new hire
Holt 350i	Chestnut Lab/Mycology Lab	Dr. Hill Craddock: Chestnut breeding, chestnut systematics, Mycology, MS student research space, DHON student research space

5.2 Learning and Support Resources to Support Teaching and Learning

5.2.1 Motor Vehicles and Other Vessels

The Department currently has an 8-passenger 4wd SUV (purchased in 2022) with towing ability, a 12-passenger van, and one single cab 4wd truck with towing ability that can be used by faculty, staff, and employed students for teaching and research activities. Reservations for these vehicles occur through a shared Google calendar. Use priority is given to teaching. Additional vehicles can be reserved from the motor pool at a cost. BGE has two additional vehicles purchased to support specific research programs: a small Toyota SUV for the American Chestnut Restoration Program and a four door Ford heavy duty dually truck to trailer Dr. Wilson's research boat. MS ESC students frequently check-out motor vehicles for travel to field sites for research.

BGE has one general use boat that can be used by faculty, staff, and employed students for teaching and research activities and three boats purchased to support specific research programs. In 2021, BGE purchased a general purpose 21.5' Tracker Grizzly jon boat that can be towed by the SUV or the single cab truck. This boat replaces a 21-foot pontoon boat that was totaled by a falling limb years ago. The Tracker is powered by a 115hp 4 cycle Mercury outboard motor and is a shallow draft stable boat with low sides suitable for aquatic sampling. The boat is equipped with all required safety gear. The 9-person capacity Tracker is available for use by all faculty for teaching and research purposes.

Research boats purchased to support specific faculty include a 26" river research boat, a motorized kayak, and a 15' jon boat. The BGE river research boat is called the *utC. Serpentina* and it was designed by one of our faculty and built by Clarke Custom Boats and Trailers. The *Serpentina* is a 26-foot heavy-duty

research vessel with a shallow draft and is designed to accommodate nets, turtle traps, etc., and carry up to 24 people. Primary power is from a 200hp 2 cycle Mercury outboard motor. The boat is equipped with an auxiliary motor, fuel cell, running lights, submersible lights, three on board batteries, depth finder, GPS, underwater camera, sonar, two-way communications, and appropriate safety gear. The department also has an 11-foot Kayak (made by Mokai Industries) that is jet propelled by a Honda inline motor. BGE also has a 15' G3 jon boat powered by a 40hp 2 cycle Yamaha outboard motor and equipped with a trolling motor and safety equipment. The department also has a 14 foot utility trailer for use on overnight field trips. Other non-motorized vessels (e.g., canoes) can also be checked out for use by students and faculty through the UTC Aquatic and Recreation Center.

BGE vehicles are kept in the parking lot behind Holt Hall, the three boats and utility trailer are stored off campus in a locked fenced facility located just off campus. It is a new location purchased by UTC for surplus storage and it is right next to the UTC Intramural Fields, 1110 Oak Street. Figure 5.1 shows the boat and trailers in storage status. The motorized kayak is stored in 110 Holt Hall, BGE's Mud Room. Additional boating safety equipment and tow hitch are also stored in the Mud Room.

Figure 5.1 BGE Boat and Trailer Storage



5.2.2 Construction Room

Over the years various faculty and students have constructed items to support teaching, field research, and research laboratories. Faculty typically supplied personal tools and constructed items in their research labs or outside in the loading dock area. Department faculty recognized the need for a dedicated space and tools and included a Construction Room in the Holt Hall Renovation plans. In 2021, the College of Arts and Sciences provided funds to purchase tools and equipment for the new room. Working with the Campus Safety Office and BGE Safety Officer, the Construction Room became operational in 2022. The room is now well-equipped with common shop items. Table 5.3 contains the list of available equipment.

Table 5.3 BGE Construction Room Tools & Equipment

Hand Tools	250 Piece Mechanics Set (Kobalt) Hammer (16 oz Estaing) Dead Blow Hammer (Kobalt plastic 28oz) Vise (4") Pipe Clamps (2 2.5') Spring clamps (4) One Handed Bar clamps (2) Level Speed square (plastic) Square (aluminum) Staple Gun (Arrow), 5/16" and 3/8" Stainless Staples Hacksaw (12") Adjustable Wrench Set Screwdriver kit Channel lock pliers set
Power Tools (Corded)	Compound Sliding Miter Saw (DeWalt 12"), 2 General Construction Blades, 1 Metal/Plastic Blade Band Saw (Porter Cable Benchtop) Jig Saw (Bosch), jigsaw blade kit Drill Press (Wen Benchtop) 3/8 Hand Drill (DeWalt), Skil Drill/Driver Kit Angle Grinder (DeWalt 4.5"), 4.5" Abrasive Disks Bench Grinder (Delta) Random Orbit Sander (Bosch 5" 8 Hole), 80, 180, 220 grit disc sandpaper Belt Sander (Metabo HPT 3" x 21"), 3" x 21" 80 grit sanding belts Shop Vacuum (Craftsman 12 gallon) Air Compressor (California Tools Quiet 10 Gallon Portable), 50' air hose, attachment kit 50' 14/3 Extension Cord 25' 12/3 Extension Cord
Power Tools (Battery)	DeWalt 6 Tool 20V Combo Kit Impact driver Reciprocating saw, blade kit Circular saw (6.5"), 2 blades Oscillating tool, 3 blade kit LED work light Charger Two batteries Tool bag
Benches and Shelving	Tool Bench with Light and Peg Board (Kobalt 45" L x 24" W x 62.5" H) Work Bench (Kobalt 72" L x 24" W) Portable Miter Saw Stand Wire Shelves (DeWalt 3-shelves, 49" L x 18" W x 48" H) Wooden Work Bench (8'L x 4'W) Steel Cabinet
Safety Gear	Safety Glasses N95 Respirator Masks

	Ear Plugs Earmuffs Leather and rubber gloves First Aid Kit

5.2.3 Environmental Growth Chambers

UTC was awarded funds from the National Science Foundation Major Research Instrumentation program in Fall 2013 (Award # 1337530) to support the acquisition of six controlled-environment growth chambers to strengthen its active faculty scholarship, experiential graduate and undergraduate research opportunities, and involvement in community outreach. The growth chambers specifically support faculty research agendas requiring precise and simultaneous environmental controls with focus on global change biology at UTC. Projects completed to date have aimed to help elucidate the role that local adaptation could play in plant species migrations in response to climate warming and provide information about how imperiled eastern hemlock will respond to climate change within the context of hemlock woolly adelgid invasion. More recent NSF-funded research (Award #1655762) aims to improve understanding of species rarity by assessing the ability of rare endemic species to adjust to rapid environmental changes compared to closely related species that are more common. By enabling faculty to conduct year-round campus-based research and consequently integrate more ongoing research into their sizeable teaching duties, the growth chambers have increased research productivity while fostering student research training and experiential learning. In the past five years, ~50 UTC undergraduates have been engaged in research using the growth chambers during lab-based coursework (primarily in Plant Ecology, BIOL 4450, ESC 5450). Because almost 70% of BGE majors are women and 31% represent racial or ethnic minorities, participation of these students in research has been inherently broadened by teaching applications of the chambers. In addition, the growth chambers have supported the research of two students enrolled in the M.S. in Environmental Science Program at UTC, two undergraduate students conducting Departmental Honors (DHON), and an additional 29 students mentored in individualized research experiences. About 85% of these students are women, and 15% represent racial and/or ethnic minority groups. Research conducted in the chambers also has supported collaborations between UTC faculty and faculty at the University of Georgia, University of Oxford (UK), Austin Peay State University, and Seton Hill University, as well as collaborations between UTC and the U.S. Fish and Wildlife Service.

5.2.4 Greenhouses

The Department has access to two greenhouses. One greenhouse adjacent to Holt Hall is for general use and provides a wealth of teaching material that is used in multiple lectures/labs in these courses and from plant anatomy, morphology, evolution to pollination syndromes, growth and development, water use strategies (xerophytes vs mesophytes), and more. Greenhouse activities specifically support and strengthen the MS ESC program by providing plant materials and space that is used in many different laboratory sessions of different courses including Plant Physiology, Plant Morphology, Taxonomy, and Biogeography. In addition, there is space for many other activities including plant research under controlled environmental conditions, medicinal and other plant collections. The second greenhouse is located a block from Holt Hall and is devoted to the American Chestnut Restoration Program.

5.2.5 Teaching and Learning Urban Garden

Since its inception in May 2016, the Teaching and Learning Garden has thus far had a significant impact on our students and the community. The Urban Gardening courses (BIOL 1140 and BIOL 4370) are taught every semester, and open to any UTC student. The courses provide opportunities for active experiential learning. All activities of the course are spread between two field plots: a larger plot of 636 m² contiguous to Holt Hall and a smaller plot of 120 m² across the street from Holt Hall and contiguous to

the Challenger Center. In addition, the greenhouse contiguous to Holt Hall is fully dedicated to supporting activities of the urban gardening course and the garden. Students use this facility mainly for seedlings production during winter and maintaining the germplasm collection of some tropical and medicinal plants. More detail about student learning related to the garden can be found in the **2023 Undergraduate Self-Study Section 3.2.5**.

5.2.6 Collections of the Natural History Museum

The museum holds a collection of fossil vertebrates and invertebrates numbering several thousand specimens (including 1102 catalogued mammals, 250 catalogued birds, 42 catalogued reptiles & amphibians, more than 500 invertebrate specimens, with approximately 3,000-4,000 uncatalogued specimens), and an extant vertebrate teaching collection of more than 500 specimens (216 whole body, whole skeleton, or mounted or preserved dissected specimens and models, roughly 300 microscope slides [chicken embryos, protochordates and misc. histology slides], and ~100 miscellaneous, isolated bones). Additional details of collections are provided below.

- **Mammal Collection:** The UTC Natural History Museum mammal collection, which is curated by Dr. Tim Gaudin, includes 2438 catalogued specimens, representing 226 species in 84 families and 25 orders (i.e., all but three of the living mammalian orders). Based on a 1997 survey [Hafner, M.S., Gannon, W.L., Salazar-Bravo, J. and Alvarez-Castañeda, S.T. 1997. Mammal collections in the Western Hemisphere. Lawrence (KS): American Society of Mammalogists], the mammal collection would be the second largest in the state of Tennessee and is positioned at the opposite end of the other significant mammal collection in the state at the University of Memphis. The mammal collection serves as an official repository for specimens collected in biotic surveys of two national parks (Chattanooga/Chickamauga National Battlefield and the Great Smoky Mountains) and includes significant collections of specimens from east and southeast Tennessee, northwest Georgia, and western North Carolina. Its taxonomic strengths are in small terrestrial soricids and rodents. These collections are used in the Comparative Vertebrate Zoology course (BIOL 4050, 24-48 students per year), the Mammalogy course (BIOL 4140, 24 students every two years), and the History of Evolutionary Thought course (BIOL 4550, 10 students every two years). We are currently in the process of uploading the collection data to the public database SYMBIOTA, so that it will be more universally available for use in the scientific community.
- **Insect Collection:** The UTC Insect collection (UTCi), which is currently curated by Dr. Stelios Chatzimanolis, was established in the early 1970s by Charles Nelson, a Plecoptera expert. Over his 30-year career, Nelson developed an outstanding teaching collection (identified at the family level), with representatives from most USA Southeastern families and approximately 40,000 specimens. Chatzimanolis arrived at UTC in 2008 and quickly established a modern research-focused collection of Coleoptera, which currently has an additional ~45,000 specimens. Six new modern cabinets were acquired and dozens of Cornell drawers to rehouse the teaching collection and make room for the developing research collection. The main geographical focus of the research collection is the SE USA but due to the neotropical research program of Chatzimanolis, many neotropical materials are present as well. In fact, the collection has specimens from 40 different countries, excluding the USA. Chatzimanolis' research focus is the largest family of animals, the rove beetles (with >60,000 species described) and the UTCi collection is quickly becoming one of the more diverse rove beetle collections in North America. The Xanthopygina rove beetle collection at UTCi is probably one of the top 10 in the world, regarding species diversity present in the collection. Because Chatzimanolis is the only rove beetle systematists currently employed in the USA at a university level, UTCi is also becoming the de facto collection for rove beetle specimen identification in the country. Recent donations of materials include 5,000 specimens of rove beetles from Arizona and 2,000 specimens from Paraguay. The UTCi collection is extensively used in BIOL4070 (Entomology) 24 students/year, BIOL4130

- (Invertebrate Zoology) 24 students/year, and BIOL4085 (Parasitology) 24 students/year.
- **Amphibian and Reptile Collection:** This collection includes 5000+ specimens, including ~2000 species, 239 genera, and 78 families (of the 153 recognized), which does not account for a backlog of un-accessioned specimens. Of note, the oldest specimen in the collection from our region is *Regina septemvittata* (Queen Snake) Kenton Co. Kentucky, R.S.W. (Gift from GMU1998/UKR381). The taxonomic focus of the collection is variable but focused on Caudates, Chelonians and Colubrid snakes. Like the taxonomic focus its geographic focus is also variable. This collection is utilized by the following courses and students: BIOL 4090 (Herpetology) 24 students; BIOL 5400 (Special Topics) 2-4 students; ESC 3400 (Environmental Survey Methods) 24 students; BIOL/ESC 4995/4998/4997 (Team Salamander) 8-12 students, every semester; BIOL/ESC 4512 (Amphibian Ecology and Conservation) 24-30 students, and Comparative Vertebrate Zoology course (BIOL 4050, 24-48 students).
 - **Bird Collection:** The bird collection in the UTC Natural History Museum consists of approximately 250 bird specimens and about two dozen nests, representing 106 species and 36 families. Notable specimens include the first North American inland record of Great Shearwater (*Puffinus gravis*) and the 6th Tennessee record of Snowy Owl (*Bubo scandiacus*). The collection is used primarily for BIOL 4710 (Ornithology), which has a limit of 24 students in it. Some specimens are occasionally used by BIOL 4050 (Comparative Vertebrate Zoology).
 - **Fish and Additional Invertebrate and Salamander Collections:** Details of the collections previously managed by Dr. Mark Schorr are provided in Table 5.4. In summary, this collection contains numerous invertebrates, fish from more than 110 families, and more than four species of salamanders.

Table 5.4. An overview of the collections previously managed by Dr. Mark Schorr.

	Drainage	Watershed(s) or project	Year(s) of collection	Specimens	Families	Genera	Species
Invertebrates ¹	TN	NCCP ³	1996-97 ³	?	≥30	≥44	
Invertebrates ¹	River TN	USP/multi. ⁴	1998-2000 ⁴	?	≥76		
Invertebrates ¹	River TN	SRP, multi. ⁵	2012 ⁵	?	≥37		
Invertebrates ¹	River TN	Lookout Cr	2014	?	50		
Invertebrates ²	River multiple	multiple	multiple	?	?		
Ichthyological ¹	multiple	multiple	multi-year	?	?		
Ichthyological ²	multiple	multiple ^{3,4}	multi-year ^{3,4}	?	≥110		
Salamanders ^{1,2}	TN River	NCCP ³	1996-1997 ³	~20	1	4	≥4

¹research/reference collection(s), which contain site- & date-specific information, are used primarily by researchers or professional biologists; however, many of the reference specimens are used for teaching

²teaching collection(s), which may or may not contain site- & date-specific collection information, are used primarily for teaching

³“North Chickamauga Creek Project” (NCCP) -- Site- specific location information is detailed in the following literature: Schorr, M.S., C.H. Nelson, and G. Van Horn. (1997). Ecological assessment of streams impacted by acid mine drainage in the North Chickamauga Creek System, Tennessee, and an evaluation of the mitigation potential of constructed wetlands. Contract Number ID-6-05876-6-00. Annual Report. Tennessee Wildlife Resources Agency, Nashville, Tennessee, 72.

⁴“Urban Streams Project” (USP) -- Site-specific location information is detailed in the following literature: Schorr, M.S., E. Crews, P. Freeman, J. Long, P. Johnson, and D. Fritz. (2001). Assessment of water quality and aquatic macrofauna in Chattanooga area streams. Contract No.

R04101154-64. Final Report. City of Chattanooga, Department of Public Works, Stormwater Management Section, Chattanooga, Tennessee, 444.
⁵“Stream Restoration Project” (SRP) -- Site-specific location information is detailed in the following literature: Schorr MS, Carroll A, Cuervo J, Freeman PL, Genard L, Geren D, Ghazi H, Hubbuch JM, Landis L, Smith JB. (2013). Macrofaunal responses to habitat improvements in two urban streams in Chattanooga, Tennessee. Final Report. The City of Chattanooga, Department of Public Works, Water Quality Program. Chattanooga, Tennessee, 115.

- Herbarium: The herbarium at UTC (UCHT) is the oldest herbarium in Tennessee. Established in 1886 and with several hundred specimens from the early 1900s, today it houses >46,500 specimens with at least another 7,000 in preparation. UCHT’s specimens are digitized and contribute to state-level, regional, national, and international biodiversity data portals. There are specimens from all 50 US states and many of our National Parks, including Mt. Rainier NP, North Cascades NP, Olympic NP, Grand Tetons NP, Yellowstone NP, Yosemite NP, Rocky Mountains NP, Zion NP, Bryce Canyon NP, and Grand Canyon NP. Our herbarium is also international in scope with specimens from Africa, the Middle East (Abu Ghraib, Iraq), Europe, and Southeast Asia. UCHT is an official repository for the Chickamauga and Chattanooga National Military Park. While it is hard to put a monetary value on specimens, averaging a couple of published estimates and adjusting for inflation since the late 1990’s would value the UTC herbarium at about \$4.5 million. It is used to support Plant Morphology, Plant Taxonomy, Field Botany, and Biogeography and it could support more classes. Dr. Shaw frequently has a lab of 3-6 MS ESC students and several undergraduate students each semester who all use the herbarium in their research. It is an education resource as well as a repository for voucher specimens that give life to published studies dating back generations in BGE.

5.2.7 Computers

A detailed list of departmental computers is provided in [Appendix 5-C](#). While some of these computers might be used by MS ESC students as facilitated and allowed by individual faculty advisors, BGE lacks funds for individual computers for graduate students. The Department has acquired approximately 49 computers in the past five years through department, college, university, and grant funds. UTC Information Technology provides support for these computers and initiated a Computer Refresh Program in 2016. The Computer Refresh Program was established to create an annual cycle of computer replacement so that all faculty and staff would receive a new, primary computing device every four years. The university refresh fund contributes up to \$1,400 toward a refreshed device with departments paying for any overages. Prior to this, computer refresh was ad hoc. The university additionally provides a range of relevant software and cloud access, including Microsoft Office Suite, Adobe Pro and Adobe Create Cloud, ArcGIS Pro, AutoCAD, EndNote, Maple, MatLab, Qualtrics, QuestionPro, SAS, and SPSS.

5.2.8 Field Stations

The Department oversees the operations of five Biological Field Stations (BFS) which can be used by the MS ESC students for research purposes. The BFS are in the Ridge and Valley ecoregion, and their underlying geology is dominated by limestone and dolomite formations and rolling hills. The BFS properties are comprised of five distinct parcels.

- Enterprise South Upland (35.100° N, -85.104° W, 77 ha)
- Enterprise South Wetland (35.105° N, -85.138° W, 37 ha)
- UTC Aquatic Laboratory (35.054° N, -85.284° W, 0.24 ha)
- Wisdom Street Wetland (35.081° N, -85.260° W, 2 ha)
- TVA Test Track Wetland (35.099° N, -85.239° W, 1 ha)

The landscapes are a mix of hardwoods and conifers, and all are proximate to various water sources. The wetland habitats stay wet all year-round, but water levels vary with precipitation. The upland and aquatic landscapes at the BFS create habitat for 43 species of amphibians and reptiles, 50 species of birds, and 40 species of mammals. Infrastructure at the BFS includes two outdoor classrooms as well as permanent

study plots, transects, drift fences, a small weather station, and boat storage. This infrastructure provides a framework for training students on basic field techniques, as well as for conducting research. The Enterprise South sites are about a 30-40 minute drive from UTC, while the other sites are within a 20 minute drive from campus. Human encroachment from residential and industrial areas is occurring along the borders of some of the BFS properties, resulting in some habitat degradation (e. g. trash) and security issues in the outdoor classrooms. In addition, the travel time to and from the Enterprise South sites makes it challenging to use them for any labs that are only two hours long. Another reported problem at Enterprise South is the need for multiple keys to access the different sites, which makes it cumbersome to use those areas. The fact that we try to limit the number of keys students creates a barrier for many students to go to those sites for class (e. g. students must collect plant specimens for plant taxonomy) or for graduate research.

5.2.9 Health and Safety

A chemical hygiene plan for the department is provided in [Appendix 5-D](#). The university also maintains an Office of Safety and Risk Management, and details of their activities can be found at the following website: <https://www.utc.edu/safety-risk-management/emergency-management/index.php>.

5.2.10 Library

UTC has a state-of-the-art library that provides access to 400,000+ print and online materials, relevant databases, and discipline-specific journals. All items are available to current UTC students, faculty, and staff for check out and many resources can be accessed online from home via the library catalog, which can be searched from their homepage at <https://www.utc.edu/library>. The library provides access to information in every format available from books, e-books, audiobooks, and journals to online databases, digital image collections, CDs, and DVDs. Inter Library Loan (ILL) is highly effective at getting resources that are not owned by UTC. Articles are usually shared within 24 hours in PDF format. Book and other hard copy documents arrive within 3-7 days. The Library Studio can help with various technological needs. The space has an audio suite, video/photography suite, 3-D printing, and media tables. Students and faculty can also check-out equipment such as professional cameras, GoPro's, camcorders, camera lenses, external microphones, gimbals, stabilizers, recorders, recording cubes, lighting, backgrounds, tripods, music and recording gear, presentation gear (projector, speakers, screens), power stations, and portable disk drives. The Library provides access to small and large study rooms, a computer classroom that can be reserved for instructional purposes, presentation rooms, and conference rooms. Chapel Cowden, one of the library faculty, is assigned as our liaison. She regularly visits the department and reaches out about resources available for the sciences. She can also provide instruction and research support. The Library also offers a program called Affordable Course Materials Initiative (ACMI). This yearly grant support helps faculty identify electronic resources to use for their classes. The library will either purchases e-materials to be linked online or help faculty find other available OER resources.

5.2.11 BGE Study Rooms

We have three study rooms that are open (meaning the doors are not locked). Two are in Holt Hall on the second floor. In addition to comfortable study space and group areas, one of the rooms has a refrigerator, microwave, and sink. The rooms also has a television that can be connected to student computers for group work. A third study room is available on the second floor of Grote. The space is a Map Room for the Geology majors but has a table and other amenities. We also have a graduate student lounge that has swipe card access. This is a dedicated space for graduate students and has similar amenities to the open study rooms. Finally, there is a graduate student office area that is used by the Graduate Teaching Assistants. They hold office hours there and meet with students. There are also several computers and a

printer so that the GTAs can develop materials for the labs.

5.2.12 Teaching and Research with Vertebrates, Human Subjects, and Biohazardous Materials

The Office of Research Integrity manages the Institutional Review Board (IRB), Institutional Animal Care and Use Committee (IACUC), and the Institutional Biosafety Committee (IBC). Both IACUC and IBC are chaired by faculty from BGE. The process for securing approvals is detailed at the following links

- IRB: <https://www.utc.edu/research/research-integrity/institutional-review-board>
- IACUC: <https://www.utc.edu/research/research-integrity/institutional-animal-care-and-use-committee>
- IBC: <https://www.utc.edu/research/research-integrity/institutional-biosafety-committee-ibc>

5.2.13 GIS and Remote Sensing Resources

GIS and Remote Sensing are popular MS ESC classes and graduate student research may require use of these techniques. The BGE Computer lab in Holt 3999 has 24 desktop computers with ArcGIS Pro and the Geology student lounge has five desktop computers with ArcGIS Pro and ERDAS Imagine. BGE faculty also use a computer lab in 540 McCallie Building that has 40 computers with ArcGIS Pro, Erdas Imagine and Google Earth. The Interdisciplinary Geospatial Technology Lab (IGTLab) provides a variety of GIS resources and support services for the university community, including an ESRI site license, ESRI Virtual Campus Courses, Trimble site license, 2+ TB of regional geospatial data, Enterprise geospatial data server, Web mapping development and hosting, Mobile GIS application development, Survey and map-grade GPS equipment, On call support by certified GIS Professional, and Lab and classroom instruction. The IGT Lab has 24 desktop computers with ArcGIS Pro, Erdas Imagine, and Google Earth. Finally, students can install ArcGIS Pro and Erdas Imagine on their laptops and/or personal computers for class and research use for free. Both Dr. Hossain and Dr. Wilson have research GIS resources including high performance computers, large screens for data visualization, iPad for field use and additional software including Resonon Hyperspectral Software, and EPA's BASINS.

5.3 Materials and Support to Encourage Research and Publication

BGE' facilities and resources support research by MS ESC faculty and students and the ability to publish their research. Faculty research and graduate research advisement also is supported to varying degrees by practices that alleviate the teaching demands associated with our large undergraduate programs. In many departments at UTC, the typical teaching load is four class preparations per semester. To facilitate research and graduate student advising, all tenure-track BGE faculty typically teach three course preparations per semester. In part, this general release is facilitated by our practice of assigning Graduate Teaching Assistants to most lab sections associated with our large introductory courses. BGE may provide additional course releases to faculty who are very research active as encouraged by new University-policy; however, our teaching demands often do not allow such releases to be granted in practice. Faculty teaching load is a complex issue and is discussed in more detail in Section 4 Faculty. The costs associated with publication (e.g., page charges, open-access fees) may be paid by external grants, departmental funds, CAS support and the graduate school. In addition, the Office of Research and Sponsored Programs manages the Open Publishing Support Fund (OPSF). The OPSF covers article processing charges for eligible peer-reviewed, open access journals. Funds are available on a first-come, first-served basis, with a maximum award of \$2500 per request. Requests for funding should be made immediately after an article is accepted for publication. Application occurs through the InfoReady Review portal. BGE often supports MS ESC publication costs by using gift funds. The newly endowed Dr. Mark Schorr Memorial Fund for Graduate Students may be used for this purpose once the fund generates revenue.

Online courses do provide support for one GTA over the last two years. They can also provide support to research students by allowing them to have more flexibility in their schedule for research activities requiring fieldwork and/or internships. Similarly, online courses could provide flexibility for faculty research, especially involving extensive fieldwork and/or collaborations with other institutions that make it difficult to be on campus. UTC encourages online course development and delivery and provides extensive support and training for these activities through the Walker Center for Teaching and Learning. BGE graduate faculty have not proposed developing any online graduate courses, though we do offer some cross-listed courses online and hybrid (Global Change Ecology, Behavioral Ecology).

5.4 Assessment of Learning Resources Strengths, Weaknesses, and Recommendations for Change

Very few equipment items are dedicated to the MS ESC program. In our original proposal for the MS ESC program, funds had been requested to purchase equipment for three unique dedicated laboratories: toxicology, general research, and computing. The budget was approved by the UTC Administration when the program was approved, however, these funds were not provided to the program. MS ESC program lacks a computer lab dedicated to our students. The overall limited instrumentation dedicated to bench research has forced many faculty to allow graduate students to use their own research equipment for both teaching and research. This practice should be discouraged, as it can result in damage to the equipment and/or reduce the ability of faculty members to conduct their own research. This is an unsustainable practice, as the loss of a key instrument could lead to the inability to teach a lab-based course, for a graduate student to conduct thesis research, or for a faculty member to conduct his/her own research.

5.4.1 Equipment and Facilities

5.4.1.1 Instructional Equipment

The Chair of the Equipment Committee, Jessica Sanders, has evaluated our equipment needs. The department is not in dire need of any major equipment at this time but could benefit from a few equipment upgrades. The computer lab on Holt 399 holds 24 desktop computers that are approximately 5 years old. Due to their age, software programs that are required for certain courses (GIS, Remote Sensing, etc.) run slowly. The Geology department could also use more storage space for its rock, mineral, and fossil collection.

5.4.1.2 Teaching Labs

Graduate students serve as GTAs in the introductory teaching labs. They are also students in graduate courses that have associated labs. The introductory labs that are taught by GTAs could use some upgrades. **Please review the Undergraduate Self Study Section 5.3.1.1** for specific strengths, weaknesses, and recommendations. The graduate labs (that are cross-listed with undergraduate BIOL and ESC courses) are very similarly equipped. Lab fees are used to ensure equipment is refreshed as possible.

As Table 5.3 clearly shows, many *Geology Laboratories* are currently being used for both teaching and research activities. Since the last program review, two new lab spaces have been added for faculty research. Grote 113 was renovated a Biogeochemistry lab which is shared between Dr. Manning-Berg and the hydrogeology faculty. Holt 324 houses the Rock Preparation Lab which is used by new faculty Dr. Taylor. The addition of these lab spaces is significant because Geology did not have assigned lab spaces for faculty prior to the merger. Facilitating research by assigning dedicated laboratory space to Geology faculty is a positive direction for the department.

The GIS and Remote Sensing programs have grown in recent years at BGE. BGE offers four graduate level GIS and Remote Sensing classes for the ESC Master's program that are cross listed with the undergraduate courses. Currently all GIS and Remote Sensing classes are primarily being held at the Integrated Geospatial Laboratory (IGT) Lab, which is about a 15-minute walk from the Department (on the other side of campus). The lab has the bare minimum computing facility for GIS and Remote Sensing

classes as the computers are old. The lab also has restrictions for after-hours use. The availability of a classroom with efficient computing facilities within the department or in close proximity would be of great benefit by providing an optimum learning environment for GIS and Remote Sensing classes. The computer lab in Holt has only 24 computers and they are not fast enough to handle all that is needed. A request has been made for funds from the college to replace the computers, but that is pending. It has been recommended that we require GIS and Remote Sensing in the graduate program as a core class, but we do not currently have the facilities or faculty to support that recommendation.

5.4.1.3 Research Labs and Other Facilities

Since the completion of the Holt Hall renovation, there has been a significant increase in overall space, primarily for use by Biology and Environmental Science faculty and MS ESC students. All Biology and Environmental Science research faculty have dedicated research/storage space, and many have increased and improved space post-renovation. More space has been identified in Grote for Geology research, but a continued need for Geology will continue to be independent research space, as mentioned. There is not any surge space currently, but half of two different research labs in Holt. All office and research spaces are designated for current faculty or searches that are in progress. If there are any Geology tenure-track hires due to growth, there is not any space in Grote for that expansion. Thus, while the building renovation has improved our space, the department may soon require additional space.

Another area of research where specific equipment needs impact MS ESC graduate students is in the molecular and microbiology areas of research. In particular, graduate students working in these areas need access to the departmental autoclave (steam sterilizer) at some point in their work. Though this previously could have been a weakness due to age of equipment and availability of use, the purchase and install of a new autoclave in the last few months has alleviated this issue. A water filtration system was also purchased to extend the lifetime of the autoclave.

5.4.2 Other Resources to Support Teaching and Learning

- General use vehicles: There are no major needs for general use vehicles at this time, however, should the department van or truck need to be replaced, there are no funds available for purchasing a new vehicle.
- Growth Chambers: No major needs are noted with respect to the growth chambers currently. Annual maintenance costs are about \$3,000 and are covered by the department.
- Greenhouses: The greenhouses need storage facilities for materials including pots, tools, equipment, and chemicals. In addition, a greenhouse manager that could free faculty from being the caretaker of the structures would be beneficial. Ideally, the greenhouse manager would be a student to increase paid student opportunities. Currently the greenhouse functions as what it is intended for (greenhouse), but also as storage place which deters taking advantage of its full capacity. As far as needs for the greenhouse, natural history collections, and the herbarium, we are pushing to start thinking about these as pieces of equipment. Like any other teaching/research tools, they need maintenance and upgrades to keep them useful and functioning. These are valuable resources that span several professors, classes, and students and they support and underlie publications, environmental impact assessments, and grant funding. As such, they need maintenance. However, there is no dedicated budget for any of this. Even more, the collections and greenhouse require constant attention (watering, weeding, repotting, monitoring dermestid). Ideally, BGE needs a new state of the art greenhouse to keep up with advances in technologies and new plant production techniques. Refurbishing what we currently have could improve conditions for research and teaching but will still be far from what would be desirable for a school like UTC. It would be desirable to create a facility where key activities such irrigation, light control, and climatization were computer programed and controlled. This adds up to considerable time of curators of these resources. At the very least, even small, dedicated budgets

would help protect and maintain these valuable resources.

- **Urban Garden:** The needs to improve the Urban Gardening program include a dedicated storage facility for the small garden tractor, tillers, and other equipment. In addition, the acquisition of irrigation systems for the area is a high priority for the urban garden.
- **Natural History Museum Collections:** Lab fees have allowed for the purchase of additional storage and curation supplies. We have also used lab fees to pay graduate students to help curate the collection. Major weaknesses in the museum have to do with a lack of labor and lack of a dedicated budget for the museum to purchase supplies. This applies across the board for all the collections. We depend on students for all curatorial activity, but between preparing backlogged specimens, maintaining a dermestid beetle colony to clean skeletons, the actual work of cleaning skeletons, identifying and labeling and databasing specimens, and specimen upkeep (including tasks like regular treatment for pest control, specimen repair, etc.), many tasks fall through the cracks. For the museum in general, we need dedicated collection/curatorial staff and dedicated. There is just enough time in a week for our faculty to direct students or complete the tasks themselves.
- **Computers:** Teaching computers are refreshed through IT's Computer Refresh Program. After the Holt renovation, Holt 399 was designated as the student computer lab. It holds 24 desktop computers but there is no current program in place to upgrade them after a certain period. New computers were requested in the Fall 2023 semester. There is not a computer lab dedicated to MS ESC student use.
- **Field Stations:** Unfortunately, human encroachment is occurring along the borders of the BFS and is primarily residential or industrial in nature. Hence, the primary challenge, as of late, is increased security at the BFS. Security cameras would increase safety at all locations.
- **Health and Safety:** No immediate modifications are needed to our current health and safety protocols.
- **Library:** No major library needs are noted currently.
- **Research with vertebrate animals, human subjects, and biosafety:** The IACUC, IRB, and BSC work well with students and faculty to approve and monitor relevant research. However, the review process is often time consuming, particularly with IACUC and IBC. Because of this, and because revisions and re-review of the protocols are typically required, the review process can make it challenging for students to conduct vertebrate research. A more streamlined process would benefit both faculty and students.
- **GIS Resources:** The availability of a larger GIS classroom with efficient computing facilities within the department or in the close proximity would be of great benefit in providing an optimum learning environment for GIS and remote sensing classes. This would be extremely beneficial to the MS ESC students who use GIS and remote sensing in their research.

5.4.3 Assessment of Research and Publication Materials and Support

Advising graduate students is expected of BGE faculty whose research focus fit within the MS ESC program. Advising graduate students is a time-consuming process, however, and currently there are no tangible rewards for BGE faculty (e.g., reduced course load, additional stipend, additional support for research supplies) beyond the potential benefits of working with graduate students, who are more educated, experienced, and competent than undergraduate students. Such rewards would enhance faculty enthusiasm to participate in our graduate program.

The campus program for publication costs is extremely helpful but costs are continuing to rise. Also, data storage for publications is a fee that can be costly. A department budget line for publication costs would facilitate publication of manuscripts by our graduate students and their faculty advisors. If developed, a formal process would be needed to request departmental support for publication cost could emphasize to our students that publication is strongly encouraged.

As appropriate and when there is BGE faculty interest in teaching such courses, online graduate courses should be considered, as such courses would increase the accessibility of courses to graduate students and their advisors, particularly when there is a need for flexibility in scheduling due to research or internship activities. This would be extremely beneficial to the MS ESC Environmental Students in the Environmental Administration and Management concentration. The flexibility that offerings of online courses would make this concentration more attractive to more types of prospective students, especially those with considerable outside obligations like work and family.

6 Support

The Department of Biology, Geology, and Environmental Science utilizes a single operating budget. Until 2015, the Geology Program was part of the Department of Physics, Geology, and Astronomy and had its own budget. Budgets for the Biology and Environmental Science Programs were also maintained separately. A decision was made in 2016 to merge all three budgets and treat them as one. Numbers presented below were gathered from IRIS (UT accounting system), BGE records, UTC Factbook, and the Office of Planning, Evaluation, and Institutional Research (OPEIR).

A UTC fiscal year (FY) runs July 1 – June 30, and it is referred to by the fiscal year of the ending date. For example, the academic year 2023-2024 is FY2024. While it is customary to split an operating budget into line items (e.g., student employees, travel, motor vehicle operation, printing, supplies, rentals, insurance, equipment) to better understand spending trends, we frequently redistribute funds as needed. BGE's allocated operating budget only accounts for about 14% of the total funds necessary to run our department, so it can never be an accurate representation of a line-itemed operating budget. Thus, we will focus on the Operating Budget, Salaries Budget, and Total Budget as aggregate totals with respect to faculty numbers, enrollment, and degrees conferred.

6.1 Program Budget and Needs

The MS ESC program does not have an operating budget that is separate from that of the Biology or Environmental Science undergraduate programs in BGE. Instead, the MS ESC program has been run as an additional component of those two programs. The combined Operating Budget for the Department of Biology, Geology, and Environmental Science has historically come from four sources: state allocations, monies from the College of Arts and Sciences ("Budget Revision totals" in the tables, below), lab fees, and gift funds. The first two sources each are about 51 % of the total operating budget for BGE. In 2007, we initiated a lab fee of \$25/lab course for all courses with labs. In Summer 2022, the Board of Trustees voted to approve an increase in the lab fee to \$50/lab course which was first applied in FY2023.

It should be noted that the MS ESC program used a small fraction of the operating budget. The Department Head has been able to locate and allocate funds for MS ESC needs and expenses when necessary. This situation has constrained growth in the MS ESC program to include new courses and new options for research by our students that require financial support. The almost complete lack of dedicated research equipment funding from UTC to support MS ESC graduate student research has shifted the burden of providing this equipment to individual faculty who have managed to obtain external funding or other means to support their research. By not having a source of regular funding to support the purchase of dedicated equipment to support graduate student learning or research, faculty active in the MS ESC program are constrained in their ability to keep the program current in its dynamic field. At a minimum, having a small dedicated annual MS ESC budget, with the ability to save funds from year-to-year for larger purchases might help to encourage more faculty involvement and student interest in the program.

Table 6.1 summarizes the budget by category, Operating, Salary, and Additional Funds. The FY total for each category is included as well as the sum of all categories.

Table 6.1 BGE Budget Summary

Operating	FY19	FY20	FY21	FY22*	FY23*
State Allocations	\$117,000	\$117,000	\$117,000	\$117,000	\$117,000
CAS Revisions	\$ 5,311	\$10,557	\$16,141	\$78,767	\$104,320
Total	\$122,311	\$127,557	\$133,141	\$195,767	\$221,320
	Percent Change	4.3%	4.4%	47%	13%
Salary					
Total State Allocations	\$2,343,808	\$2,487,884	\$2,621,733	\$2,656,932	\$2,660,825
	Percent Change	6.1%	5.4%	1.3%	0.15%
Additional Funds					
Lab Fees	\$ 99,841	\$86,320	\$109,600	\$94,783	\$172,103
Gift Funds	\$75,697	\$ 41,512	\$47,508	\$45,113	\$37,398
FY Totals	\$2,641,657	\$2,743,273	\$2,911,982	\$2,992,595	\$3,091,646

*COVID Relief funds resulted in significant CAS Revisions in FY22 and FY23.

Within the Operating Budget, State Allocations were \$117,000 and did not change throughout the review (Table 6.1). Extra funds from CAS (Budget Revision totals) increased significantly during the review, from \$5,311 to \$104,320. This increase is attributed to COVID-19 Relief funds awarded to the university. Those additional funds allowed CAS to reallocate other funds to the college departments. In BGE, those funds were used to purchase a new SUV, a new boat, and numerous pieces of lab equipment. They were also used to fund research start-ups for new faculty. Moving beyond FY24, these funds will not be available, and we will return to small CAS revisions between \$5,000 and \$10,000.

Figure 6.1 graphically shows the total BGE Expenditures (Salaries, Benefits, and Operating) per SCH, per Student Major, per Degree Conferred, and per FT Faculty FTE. All divisions and degree types are included in this data as faculty members teach classes and students enroll in classes across all divisions and degree types. With the log scale, it may be difficult to note much change. Between FY19 and FY23, the increases across the categories were 1% per FT Faculty Member FTE, 31% per Student Major, 13% per Degree Conferred, and 16% per SCH. Based on this information, the large increases are attributed to the addition of faculty between FY19 and FY23. FT Faculty FTE went from 31 to 36 during that time, which increased our expenditures due to salary and start-up costs. The added expenditures for faculty make a marked change on the other categories. There were raises across the board during that time ranging from 0% to 3%, which would increase the salaries of all employees. Table 6.2 includes these increases.

Figure 6.1. Log scale of Expenditures per SCH, per Student Major, per Degree Conferred and per FT Faculty FTE from FY19-FY23.

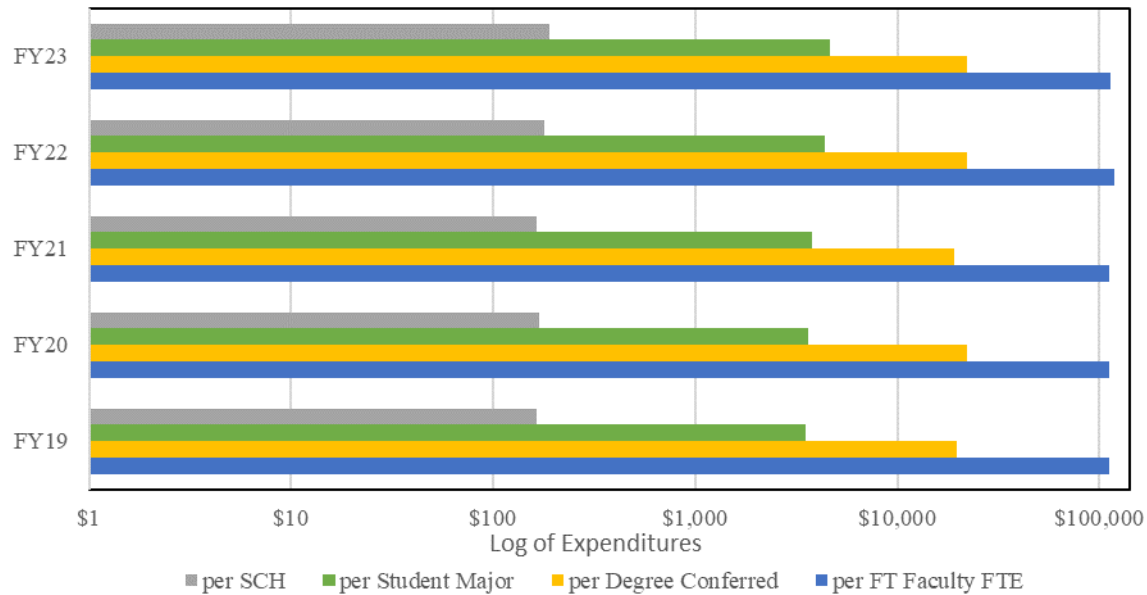


Table 6.2 includes the data from Figure 6.1 along with the annual pay raises, FT Faculty FTE numbers and the actual expenditures. Over the review period, the expenditures increased by \$595,134 and the FT Faculty FTE increased by five faculty.

Table 6.2 FT Faculty FTE and Expenditures per FT Faculty FTE

	FY19	FY20	FY21	FY22	FY23
Across the board raises	2%	2%	0%	2.75%	3%
FT Faculty FTE	31.00	33.00	33.00	33.00	36.0
Actual Expenditures	\$3,465,746	\$3,676,687	\$3,660,418	\$3,876,787	\$4,060,880
Expenditures/FT Faculty FTE	\$111,798	\$111,415	\$110,922	\$117,478	\$112,802
Expenditures/Student Major	\$3,518.52	\$3,618.79	\$3,781.42	\$4,370.67	\$4,609.40
Expenditures/Degree Conferred	\$19,580.48	\$22,148.72	\$19,064.68	\$22,027.20	\$22,190.60
Expenditures/ SCH	\$164	\$167	\$164	\$178	\$190

In addition to the Operating Budget, BGE has income through lab fees and gift funds. In FY23, the lab fee was raised from \$25 to \$50, and it significantly impacts our ability to service the labs. The Operating Budget increased by 72.3% from FY19 to FY23 because of these fees. It is important to note that, even with 30-50% added to our base operating budget, it is still less than what is required to meet BGE's minimum budgetary needs. From another perspective, the state and university allocated budget, plus the

lab fees only support about 74% of the minimum operating budget necessary to run a program that accounts for 7% of all degrees conferred at UTC.

Financial donations to the BGE general gift funds have remained unchanged during the review period. BGE has several endowed gift funds with annual revenues for awarding scholarships and managing unexpected equipment service. Two new gift funds were endowed over the review period:

- Andrew Gamble Memorial Travel Fund: Endowed at \$50,000 in Fall 2022, specifically to support students (graduate and undergraduate) who participate in the annual geology field experience course
- Dr. Mark Schorr Memorial Fund for Graduate Students: Endowed at \$25,000 in Spring 2023, specifically to support graduate student research, travel, scholarships, or the greatest needs for the graduate students in the MS ESC program

In FY19, the Total Salaries Budget of BGE was \$2,343,808 and in FY20 it increased to \$2,487,884 (Table 6.1). It increased by 6.1%, 5.4%, 1.3%, and 0.15% each year from FY19 to FY23. While these increases seem promising, they were due to faculty being added or promoted during this time, as well as annual across the board increases. We also lost some TT faculty who were replaced by visiting lecturers, and those salary savings were absorbed by the college. In 2019, we had 31 FT Faculty FTE. This increased to 36 FT Faculty FTE in 2023. The faculty additions since our last review have trended toward an increased number of non-tenure track faculty. In Fall 2018, there were 23 TT faculty and 7 NTT faculty. In Fall 2023, there were 23 TT faculty (two lines are currently being searched and filled by visiting NTT and adjuncts in the interim) and 12 NTT faculty (one of which is visiting and will be searched as NTT in the future). The increase in faculty has only occurred in the NTT category. The university funded several of the NTT lines from enrollment initiatives labeled as “15/4”, which was an increase in tuition dollars generated from switching to a model where students are billed for 15 hours each semester when considered full-time (whether they take 15 hours or not). The total BGE budget for salaries is 13.5% higher in FY23 than it was in FY19, largely because of the additions of these NTT lines, annual across the board increases, adjustments for equity, and faculty who earned tenure and promotion.

One area of support that is semi-dedicated to the MS ESC programs is the funding provided to support our Graduate Teaching Assistants (GTAs). Unfortunately, the number of GTA lines has dropped significantly over the last six years, dropping from 11 to 7 lines. During the past six years, our GTA lines dropped from 11 in fall 2018 to 9 in 2020 to 7 in 2023. Our GTAs provide a large return on investment as they teach most of the first-year Biology and Environmental Science laboratories each semester, making it possible for faculty to focus on research. As such, GTAs represent an invaluable resource to the department and the MS ESC program. However, the \$4,550/semester stipends paid our GTAs remain low when compared to our peer institutions. It should be noted that this is an institution-level issue, as the minimum stipend to be paid to Graduate Assistants is set by the University. Faculty who write proposals for external funding are allowed to request additional stipends to involve graduate students in funded projects as Graduate Research Assistants (GRAs) provided that the amount is reasonable and aligned with market competition, suggesting that the University recognizes the value of graduate student compensation as an effective recruiting tool. Most often, our GRAs are paid at a higher rate than our GTAs.

6.2 Program Enrollment and Graduation Rates

All the BGE programs have a history of enrollment and/or graduation rates sufficient to sustain high quality and cost-effectiveness. The MS ESC program has sustained enrollment numbers over the last 10 years.

During the past five years, enrollment in the MS ESC program has ranged from 27-36 students, with an average semester enrollment of 32 students and a median of 36. More students are enrolled in fall

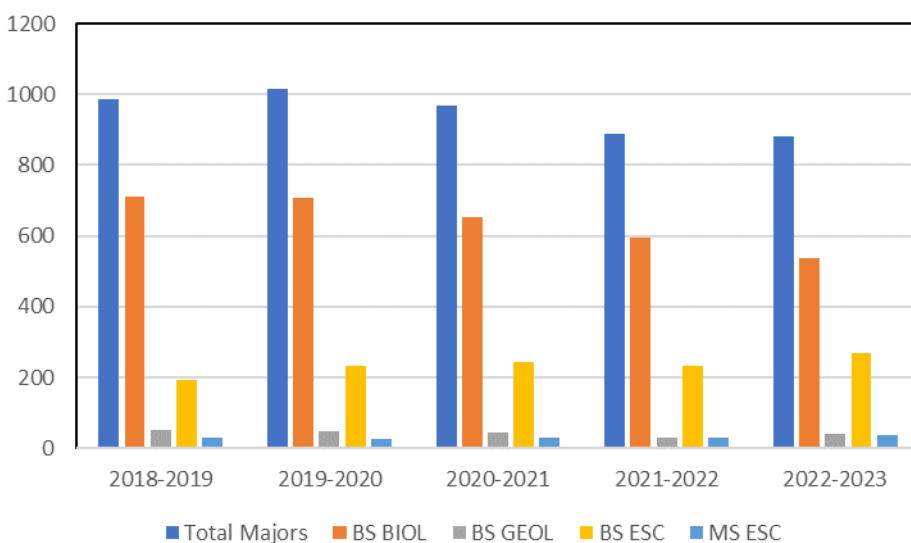
semesters due to greater numbers of incoming students at this time and graduations that occur during the academic year. In total, 59 students have earned the MS ESC degree from UTC during the past five years, which is a 44% increase from the last self-study. The number of graduates produced by the program per academic year has fluctuated from 5 to 19 throughout the past five years, but these numbers have not followed any noticeable trend through time. On average, 12 students/year graduated from the MS ESC program during the past five years, which is four more than the previous review period. Of the 59 graduates since 2018, 46% completed theses, and 54% completed a non-thesis capstone. This distribution differs from that during the previous two five-year program review periods, during which equal numbers of graduates completed theses and internships. Changes to admission procedures that require applicants to secure a faculty chair prior to applying may have impacted this distribution.

While most students enrolled in the MS ESC program during the past six years either graduated or are continuing to work toward the degree, 10 students were enrolled in the program at some time during the past six years but did not complete the program. Reasons for not completing the program vary and are not always known.

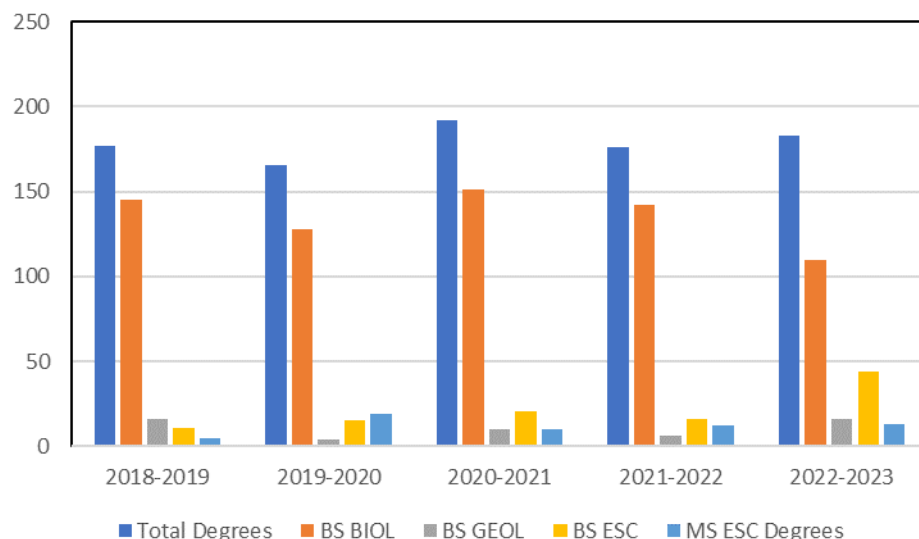
Many graduates of the MS ESC program obtain jobs in environmental fields or continue their education in PhD. We have been able to follow the career and/or further educational paths of several students who have graduated from the program in the past six years. These graduates are mostly employed in a variety of environmental career sectors, including consulting, government, industry, and education (~50% of graduates in each of these sectors) and non-profits (30% of graduates). About 10% of recent graduates are employed in non-environmental careers, and the remainder are in professional degree programs.

Figure 6.2 shows the trend in department majors for all tracks from 2018-2022.

Figure 6.2 Five-year trend of Enrollment, 2018-2022



The BS BIOL degree accounts for most of the degrees conferred as well as the enrollment changes over the last five years. There is also a significant increase in BS ESC degrees conferred over the last five years. MS ESC and BS GEOL degrees have remained constant. Figure 6.3 depicts the trend in the degrees conferred for each degree and the overall total.

Figure 6.3 Five-year trend of Degrees Conferred, 2018-2023

Over the last five years, UTC has had a 7% decrease in undergraduate enrollment and a 20% decrease in graduate enrollment. In comparison, BGE has had a 12% decrease in undergraduate enrollment, but a 20% increase in graduate enrollment. It is encouraging that the MS ESC program enrollment growth is contrary to the university.

6.3 Program Responsiveness to Local, State, Regional, and National Needs

BGE faculty represent diverse scientific disciplines including conservation and restoration; ecology, evolution, and behavior; environmental and human health; environmental law and policy; geology; geospatial sciences; microbiology; molecular biology and cell physiology; organismal biology; and systematics and biodiversity. This diversity allows our programs to address diverse local, state, regional, and national needs for trained professionals in all aspects of the environmental career sector and is reflected in the diverse placement of our graduates.

Chattanooga, as a county seat and city known for its sustainability initiatives, offers excellent opportunities for environmental study and employment. One way in which we leverage our location is to incorporate internships with local, state, and regional entities in MS ESC programs of study as capstone experiences. We also provide opportunities for thesis students to network while conducting research through our engagement partners beyond campus. For example, recent thesis students have collaborated with professionals from the City of Chattanooga, Cumberland Trail Conference, Erlanger Health System, Tennessee Department of Environment and Conservation, U.S. Fish and Wildlife Services office, Tennessee Aquarium, Tennessee River Gorge Trust, and Tennessee Valley Authority. The MS ESC faculty integrate real-world experiences and applications into their courses, and the program was developed with feedback from key stakeholders to support professional development. Because dealing with environmental issues requires an interdisciplinary approach, our program is designed to help students master their understanding of environmental issues in scientific, political, and social contexts while developing strong independent research and effective communication skills.

The department often collaborates with the UTC IGTLab, which offers GIS and cartographic support for the UTC campus community and region for teaching, academic research, applied research, and planning. BGE faculty have also been supported by internal Center of Excellence in Applied Computational Science and Engineering (CEACSE) grants supporting computational research. In short, our programs help meet

the needs of our students and provide opportunities for students and faculty to address local, regional, national, and international problems.

An example of program change due to needs is the development of the MS ESC Environmental Administration and Management Concentration, the development of two new graduate certificates in Environmental Science and Climate Science, and the TADPOLES program. These programs were all developed in consultation with current, former, and prospective students with input from organizations who hire people trained in environmental science. Ultimately, these programs are designed to provide greater flexibility for students across multiple levels all while still meeting the demands of today's transformative job market. All these programs will likely contribute to the grow, change, and excellence in our MS Environmental Science Programs and BGE as a whole.

6.4 Evaluation of Graduate Placement

It is difficult to track every single graduate through time as people move to new locations and are out of contact with our faculty. However, the MS ESC Program Director and faculty advisors make concerted efforts to engage with our alumni for updates about their lives and careers, which has been helped enormously through time by various means of electronic communication. We have been able to follow the career and/or further education paths of 90% of alumni who have completed the program in the past six years. Of the alumni who we have tracked, the majority (75%) are employed in diverse environmental careers with consulting firms, government agencies, the industrial and non-profit sectors, and secondary schools. Five graduates from the past five years (<10% of alumni who we have tracked) are either furthering their scientific education or working in academia, four in PhD programs and one as a scientist/lab technician in a university research lab. We consider these placement rates to be a strong indicator of our success at training environmental professionals and scholars. The program has been around long enough that several earlier graduates are now in senior leadership positions in government and corporate institutions.

Although we have been able to track many of our recent graduates primarily through communication between alumni and their former graduate advisors, we would like to find ways to have a more continued presence with all our alumni. Given the accessibility and popularity of electronic means of communication, it would be worthwhile to consider developing an electronic alumni newsletter and/or having dedicated program content on popular social media platforms. We also would like to consider means to assess the overall satisfaction of our graduates with the program and its effectiveness and relevance to their post-graduate paths that would help us to assess and guide our program.

6.5 Review of Alignment of Program with Institutional Policies and Mission

The BGE Graduate Faculty Committee meets on a regular basis to discuss the state of the MS ESC program and how it might be improved, as well as any changes being proposed or implemented at the university level. The Committee discusses such aspects as course requirements, length of time to complete the program, and graduation rates. The role of the Committee is to make recommendations to the larger body of BGE Faculty on such matters that can then be brought to a vote as appropriate during regularly scheduled Department meetings. Our Graduate Director serves on the Graduate Council and is always made aware of any changes to institutional policies and mission that are relevant to our graduate program. All institutional or system wide changes are then brought to the attention of the BGE Graduate Committee. The UTC Graduate School also uses forms that assist our program in documenting and tracking procedures and policies. All forms require approval from the Graduate School Dean once they are completed at the programmatic level. Any proposed program curriculum changes are received and discussed by the Committee before being brought to the attention of all BGE Faculty for discussion and vote. If approved, the proposed changes are submitted electronically in the form of a formal curriculum proposal via *Curriculog*. Proposals are processed through a chain of approvals in *Curriculog* that includes the Department Head, Dean of the College, the Graduate Council Curriculum Chair, Graduate Council

Chair, the Dean of the Graduate School, and the Vice-Provost for Academic Affairs. Through these procedures, any proposed changes must be approved at multiple levels to ensure that they follow UTC's policies and mission.

UT's strategic plan was updated recently and is dated 2021-2025 can be reviewed at <https://www.utc.edu/chancellor/strategic-plan>. UTC's current vision is that "We engage students, inspire change and enrich community." The associated mission statement is

The University of Tennessee at Chattanooga is a driving force for achieving excellence by actively engaging students, faculty, and staff, embracing diversity and inclusion, inspiring positive change and enriching and sustaining our community.

The University mission is clear and aligns well with the MS ESC programs. For example, the University mission involves the active engagement of all members of the campus community. Students in the MS ESC program work closely with faculty on experiential projects both in the classroom and beyond the classroom while working on a thesis, or non-thesis discourse; this training is part of our mission. The university mission describes the importance of embracing diversity. In their scientific work, environmental scientists must understand and consider contemporary, socioeconomic, political, and legal realities; this understanding also is part of our mission. In addition, the university mission describes its goal to enrich the world at large. MS ESC students often explore environmental issues that are global in scope through focus on region and/or local systems. As such, students are prepared to enrich their local community and the world as trained environmental professionals.

6.6 Assessment of Support Strengths, Weaknesses, and Recommendations for Change

The MS ESC Program has multiple strengths related to support. The ESC Graduate Program is more versatile than ever, and more likely to be competitive with similar programs, given that we now offer an Environmental Administration and Management Concentration for the MS ESC degree and two new certificate programs (one in Environmental Science and another in Climate Science). The Joint Undergraduate to Master's Program (JUMP- TADPOLES) is also a promising change.

- Faculty have been successful in obtaining grant funding to support some graduate students and provide higher stipends than state funded assistantships.
- Faculty have been successful in obtaining grant funding to purchase high-cost equipment to support graduate faculty and student research.
- The programmatic unit has experienced stable enrollment during the review period, with an average semester enrollment of 32 students during the past five years (the same as the previous review period).
- The program graduated an average of 12 students per year during the past six years, four more than the previous review; and the students' time to degree is less than 6 semesters, 2 shorter than the previous review.
- The program successfully trained environmental professionals and scholars, as evidenced by recent graduates employed in diverse environmental careers and alumni furthering their scientific education or working in academia.
- Program faculty represents diverse scientific disciplines that allows our programs to address diverse local, state, regional, and national needs for trained professionals.
- The program aligns well with UTC's institutional mission to engage all members of the campus community as an engaged metropolitan university. Students in the MS ESC program work closely with faculty on experiential projects.

Weaknesses of the program and recommendations for change include the following:

- The funding provided to support our GTAs has decreased over the last 6 years. This is a major

concern as it affects recruitment and graduate student success. We recommend the return on investment of graduate students serving as GTAs be carefully considered by CAS and the UTC Graduate School. We know their value and hope that it will be recognized with increased GTAs.

- University funded graduate assistantships stipends are lower than at many peer institutions, thus making it challenging to attract competitive students to the program. Faculty grant awards have provided higher stipends for a limited number of students. The program continues to request that the Graduate School/University increase graduate stipends and cover the student fees for students that receive assistantships.
- The overall BGE budget is inadequate to fully support its four academic programs, so any meaningfully dedicated budget to MS ESC would require an increase.
- Inadequate funding for equipment purchases has severely limited the development of graduate laboratory courses.
- The program struggles with tracking graduates and there is less information known about alumni from earlier years. The program is considering developing a more formal system for tracking and communicating with alumni via a digital portal.

Appendices

[Appendix 0-A](#)
[Appendix 0-B](#)
[Appendix 0-C](#)
[Appendix 1-A](#)
[Appendix 1-B](#)
[Appendix 2-A](#)
[Appendix 2-B](#)
[Appendix 4-A](#)
[Appendix 4-B](#)
[Appendix 4-C](#)
[Appendix 4-D](#)
[Appendix 4-E](#)
[Appendix 4-F](#)
[Appendix 4-G](#)
[Appendix 4-H](#)
[Appendix 4-I](#)
[Appendix 4-J](#)
[Appendix 4-K](#)
[Appendix 4-L](#)
[Appendix 4-M](#)
[Appendix 4-N](#)
[Appendix 5-A](#)
[Appendix 5-B](#)
[Appendix 5-C](#)
[Appendix 5-D](#)

Appendix 0-A

MASTER'S IN ENVIRONMENTAL SCIENCE PROGRAM

DEPARTMENT OF BIOLOGY, GEOLOGY, AND

ENVIRONMENTAL SCIENCE UNIVERSITY OF

TENNESSEE AT CHATTANOOGA

GRADUATE GUIDEBOOK

Living Document- Updated Feb. 14, 2023; Approved Sept. 2021.

*This Student Guidebook is a compilation of the efforts of our present and past
ESC Graduate Coordinators: T.P. Wilson, J. Boyd, H. Craddock, J. Shaw, D.

Aborn, M. Schorr, J. Tucker and R.

G. Litchford. *

TABLE OF CONTENTS

ADMISSION REQUIREMENTS	3
PROGRAMS OF STUDY	5
THESIS TRACK	5
NON-THESIS TRACK	5
ENVIRONMENTAL ADMINISTRATION AND MANAGEMENT TRACK	6
COURSE REQUIREMENTS	7
STUDENT ACADEMIC FILES	16
THESIS GUIDELINES	17
THESIS PROPOSAL	17
THESIS PROPOSAL DEFENSE	17
THESIS	17
THESIS DEFENSE	18
RESPONSIBILITY OF THE ADVISOR AND STUDENT	19
FINANCIAL SUPPORT	20
OFFICE SPACE	22
FACULTY	22
CAMPUS RESOURCES	23
STUDENT CHECKLISTS	25

**ENVIRONMENTAL SCIENCE GRADUATE GUIDEBOOK
DEPARTMENT OF BIOLOGY, GEOLOGY, AND ENVIRONMENTAL
SCIENCE**

UNIVERSITY OF TENNESSEE AT CHATTANOOGA

Interim Head: Dr. Gretchen Potts (Gretchen-Potts@utc.edu)

Graduate Program Director: Dr. Thomas P. Wilson (Thomas-Wilson@utc.edu)

Department of Biology, Geology and Environmental Science
215 Holt Hall
University of Tennessee at Chattanooga Chattanooga,
TN 37415

Phone: (423) 425-4341

The Department of Biology, Geology, and Environmental Science (BGE) offers a program of study leading to the Master of Science in Environmental Science. The program provides advanced research and educational opportunities in environmental sciences. Departmental areas of concentration include ecology, natural resources, environmental biology, environmental policy and planning, environmental ethics and law, geographic information science, remote sensing, hydrogeology, biogeography, toxicology, and soil science. The program includes both a thesis and non-thesis option, which provides a foundation for employment in the private and public sectors in the environmental fields. In addition, the thesis option prepares students for advanced study leading to the doctoral degree.

ADMISSION & REQUIREMENTS

Prior to applying to the M.S. ESC program at UTC, you should ensure that you meet associated academic requirements *and* if you are pursuing the thesis track you must identify a faculty member who will serve as your graduate advisor. It is important to note that the requirements listed here are minimums for consideration and do not guarantee acceptance into the program. Ultimately, admissions decisions are based on evaluations of quantitative and qualitative information, including the compatibility of your environmental science interests with that of our faculty.

The ESC Graduate Program has a rolling admission process. However, applicants seeking admission to the graduate program in Environmental Science that want full consideration should submit the following to the Office of Graduate Admissions ideally by mid-February for Fall admission and early October for Spring admission:

1. A graduate admission application, along with official transcripts of all college work and a nonrefundable processing fee.
2. A cover letter stating formally the student's interest, background and professional goals, as well as their preference for the thesis or non-thesis track and being considered for a Graduate Teaching Assistantship. Applicants planning to pursue the thesis track are required to contact departmental faculty in their field of interest before applying and clearly state in their cover letter who has agreed to advise them as a thesis student.
3. Three letters of recommendation by individuals in professionally relevant fields.
4. A current curriculum vitae.

Students seeking admission to the M.S. program must hold a bachelor's degree from an accredited college or university or its foreign equivalent. The bachelor's degree may be in any discipline, but background in environmental science is encouraged, and a minimum GPA of 2.75 is required (or a 3.0 GPA in the last 60 hours). The completed application will be reviewed by the Departmental Graduate Program Committee. Conditional admission may be granted if the student needs to complete the appropriate foundation courses with grades of "B" or better or to address other academic deficiencies.

Students applying to the ESC M.S. program are encouraged to have the equivalents of the following recommended courses:

1. a college-level sequence in chemistry, geology, physics or engineering
2. three upper-level science courses (with associated laboratories) in biology, natural resources, chemistry, geology, or environmental sciences
3. an upper-level course in ecology with laboratory
4. a course in each of the following: statistics, calculus, quantitative methods, coding or computer science
5. an upper-level course in environmental law, policy, planning, management, or ethics
6. a course in geographic information science or remote sensing

Students without the equivalents of **any** of the above recommended courses may be advised to enroll in a suite of appropriate foundational courses prior to being considered for admittance to the M.S. program. Students having **some** of the foundational proficiencies may be admitted to the M.S. program conditionally (e.g., the student may be advised to enroll and successfully complete certain undergraduate courses during their first year of graduate study or through some comparable experience).

PROGRAMS OF STUDY

Students accepted into the ESC MS program should select the thesis or a non-thesis option and must file a Program of Study with the ESC Graduate Coordinator and Graduate School. The Program of Study is a formal list of courses the student will complete to fulfill the requirements of the degree and should consist solely of courses directly related to the master's degree. Ideally, students should file their Program of Study by the end of their first semester and no later than the end of the second semester. Students who select the thesis track must develop their Program of Study

in consultation with their Thesis Advisor and Committee; and, non-thesis students should work closely with their Advisor when completing their Program of Study. All Program of Study forms must be approved by the Graduate Coordinator prior to being forwarded to the Graduate School for final approval.

Thesis track - The thesis track is considered essential for students with career goals in advanced research or academic fields. The thesis track entails 36 semester hours (sh): 15 sh are core classes, 12 sh of electives at the 5000 level or above and may include up to 6 sh of independent study, and 9 sh of thesis.

Research conducted by graduate students reflects the core specializations of the Department (ecology, biodiversity, conservation, management, climatology, geographic information science, hydrogeology, biogeography, and soils science). Within each of these broad areas, there are numerous opportunities for students to pursue their interests in collaboration with faculty. To learn about specific research areas, prospective graduate students should review the research interests of the faculty, and the descriptions of current graduate research opportunities.

Students should formalize, no later than the end of the second semester, their Thesis Advisor and Thesis Committee members. Completion of the thesis track is contingent upon identification of a suitable Thesis Advisor. Applicants who intend to pursue this track are strongly encouraged to contact faculty in their field of specialization during the application process to secure a Thesis Advisor. Once a faculty member has agreed to act as a Thesis Advisor, the student will submit a detailed Research and/or Course Plan (the Program of Study) to a Thesis Committee consisting of at least three faculty including the Thesis Advisor; at least two Committee members must be approved Graduate Faculty. The Thesis Committee guides students through their course of study and their research. The Committee will advise the student on the acceptability of the Program of Study and will decide on any further steps to be taken in shaping the thesis research project. Students are expected to maintain an active discourse with, and seek advice from, their Committee. Committee meetings should be scheduled by the student or Thesis Advisor as specific problems or accumulated research demands.

Non-Thesis Track - The non-thesis track entails 36 semester hours (sh), of which 15 must be from the core courses with an additional 15 hours of electives plus 6 semester hours of experiential learning (i.e., independent study, research, internship). All courses must be 5000 level or higher to receive graduate credit.

Students who select the non-thesis track must maintain an active discourse with, and seek advice from the Graduate Coordinator regarding program, course, university, system and state requirements.

Environmental Administration and Management - All requirements of the UTC Graduate School must be satisfied, and students should complete their degree in a 12 to 24-month period. At least 36 hours of graduate credits (at the 5000 level) is required beyond the bachelor's degree. Because of the diversity in backgrounds and interests of students accepted into this program, it has been structured into blocks where students have some flexibility in course selection beyond the core requirements. Students must take courses from the following four areas of focus: 1) Fundamentals [10 credit hours], 2) Basic Ecological Knowledge [4 credit

hours minimum], 3) Habitat Manipulation and Computational Skills [9 credit hours minimum], and 4) Human Dimensions [6 credit hours minimum]. A grade-point average of 3.25 in graduate coursework must be maintained. Failure to meet this requirement will result in academic probation. A capstone project consisting of a grant proposal presented to the agency providing the internship and approved by the ESC Graduate Coordinator (i.e., Program Director) must be completed prior to graduation.

Program of Study Changes -Changes to the program of study (e.g., from thesis to non-thesis, etc.) must be approved by the student's Advisor and the ESC Graduate Program Director prior to making the change. Once approved, the Graduate School must be informed of this change prior to graduation. The student must wait to make this formal notification until they are near program completion and ready to submit the Graduation Audit; do not submit a second Program of Study form to the Graduate School. However, the student must inform the ESC Graduate Program Director of the change by email before the end of the current semester or the beginning of a new semester if the change is made during summer or winter break so that departmental records can be kept current. Also, please keep in mind that changing a program of study may impact your eligibility for a Graduate Teaching Assistantship in our program as priority and preference is given to thesis students.

COURSE REQUIREMENTS

The coursework in a student's Program of Study must be developed in consultation with the student's advisor and Graduate Coordinator as needed. Students may request to include a maximum of two online courses and/or transfer credits (10 sh maximum) in their Program of Study. Requests will be considered on a case-by-case basis and must be approved by the ESC Graduate Coordinator.

Environmental Science Core Courses (15 sh). All thesis and non-thesis track students *must* enroll in Graduate Seminar (ESC 5700 (1sh) & ESC 5710 (1sh)) during their first year in the program. All students must complete the following core classes before the student can be advanced to candidacy:

- [ESC 5020 - Mechanisms in the Environment \(3 sh\)](#)
- [ESC 5050 - Biodiversity and Natural Resources Conservation \(3 sh\)](#)
- [ESC 5120 - Applied Statistics for Environmental Scientists \(4 sh\)](#)
- [ESC 5140 - Environmental Law and Regulations \(3 sh\)](#)

Electives - Every ESC graduate student must complete either 12 (thesis) or 15 (non-thesis) semester hours of unrestricted graduate electives. The required number of elective hours is determined by the capstone experience that the student chooses to pursue in partial fulfillment of the degree. Specifically, students conducting a thesis for the capstone experience must complete 12 hours of electives, while students conducting a non-thesis option must complete 15 hours of electives. Elective hours may consist of graduate-level elective courses offered by the Department of Biology, Geology, and Environmental Science (BGE) or graduate-level courses

7

offered by other departments that are relevant to the study of environmental science and the students specific degree program objectives as approved by the student's graduate advisor. Questions about the relevance of specific courses to your degree program (especially those offered outside of BGE) should be directed to both the student's advisor and the ESC Graduate Program Coordinator.

Capstone Experience - Each ESC graduate student must choose one of two capstone experiences for the program of study – thesis, or non-thesis experience (i.e., internship, individual studies or research experience). You should consult with your graduate advisor and/or the ESC Graduate Coordinator to devise a formal plan for this experience appropriate for your academic objectives, research interests, and career goals. Ideally, you initiated this conversation with your prospective advisor when you were applying to the program.

Thesis Program of Study

All students must complete 9 credit hours of thesis credit associated with the development, conduct, and successful defense of an approved thesis project.

- [ESC 5999r - Thesis](#)

Unrestricted Electives (12 hours)- All students must complete 12 credit hours of graduate elective coursework as recommended by the thesis advisor and approved by the Graduate Program Coordinator. These elective hours may include up to 6 total credit hours of any combination of the following courses if the associated work conducted is distinct from the thesis project:

- [ESC 5996 - Internship](#)
- [ESC 5997r - Individual Studies](#)
- [ESC 5998r - Research](#)

In summary, the thesis option involves independent original research focused on a specific issue that is relevant to environmental science. This research will demonstrate broad knowledge of the topic, identify a gap in the knowledge base, and attempt to fill that gap through appropriate study. Initiation of a thesis requires acceptance by your graduate advisory committee of a proposal that describes your thesis objectives, provides a preliminary review of pertinent literature, outlines the methodologies that you will use, and details the relevance of your thesis to the field. You then will work closely with your graduate advisor toward meeting your thesis objectives.

A thesis capstone experience culminates with your submission of a successful written thesis and successful public oral defense as assessed by your graduate advisory committee. A successful written thesis will include a clear and focused statement of purpose, comprehensive review of relevant literature, hypotheses, explanation of study design and methodologies, appropriate analyses and interpretation of data, and description of the significance of findings. A successful defense will involve a clear presentation of your thesis and informed and thoughtful answers to questions from your graduate committee and the audience about its substance and significance.

Once approved by the Graduate School, your written thesis becomes part of the permanent body of scientific knowledge and is considered a reflection of you, your advisor, BGE, and UTC.

If you opt to conduct a thesis in partial fulfillment of the M.S. ESC degree, you must enroll in at least 9 semester hours of ESC 5999 (Thesis) while actively engaged in your thesis research, writing, and/or defense preparation, with at least two of these credit hours completed during the semester of your graduation. Once you initiate your thesis, you must register for thesis hours continuously (i.e., every semester) until you graduate. For determining continuous thesis registration, the summer term is not considered. As such, you do not need to register for ESC 5999 during summer sessions unless you plan to defend your thesis research during a summer term. You should consult with your graduate advisor to determine the number of ESC 5999 hours for which you should register each semester, depending on the work that you plan to do toward completing your thesis.

Non-Thesis Program of Study

All students must complete 6 credit hours of internship, individual studies, and/or research experience as approved by a graduate faculty advisor. These hours may be comprised of any combination of the following:

- [ESC 5996 - Internship](#)
- [ESC 5997r - Individual Studies](#)
- [ESC 5998r - Research](#)

Unrestricted Electives (15 hours) - All students must complete 15 credit hours of relevant graduate elective coursework as approved by their graduate faculty advisor and the ESC Graduate Program Director.

A brief description of these requirements follows:

Internship - The internship option is designed to provide you with an opportunity to acquire specialized technical/professional knowledge by working on an environmental project with an appropriate sponsoring organization or business. As a form of experiential learning, an internship will integrate your academic knowledge in environmental science with its practical application in a workplace setting. Initiation of an internship in partial fulfillment of the M.S. ESC degree requires that you identify a suitable internship opportunity and that your graduate advisory committee and a workplace supervisor approve a proposal that describes your internship objectives, provides a preliminary review of pertinent literature, details work to be completed, and discusses the relevance of the internship to the workplace and your career goals. Your internship may be paid or unpaid. During the internship, you will work closely with your workplace supervisor with oversight from your graduate advisor toward meeting your internship objectives. You and your workplace supervisor will be required to document your

experience via a series of formal periodic reports to your graduate advisor. An internship is an appropriate choice for your capstone experience if you wish to develop skills specialized for environmental work. It is especially recommended if you have very specific career goals (e.g., natural resource management, environmental consulting) that do not require further graduate studies.

An internship capstone experience culminates with the application of acquired technical/professional knowledge while working for an appropriate sponsoring organization actively involved in interdisciplinary environmental activities where your efforts will be assessed by your graduate advisor. Initiation of this project requires acceptance by the student's graduate advisor where a written prospectus outlines the scale and scope of the work. The project requires at least 600 hours of work (i.e., 100 hours of work per credit hour) with the interning agency and requires the guidance of a supervisor on site who will give the student's graduate advisor periodic updates of progress made toward the objectives of the internship. Please be advised that the internship amounts to 15 weeks of full-time (i.e., 40 hours/week) or 30 weeks of part-time (i.e., 20 hours/week) work. The internship is graded as Satisfactory (S) or No Credit (NC).

Individual Studies or Research Experience (ISRE) - The ISRE allows you to explore deeply a specific topic relevant to environmental science through independent and original review of relevant available literature, research, or through experiential learning. Initiation of an ISRE requires acceptance by a sponsoring faculty member and the ESC graduate program director. You then will work closely with your sponsoring faculty member toward meeting your learning objectives. An ISRE is an appropriate choice for your capstone experience if you want to further your knowledge base in an environmental science topic without focus on development of applied research or specialized workplace skills. The ISRE option is especially recommended if you want to advance in an already established career.

You should consult with your sponsoring faculty member and graduate coordinator to determine the number of hours for which you should register each semester, depending on the work that you plan to do toward completing your degree.

Environmental Administration and Management Program of Study

All requirements of the UTC Graduate School must be satisfied, and students should complete their degree in a 12 to 24-month period. At least 36 hours of graduate credits (at the 5000 level) is required beyond the bachelor's degree. Because of the diversity in backgrounds and interests of students accepted into this program, it has been structured into blocks where students have some flexibility in course selection beyond the core requirements. Students must take courses from the following 4 areas of focus: 1) Fundamentals [10 credit hours], 2) Basic Ecological Knowledge [4 credit hours minimum], 3) Habitat Manipulation and Computational Skills [9 credit hours minimum], and 4) Human Dimensions [6 credit hours minimum]. A grade-point average of 3.25 in graduate coursework must be maintained. Failure to meet this requirement will result in academic probation. A capstone project consisting of a grant proposal presented to the agency providing the internship and approved by the ESC Graduate Coordinator (i.e.,

Program Director) must be completed prior to graduation.

Program Requirements

Fundamentals (10 hours)

- [ESC 5020 - Mechanisms in the Environment](#)
- [ESC 5120 - Applied Statistics for Environmental Scientists](#)
- [ESC 5140 - Environmental Law and Regulations](#)

Basic Ecological Knowledge (minimum 4 hours)

- [BIOL 5010 - Current Issues in Biology](#)
- [BIOL 5160 - Biogeography](#)
- [BIOL 5320 - Toxicology](#) and [BIOL 5320L - Toxicology Laboratory](#)
- [BIOL 5400r - Organismic Biology \(Advanced Topics\)](#) and [BIOL 5400L - Organismic Biology Laboratory](#)
- [BIOL 5420 - Environmental Physiology](#) and [BIOL 5420L - Environmental Physiology Laboratory](#)
- [BIOL 5560 - Ichthyology](#) and [BIOL 5560L - Ichthyology Laboratory](#)
- [BIOL 5800 - Special Problems](#)
- [ESC 5030 - Microbial Ecology](#) and [ESC 5030L - Microbial Ecology Laboratory](#)
- [ESC 5040 - Bioremediation](#) and [ESC 5040L - Bioremediation Laboratory](#)
- [ESC 5060 - Advanced Ecology](#)
- [ESC 5080 - Limnology and Reservoir Ecology](#) and [ESC 5080L - Limnology and Reservoir Ecology Laboratory](#)
- [ESC 5090 - Herpetology](#)
- [ESC 5350 - Environmental and Ecological Genetics](#)
- [ESC 5460 - Global Change Biology](#)
- [ESC 5730 - Plant Ecology](#)
- [GEOL 5300 - Coal Sedimentation and Stratigraphy](#)
- [GEOL 5350 - Problems of Coal Economics](#)
- [GEOL 5960r - Geologic Field Experience](#)

Habitat Manipulation and Computational Skills (9 hours)

Recommended Courses -

- [ESC 5110 - Research Methods and Experimental Design and ESC 5110L - Research Methods and Experimental Design Laboratory](#)
- [ESC 5400 - Ecological and Environmental Census Techniques](#)
- [ESC 5610 - Advanced Applications of Remote Sensing and Geographic Information Systems and ESC 5610L - Advanced Applications of Remote Sensing & Geographic Information Systems Laboratory](#)
- [ESC 5650 - Remote Sensing and Image Analysis](#)
- [ESC 5660 - Geographic Information Systems and ESC 5660L - Geographic Information Systems Laboratory](#)
- [GEOL 5450 -](#)

[Hydrology Alternative](#)

Courses -

- [CPSC 5000 - Fundamentals of Computer Science](#)
- [CPSC 5010 - Structuring Programs and Data](#)
- [CPSC 5020 - Computing Systems](#)
- [CPSC 5030 - Systems Programming](#)
- [CPSC 5100 - Theory of Computer Programming Languages](#)
- [CPSC 5110 - Mobile Computing](#)
- [CPSC 5175 - Programming Languages for Business Data Analytics](#)
- [CPSC 5185 - Data Visualization for Business](#)
- [CPSC 5195 - Machine Learning for Business](#)
- [CPSC 5240 - Principles of Data Analytics](#)
- [CPSC 5250 - Medical Informatics](#)
- [CRMJ 5010 - Research Methodology I](#)
- [CRMJ 5015 - Social Control/Prevention](#)
- [CRMJ 5020 - Research Methodology II](#)
- [MATH 5131 - Statistical Computation and Programming](#)
- [MATH 5140 - Mathematical Statistics](#)
- [MATH 5150 - Introduction to Biostatistics](#)
- [MATH 5160 - Applied Statistical Methods](#)
- [MATH 5170 - Nonparametric Statistics](#)
- [MATH 5180 - Analysis of Variance](#)
- [MATH 5190 - Design of Experiments](#)

- [MGT 5140 - Databases and Data Warehouses](#)
- [MGT 5190 - Data Mining and Analytics](#)
- [MGT 5200 - Advanced Data Analytics](#)
- [MGT 5210 - Big Data Management and Analysis](#)

Human Dimensions (6 hours)

Recommended Courses -

- [BIOL 5440 - Amphibian Ecology and Conservation](#) or [ESC 5440 - Amphibian Ecology and Conservation](#)
- [ESC 5050 - Biodiversity and Natural Resources Conservation](#)
- [ESC 5150 - Wildlife Administration and Policy](#)
- [ESC 5170 - Advanced Environmental Law](#)
- [ESC 5180 - Case Studies in Environmental Problems](#)
- [ESC 5210 - Seminar in Environmental Ethics](#)
- [ESC 5450 - Reptile Ecology and Conservation](#)

Alternative Courses -

- [CRMJ 5050 - Criminal Justice Policy and Administration](#)
- [CRMJ 5250 - Courts, Sentencing and Society](#)
- [CRMJ 5260 - Ethics and Crime](#)
- [MATH 5130 - Introduction to Probability and Statistics](#)
- [PSPS 5111 - Public Administration Foundations](#)
- [PSPS 5112 - Public Administration Research and Analysis](#)
- [PSPS 5113 - Program Planning and Evaluation](#)
- [PSPS 5121 - Organizational Theory and Administrative Behavior](#)
- [PSPS 5123 - Public Policy](#)
- [PSPS 5211 - Local Government Management Fundamentals](#)
- [PSPS 5221 - Administrative Law](#)
- [PSPS 5224 - Government, Politics, and Policy in Metropolitan Areas](#)
- [PSPS 5311 - Nonprofit Management Fundamentals](#)
- [PSPS 5313 - Nonprofit Resource Development](#)
- [PSPS 5324 - International Nongovernmental Organizations](#)

- [PSPS 5401 - Government and Nonprofits](#)
- [PSPS 5501 - State Government, Politics, and Policy](#)
- [PUBH 5220 - Program Planning, Implementation and Evaluation](#)
- [PUBH 5310 - Inclusion and Diversity in Community Engagement](#)

Capstone (6 hours)

-
- [ESC 5996 - Internship](#)
-

All Environmental Administration and Management Students must complete at least 36 credit hours for the degree. Any elective credit hours of graduate coursework should be approved by the advisor and program coordinator.

****All ESC MS students are required to comply with terms set forth by the University, Registrar, The Graduate School, and Graduate catalog. Please keep track of your progress using your MOCs account and consult your advisor at least once per semester.****

Graduation - To earn the M.S. ESC degree, you must successfully complete your program of study (i.e., core courses, electives, and capstone experience) within the specified time limit, be admitted to candidacy for the degree as determined by your academic record, apply for graduation, and meet all other graduation eligibility criteria specified by the Graduate School.

Time Limit - It is a university requirement that all coursework (including transferred credit) must be taken within six years prior to the date the UTC degree is awarded. You may request in writing an extension of this time limit of up to one year by filing a Graduate Student Petition with the Graduate School. Your extension request must be signed by your graduate advisor and the ESC Graduate Program Coordinator prior to submission to the Dean of the Graduate School for approval. All transfer credits or course substitutions will be determined by the graduate coordinator in consultation with the Graduate School and faculty. Options for the course validation plan include materials submitted by the student but are not limited to a professional portfolio related to the subject of the course, a project, an exam, catalog description and/or syllabus.

Requesting a Graduation Audit & Applying for Graduation - By formally requesting a graduation audit, you cue specialized academic advisors affiliated with the Graduate School to review your file for expected compliance with the specific graduation requirements of your program. Applying for Graduation similarly cues the Records Office to review your status. Requesting a graduation audit and applying for graduation are required to earn the M.S. ESC degree. You should both request a graduation audit and apply for graduation in the semester prior to your anticipated semester of graduation.

To request a graduation Audit, you must submit a Graduation Audit form to the Graduate School. You, along with your graduate advisor, and the ESC Graduate Program Coordinator must sign this form prior to its submission to the Graduate School. Your request for an audit should list any additions to the courses that you listed on the Program of Study form that you submitted during your first semester of enrollment. These additions should include any elective courses that you have completed, as well as credit hours completed that are associated with the capstone experience (i.e., ESC 5996, 5997r, 5998r, or 5999). If you have changed your capstone experience (e.g., thesis to non-thesis, etc.) and/or have any other special course-based circumstances of which the Graduate School should be aware, you should attach a note to the form describing those circumstances. The due dates for requesting a graduation audit for graduation during specific academic semesters are posted on the Graduate School Calendar (but see the Graduate School website).

To apply for graduation, you must use the online graduation application located in your MyMocsNet account under the 'Academics' tab. The due date for applying for graduation is typically early October for anticipated spring graduation, early March for anticipated summer degree conferral, and early June for anticipated fall graduation. Late graduation applications may be submitted on paper to the UTC Registrar's Office by late October for fall graduation, early July for summer degree conferral, and late March for spring graduation. You should obtain late graduation application forms from the Registrar's Office. Late applications require an application fee.

Graduation Eligibility - To be eligible for degree conferral, you must have completed all coursework listed in your application for candidacy with no grades below C for courses presented for the degree and a minimum grade point average of 3.0 or better on: 1) all coursework that you took for graduate credit at UTC, 2) all coursework that you transferred to UTC for graduate credit, and 3) all coursework that you completed to fulfill the program as approved in your application for candidacy.

STUDENT ACADEMIC FILES

The Graduate School maintains a privacy-protected academic file for each graduate student. The file is started upon receipt of a request for information about the program and is kept current thereafter. It contains the student's application form, letters of recommendation, copies of letters sent to the student as well as those received from the student, memos of discussion with the student, transcripts, their program of study, approval from the Graduate Coordinator and/ or Thesis advisor, results from the Comprehensive Exam (if appropriate), memoranda by faculty on the student, and so on. A student has the right to review the contents of his or her file, if he or she wishes. The only items the student will not be shown are letters of reference which were written in confidence. A student has the right to add to his or her file anything believed to be pertinent. If he or she feels the file contains misleading information, the student may include a corrective statement.

As part of the academic file, the Graduate Coordinator will conduct a general review of the students in the ESC Graduate Program and of the progress they have made at the end of the fall and spring semesters. The review will be routine; however, an attempt will be made to identify problems. As

a result of the review, an attempt will be made to advise students appropriately. Students who are judged not to be in good standing will be informed in writing by the Graduate Coordinator or Thesis advisor or Graduate School and of the steps they need to take to return to good standing. To be considered in "good standing" in the graduate program, students must be making timely progress toward meeting their degree requirements. Students must maintain a cumulative 3.0 (B) grade average. A grade of C or lower in the program may jeopardize a student's good standing, as well as their ability to obtain or retain a research or teaching assistantship.

THESIS GUIDELINES

Thesis Proposal - The thesis proposal should be prepared when the student and Thesis advisor have settled on a research topic, and the student has completed a preliminary exploration of the sources and identified the problem and defined a research strategy. Ideally, the thesis proposal should take the form of a paper of about 10 to 20 pages in length including a research statement of the problem, a discussion of the research context in which it is set, a brief outline of sources, methodology, anticipated results, and suggested timetable for completion. Preparation and presentation of the thesis proposal will facilitate the production of the final thesis but does not constitute a draft of the final thesis. The thesis proposal should be developed in consultation with the Thesis advisor. A student must spend the time outside of their scheduled course work to develop a solid thesis proposal so that the student becomes eligible to take thesis hours (ESC 5999) the following semester. The thesis proposal must be deemed defensible by the Thesis advisor and committee before thesis hours are taken.

Thesis Proposal Defense - The thesis proposal shall be defended through a formal (30-40 minute) presentation to the Thesis Committee prior to extensive research. Ideally, the thesis proposal defense will take place before the end of the second semester in residence and before the end of the semester in which the first thesis hour (ESC 5999) was taken. The thesis proposal shall be submitted to the Thesis Committee no later than two weeks prior to the thesis proposal defense. The thesis proposal defense shall be no less than four weeks prior to the start of the semester in which the student wishes to be classified as a 'thesis student' for GA assistantship assignment purposes, or to sign up for additional thesis hours. Based upon the comments of the Committee members, students are expected to make appropriate modifications to their thesis proposal and circulate the amended documents to the Committee members for approval. A final, signed copy must be filed with the Graduate Coordinator. Students wishing to make substantial changes to their thesis research must do this in consultation with their advisor and committee.

Thesis - The student shall present a thesis embodying the results of original investigation, conducted by the student on the approved topic. Students should work closely with their Thesis advisor and committee during the research and writing stages. Students must enroll in at least one thesis hour (ESC 5999) the semester following the acceptance of the thesis proposal, and the student must enroll in thesis hours every semester until the thesis is successfully defended and approved by the graduate school. A maximum of 12 thesis hours total may be included in the degree program. Students who have completed their coursework but not their thesis must enroll for at least one thesis sh every semester until the thesis is completed. Typically, students sign up for 1-2 sh of ESC 5999 each semester after they have advanced to candidacy, and enroll in at least 2 sh during the semester in which they graduate.

A thesis should have a coherent topic with an introduction presenting the general theme of the research and a conclusion summarizing and integrating the major findings. Upon completion of the thesis, the Thesis advisor will critically review the document for content, make appropriate suggestions for changes and return the document to the student for revisions. This will most likely be an iterative process with several drafts possible and may take several months. Copies of the revised and completed thesis will be distributed to all members of the Thesis Committee two weeks prior to the scheduled defense. Each member of the Committee should confer personally with the student to discuss the strengths and weaknesses of the thesis. If major problems are found or if there is disagreement regarding any aspect of the thesis among Committee members a Committee meeting may be necessary to resolve thesis issues prior to the formal defense.

Thesis sections and formatting are outlined in the UTC Thesis and Dissertation Standards ([thesis-dissertation-standards-12-10-2019a.pdf \(utc.edu\)](https://utc.edu/thesis-dissertation-standards-12-10-2019a.pdf)) issued by the Graduate School.

Thesis Defense - There shall be no less than 16 weeks between the date of the thesis defense and the date of the thesis proposal being approved. The thesis defense shall be advertised no less than two weeks prior to the actual defense (but see the Graduate School calendar). The thesis defense shall be no less than one month prior to the deadline for submitting the thesis to the Graduate School in the semester in which the student wishes to graduate. The thesis shall be submitted to the Thesis Committee no less than 2 weeks before the thesis defense. The defense will be conducted in an open forum presided over by the Thesis advisor. In the defense, the student will give a 40-50-minute presentation highlighting the various components of the thesis with an emphasis on the research results. After the presentation, the student will field questions from the audience and then via closed door questioning with the Thesis Committee. Once the student has addressed the Thesis Committees questions and comments made during the defense, a copy of the thesis in final form should be presented to the Committee for signatures. After that, the thesis will be routed to the Graduate Program Coordinator, College of Arts and Sciences, and Graduate School per the routing guidelines provided by the university (but see Graduate School website).

RESPONSIBILITY OF THE CAPSTONE ADVISOR AND STUDENT

The Capstone Advisor is to serve as intellectual and professional mentor to their graduate students by:

- Helping students develop interpretive, writing, oral, quantitative, or other relevant professional skills required by the discipline;
- Helping advanced students design research programs that take advantage of their individual interests and strengths and that can be completed in a timely manner;
- Encouraging, by example and precept, a dedication to high-quality scholarship;
- Encouraging faculty-graduate student collaborations which entail the sharing of authorship or rights to intellectual property developed in research or other creative or

artistic activity.

- Encouraging students to be open about any problems in their working relationships (including the relationship with the advisor) and being open to making accommodations to deal with such problems.
- Providing students with evaluation of their progress and performance in regular and informative, and supportive ways. Although the frequency may vary according to circumstances and academic cultures, a suggested minimum is two meetings each semester. It is especially important for faculty to provide students with timely and candid advice when their performance is deficient or their lack of progress might prevent them from attaining the desired degree.

For their part, graduate students should:

- Understand the Capstone Advisors' central role, as well as their constraints. This includes:
 - recognizing that the Capstone Advisor provides the intellectual and instructional environment in which the student conducts research/study
 - recognizing that the Capstone Advisor is responsible for monitoring the accuracy, validity, and integrity of the student's research, and for ensuring that the contributions of all participants in the research are properly acknowledged in any publications
 - being aware of time constraints and other demands imposed on faculty members and staff
 - taking the initiative to arrange meetings with the Capstone Advisor as often necessary and to keep the advisor informed of any factors that might affect the progress of their research or time to degree
 - recognizing the importance of seeking an early and informal resolution of any problems in their working relationships with their advisor or others by first consulting with the advisor
- Take primary responsibility for informing themselves of the regulations, policies, and practices governing their financial aid, degree and course requirements, research activities, and conflict resolution. This may involve seeking clarification from the Capstone Advisor or Graduate Coordinator when they are uncertain about the precise meaning or application of a regulation or policy statement.
- Exercise high professional standards in all aspects of their work.

FINANCIAL SUPPORT

Funding is provided through a combination of graduate assistantships (GA, GTA), graduate research assistantships (GRA), scholarships or student loans. Because of the importance of

research funding from advisors, prospective graduate students (planning to enter the thesis track) should contact potential Thesis Advisors prior to applying for graduate studies to determine whether funds are available.

The ESC MS Program offers a limited number of graduate assistantships (GA). The assistantships are awarded on a competitive basis (3.00 GPA minimum; 3.25 GPA preferred) and are initially based on evaluation of undergraduate transcripts, GRE scores, letters of recommendation and the needs of the department. GTAs will be under the direct supervision of a faculty/staff member experienced in the teaching discipline and be evaluated regularly.

Each graduate assistant (GAA, GTA, or GRA) with at least a 0.50 FTE (20 hours/week) appointment and who is in good academic standing is eligible for consideration of a Graduate Assistant Matriculation Fee Waiver which is applicable toward tuition for coursework in the graduate assistant's approved program of study (i.e. degree plan).

Graduate research assistantships (GRA) are available *only* if a faculty member has a research project in which funds for research assistants are provided by the funding agency. To be considered a graduate research assistant (GRA), the student must possess the skills and knowledge to carry out the research-related support associated with the research assistantship.

Although assistantships are initially awarded on the basis of past qualifications, the student is required to maintain satisfactory job performance and academic progress (>3.25 GPA). Poor performance in academic achievement or assigned duties may result in nonrenewal of assistantships. Conversely, students admitted into the program without assistantships may, on the basis of outstanding academic and professional performance, be awarded assistantships during the course of their graduate studies (pending availability). If satisfactory levels of academic and job performance are maintained, students typically have the opportunity for a maximum of 4 semesters of assistantship support. Summer funding is typically not available except for possible research grants. Thesis students receive preference over non-thesis students when it comes to GTA availability, but all applicants are reviewed based on their overall credentials. All ESC GTAs will have an undergraduate GPA of no less than 3.0 to be eligible for an award. Students who have an undergraduate GPA >3.5 are given preference for a full-time GTA. Half-time GTA (0.25 FTE; 10 hours/week) are at times available for qualified candidates with an undergraduate GPA between 3.0 - 3.50.

Financial assistance may be available through several other avenues:

- Graduate Student Scholarly and Creative Grant Support: grant in support of research with funding to support field studies, conference attendance, etc.
- Merit Scholarships: recognizes and rewards academic achievement on a competitive basis.
- Professional organizations: usually a grant based on the student's research proposal or funding to present an oral paper or poster at a conference.
- Internships: available with local agencies.

Funds permitting, the department will assist in covering *limited* expenses related to presenting posters or papers at professional meetings.

OFFICE SPACE

Desk space is provided by the Department for students with teaching assistantships. A student with a continuing assistantship may retain his or her office during the summer. The occupant of an office is responsible for the furniture and computer systems therein. Furniture and computers are not to be moved or removed without the permission of the Graduate Program Coordinator.

FACULTY

Please see the following for a list of Department Faculty <[Biology, Geology and Environmental Science Faculty and Staff | University of Tennessee at Chattanooga \(utc.edu\)](#)> that are at the rank of Assistant Professor or higher as these may be willing to serve as an advisor for a potential graduate student.

An updated and more comprehensive list of approved Graduate Faculty Members at UTC is maintained by the Graduate School on its website. Other qualified persons may be appointed to the graduate faculty if your graduate advisor suggests that they will provide special academic expertise or professional experience to your graduate advisory committee. If you are interested in seeking committee appointment for a qualified external individual, talk with the ESC Graduate Program Coordinator for more information about this process.

Graduate Committee Appointment - Before the end of your first semester of enrollment in the M.S. ESC program, you must officially identify your graduate advisor and graduate advisory committee members. The process for doing this varies according to the capstone experience that you choose to pursue. If you are planning to conduct a thesis, you must identify your graduate advisor and committee members by filing an official Graduate Committee Appointment form with the Graduate School. You, your graduate advisor, all your graduate advisory committee members, and the Graduate Coordinator must sign this form prior to its submission.

Non-thesis students are not required to have a graduate advisory committee for degree completion.

Graduate Committee Changes - If you decide to change your capstone advisor and/or any of your graduate committee members, you must officially document such changes. To do so, you should submit a new Graduate Committee Appointment form (thesis students only) before the end of the semester in which the change is made or by the beginning of the next semester if the change is made during summer or winter break.

Campus Resources

Graduate Student Association - The Graduate Student Association (GSA) represents graduate and professional students at UTC in an official capacity. GSA members advocate for graduate and professional students through regular communications with campus administrators and representation on the UTC Graduate Council. GSA also organizes and sponsors social networking events that bring together graduate and professional students from across campus. As an ESC graduate student, you are encouraged to become involved with GSA. More information is available on the GSA website.

Library - The UTC Library provides all students with valuable resources and space, including print and electronic scholarly materials, Windows and Mac computers, group study rooms for reservation, private study carrels, 24-hour study space, and practice presentation rooms. The Library also houses a Graduate Student Lounge on the 1st floor exclusively for use by graduate students. For more information about the library or to reserve a study room, please visit the UTC Library website.

Technology - Information Technology (IT) manages access to UTC's online services (MyMocsNet, UTCLearn) and email accounts (MocsMail+) and provides technological support for both students and faculty. Students should become familiar with how to access and use UTC's online services as they provide general and up-to-date campus information, resources specific to individual students, and course content. As a UTC student, you should expect to use your UTC email account for official University business, including correspondence with faculty and being notified of important announcements by the Graduate School, the Department, and the ESC Graduate Program Coordinator. For this reason, even if you primarily use a different existing email account, you should check your UTC email account frequently.

IT also provides free software for current UTC students to install on their computers. This software includes the popular statistics packages SPSS and SAS, which often are used by ESC graduate students conducting empirical research. The bibliography management program Endnote also is available to current UTC students at no cost. Endnote is popular among ESC graduate students writing theses because UTC thesis standards require that bibliography management software be used. Information technology also provides free access to the online survey platform Qualtrics, which can be useful to ESC graduate students wanting to survey people as part of their capstone experience. A complete list of Software Available to Students is available on the IT website.

Research Compliance - If you are planning to use animal subjects or human participants in your research as an ESC graduate student, you must have your plans approved by UTC's Institutional Animal Care and Use Committee (IACUC) or Institutional Review Board (IRB), respectively. Such research may not be initiated without IACUC or IRB approval. Information about the IACUC process and IRB process is available online.

Counseling - The Counseling and Personal Development Center at UTC provides counseling at no charge to students struggling with stress, feeling depressed or anxious, having time management difficulties, or experiencing other issues that are adversely impacting their

academic progress and success. For more information, you are encouraged to visit the Center's website.

Accommodation - The Disability Resource Center (DRC) at UTC provides support to students with disabilities seen or unseen (e.g., physical, learning, psychiatric), including special assistance or accommodation in courses. For more information, you are encouraged to visit the DRC website.

Student Checklist(s)

These checklists are provided to help you make timely and successful progress through M.S. ESC degree program. Specific checklists are provided for your first and second semesters of enrollment, the semester before your graduation, the semester of your graduation, and all other semesters in which you are enrolled in the program. You should note that they do not substitute for the details of requirements as described in the full contents of the Graduate Catalog or this Student Guidebook.

ESC Graduate Student Checklist - First Semester

Early:

Set up a schedule for regular meetings with your advisor.

Define capstone progress goals for the semester with your advisor.

Submit [Capstone Progress Goals](#) to the Graduate Program Coordinator (optional).

During:

Discuss the details of your capstone experience plans with your advisor.

Discuss appropriate graduate committee members with your advisor (if needed). Discuss course offerings for *next* semester with your advisor and register.

Work on your thesis, internship, or individual studies plan.

By the End:

Declare your [Program of Study](#) to the Graduate School.

Appoint your graduate committee members:

[Graduate Committee Appointment](#) (thesis students)

Discuss your progress for the semester with your advisor.

Define capstone progress goals for the *next* semester with your advisor.

ESC Graduate Student Checklist - Second Semester

Early:

Set up a schedule for regular meetings with your advisor.

Submit [Capstone Progress Goals](#) to the Graduate Program Coordinator (optional).

During:

Discuss course offerings for *next* semester with your advisor and register.

Finalize your thesis, internship, or individual studies plan (if still in progress).

Begin your capstone experience (if proposal/plan has been approved/submitted).

By the End:

Discuss your progress for the semester with your advisor.

Define capstone progress goals for the *next* semester with your advisor.

ESC Graduate Student Checklist – Semester *before* Graduation

Early:

Set up a schedule for regular meetings with your advisor.

Attend a UTC Thesis and Dissertation Formatting Workshop
(recommended if not previously attended).

Submit [Capstone Progress Goals](#) to the Graduate Program Coordinator (optional).

During:

Discuss course offerings for *next* semester with your advisor and register.

Prepare the final written document of your capstone experience (if applicable).

By the Due Dates:

Submit your [Graduation Audit](#) request to the Graduate School.

Apply for graduation online.

By the End:

Discuss your progress for the semester with your advisor.

ESC Graduate Student Checklist – Semester of Graduation

Early:

Set up a schedule for regular meetings with your advisor.

Submit [Capstone Progress Goals](#) to the Graduate Program Coordinator (optional).

During:

Finalize the final product your capstone experience.

Plan and schedule your defense (thesis students).

By the Due Dates:

Defend your thesis.

Report the results of your defense (thesis) [Graduate Degree Examination Results](#)

Submit your final written thesis document to the Graduate School or the Graduate Program Coordinator.

ESC Graduate Student Checklist – All Other Semesters

Early:

Set up a schedule for regular meetings with your advisor.

Submit [Capstone Progress Goals](#) to the Graduate Program Coordinator (optional).

During:

Discuss course offerings for *next* semester with your advisor and register.

Work on your capstone experience toward meeting semester goals.

By the End:

Discuss your progress for the semester with your advisor.

Define capstone progress goals for the *next* semester with your advisor.

Appendix 0-B

Campus Reintegration Plan Form

The University of Tennessee at Chattanooga

The purpose of this form is to document an established Reintegration Plan for each campus unit. Each unit head should utilize this form to submit a Reintegration Plan for their respective area for review and approval by their appropriate dean/major unit leader. The Office of Human Resources should be consulted as appropriate when establishing reintegration plans. Each Vice Chancellor should have final review and approval of Reintegration Plans for their respective division before forwarding this form to Human Resources for record retention at personnel@utc.edu. Unit Reintegration Plans should be established in accordance with the UTC Phased Reintegration Plan and University Health & Safety Guidelines.

Campus Unit(s): College of Arts and Sciences
Environmental Science

Division: Biology, Geology,

Unit Head: John Tucker

Date: June 12, 2020

The following sections may be used to guide administrators in establishing Reintegration Plan details that allow for incremental reintegration of personnel to the workplace to increase capacity and functionality in response to operational needs.

Phased Reintegration Timeline – Provide proposed start/end dates for phased reintegration based on anticipated operational needs.

- Phase I – May through June
- Phase II – July through August 7
- Phase III – August 10 forward

Unit Occupancy – Provide details related to personnel returning to the workplace, personnel continuing to work remotely, innovative/alternative work scheduling practices, and total unit occupancy.

- Phase I (May – June) – Staff and faculty requested to work primarily remotely. Faculty Associate, Accounting Specialist, and Department Head in Holt 215 as needed, typically 1 - 2 times per week. Several faculty and approved students working in Holt Offices and labs on research and course planning.
- Phase II (July – August 7) – Staff continue a mix of remote work and on campus work as needed. Staff presence increases over this time period to an eventual occupancy of about 50%. Faculty continue to primarily work remotely. Number of faculty working in Holt Offices and labs is expected to increase during this period but is not required. The plan will be revised if necessary to ensure BGE operational needs are met.

- Phase III (August 10 – forward) – Percentage of staff in Holt increases to between 50% and 100%, depending upon several factors (e.g. health risk factors and childcare). Percentage of faculty on campus will increase, with faculty teaching Face to Face (F2F) labs and lectures required to meet classes. Other faculty will continue a mix of remote work and on campus work as needed. Some faculty will need to work remotely exclusively or primarily due to

health risk factors, childcare, and similar reasons. At present, about 20% (8) of BGE's 40 employees have discussed a need to work primarily or fully remotely in the fall. Another 15% (6) employees have requested a mixed arrangement, with at least 4 of those related to childcare and dependent on Hamilton County public school arrangements in the fall. Accommodations discussed thus far do not impact the meeting of BGE operational needs.

- The plan will be revised if necessary to ensure BGE operational needs are met.

Alternative Workplace Design – Provide details related to planned reconfiguration of workspaces and common use areas to allow for appropriate social distancing and hygiene practices.

Departmental Front Office - The department administrative office (Holt 215 and associated rooms) houses four staff and the department head. Four individuals have private offices within Holt 215, but the Administrative Assistant and

student workers do not. The Holt 215 complex consists of an open lobby area, four private offices, a copy/mail room, and a break room. There is daily traffic into Holt 215 (students, faculty, visitors, mail and equipment delivery, etc.) and occasionally high numbers of individuals with a line down the hall, creating a potentially unsafe environment. We will take the following actions to minimize risk in Holt 215.

- Normally we will leave the door open to Holt 215 to maintain a welcoming environment but will place a small desk in front of the doorway with a sign requesting that individuals other than faculty not enter until authorized.
- Move the Administrative Assistant's desk so she (or someone else in her absence) can monitor the entry way and control access to the room.
- We have requested a plexiglass screen for the Administrative Assistant
- Close the front door when no one is present to monitor the front entryway to Holt 215 and post information about when the office will be open and alternate ways to contact staff or the department head
- Encourage students and others to make appointments ahead of time through an electronic scheduling mechanism
- Require persons entering Holt 215 to wear a mask
- Maintain 6 foot distancing between the workstations in the Holt 215 lobby area (Administrative Assistant desk, two student worker desks, table for display (materials, signup sheets, etc.)
- Limit mail/copy room occupancy to two people at a time
- Limit breakroom occupancy to one person at a time
- Post signs outside the door reminding people not to seek access if they have any covid

symptoms

- Observe Hygiene and Health Monitoring practices described below

Other areas in Holt Hall

- Place floor signs at the entrance to every office, classroom, lab in our area to indicate six foot distancing.
- Limit number of individuals in teaching labs to 12 students plus one instructor or less, as determined by BGE staff and approved by Academic Affairs and UTC Safety.
- Place tape in all teaching labs to indicate precise locations of student seats to maintain six foot distancing.
- Post signs requesting that individuals walk/stand on the right side of hallways and stairwells, walk single file, and maintain 6 foot spacing.
- Request that students not congregate outside classroom or lecture doors before and after class. They should remain outside the building, in cars, etc. prior to classes.
- Close or drastically reduce the number of allowable students in BGE's 3 student study rooms
- Faculty and staff leading meetings in any of our conference room or computer lab will be required to sanitize the room immediately after the completion of the meeting.
- Add additional tables to teaching laboratories to achieve 12 student workstations while maintaining 6 foot distancing. We have already accomplished this by obtaining tables from UTC Surplus and moving them into labs.
- Department meetings will continue to be conducted by Zoom or similar medium because of the lack of a room large enough to accommodate all faculty and staff and maintain social distancing and the limit on gatherings larger than 30 individuals.

Hygiene and Health Monitoring Practices – Provide practices to be implemented to ensure adherence to hygiene and health monitoring expectations outlined in the UTC Phased Reintegration Plan and University Health & Safety Guidelines.

- Follow all recommended and required university hygiene and health monitoring practices
- Wipe work surfaces, door handles, elevator buttons, faucet handles, etc., in common areas daily. Coordinate with facilities personnel to ensure all areas covered.
- Six feet (6ft) social distancing standards and proper protection/hygiene practices will be required for any faculty or staff members working in Holt Hall in accordance with CDC guidelines for prevention of illness and UTC Health and Safety Guidelines.
 - o All faculty and staff will be required to wear a mask while outside their offices and during any meetings of two or more people.
 - o Students and visitors to Holt Hall will be required to wear masks at all times.
- Common use internal doors will be left open whenever possible to minimize repeated contact with common surfaces. Coordinate this with UTC Safety.
- Faculty and staff will be asked to complete the COVID-19 Employee Self Questionnaire App and take their temperature each day before they come to campus. In the event they are symptomatic, they will be advised to remain at home and contact their physician.
- Students will be required to use disinfectant to clean lab areas before and after use
- Faculty and staff will be encouraged to self-isolate in the event of a known interaction

- with a COVID-19 positive individual and report the event to the Department Head.
- Provide disinfectant near all high use door areas, including entry/exit doors to Holt stairwell, or keep these doors open if possible. This will be coordinated with UTC Safety.
- We will restrict non-essential work-related travel.
- We will discourage all meetings where social distancing is not possible and encourage use of Zoom or other virtual platforms.
- Provide individuals with a disposable face mask if they show up without one.

Existing Operational/Business Needs or Fiscal Concerns – Provide details related to current needs or fiscal concerns associated with the phased reintegration plan outlined above.

100% face to face classes are largely impossible or impractical due to covid-19 classroom and laboratory seating limits. Nonetheless, we believe we can provide a quality academic experience for incoming freshmen and other students through a combination of online and F2F rotating classes.

There are several Business Needs/Fiscal Concerns that have a bearing on safety and the quality of courses and other academic experiences. Precise quantification of fiscal concerns is difficult in light of changing conditions, multiple uncertainties, and a likely minimum 20% reduction in the BGE operating budget.

- Delivery of quality online and F2F rotating courses/ academic experiences will require use of video/sound recording equipment in every laboratory and classroom, digital drawing pads, field video recording equipment, webcams, microphones, and other technology. We are relying on UTC to purchase and make this equipment available. If they do not, academic quality will suffer. The department is prepared to make some of these purchases with our limited budget, and more if additional money is provided.
- Purchasing, maintaining, and distributing adequate supplies of hand sanitizer, disinfectant, disposable face masks presents logistical and financial challenges. We understand that UTC will provide these items but believe it is prudent for BGE to purchase some of these items as part of our normal purchasing, especially for teaching labs.
- New floor, wall, and standing signage needs for Holt Hall are extensive. We are relying on UTC to purchase and provide appropriate signage but anticipate we will need to purchase some of these items.
- New equipment, models, and supplies may need to be purchased for some teaching laboratories to reduce the sharing of items and potential to transmit the virus. The full extent of this need will not be known until faculty redesign courses.
- New equipment, models, software, and licenses may need to be purchased for some teaching laboratories to facilitate remote learning. The full extent of this need will not be known until faculty redesign courses.

**Attach additional sheets if necessary*

Signatures of Approval

John C.
Tucker

Digitally signed by
John C. Tucker
Date: 2020.06.12

Department/Unit Head Date

_____ Dean / Major Unit Head Date

_____ Division Vice Chancellor Date

cc: Human Resources

Appendix 0-C

Biology, Geology & Environmental Science

COVID-19 Related Safety Protocols for Teaching Labs

- 1. Capacities:** Teaching Lab COVID-19 capacities are 50% normal capacities + one instructor.
- 2. Face Masks:** All students and faculty are required to wear face masks at all times. The masks should cover both the mouth and nose.
- 3. Hand Sanitizer:** Upon entering and leaving the teaching lab, everyone should use hand sanitizer.
- 4. Disposable Nitrile Gloves/Hand Washing:** Students and faculty are encouraged to (should?) wear disposable nitrile gloves during the lab. If gloves are worn, emphasize the importance of not touching faces, otherwise the purpose is negated.
 - There are some circumstances in which gloves cannot be worn during a lab due to the lab activity. Under these conditions, students should wash their hands regularly.
 - (Gloves should always be made available to students and faculty within the teaching lab if students prefer to wear them)
- 5. 6ft Distance:** Students should maintain 6ft distance from each other while entering the lab and while seated.
 - Students can only sit in the designated areas.
 - It is understood that students and faculty may need to move & walk around in the room to use equipment, answer questions, etc. It is requested that this be kept to a minimum as much as possible.
- 6. Disinfecting work areas and equipment:** Both students and faculty are required to disinfect their work areas, chairs and equipment upon entering and before leaving the teaching lab.
 - Shared equipment: There could be times that students will need to use the same equipment during a lab period. Under these circumstances, the equipment should be disinfected after each student has used the equipment.
 - Cannot Disinfect Equipment/Samples: Some samples/specimens/equipment will be harmed if disinfectant is used on them. Students should refer to faculty on how/when to disinfect these types of items.
 - Microscopes: Microscopes should be disinfected before and after use. In each teaching lab, there is a designated spray bottle to use for microscopes. This solution is a combination of alcohol, vinegar and water.
 - Students should NOT touch the glass of the eyepieces.
 - Spray some of the microscope disinfectant on KimWipes.
 - Use the KimWipes to wipe off the microscope – everywhere that was touched and especially between the eyepieces where students breath onto.

- o DO NOT wipe the glass of the oculars with the disinfectant if at all possible. The alcohol could dissolve any adhesives, etc. in the eyepieces.
- o If instructors need to help students with their microscopes, make sure to disinfect the microscope before and after use.
- Run out of Disinfectant Spray? Bring the empty spray bottles to either Wendy or myself. We will exchange the spray bottles and get the empty ones refilled. This applies for both the general disinfectant spray and the microscope cleaner.

7. After-Hour Access to Teaching Labs for Students: Students will not be given after-hour access to any teaching labs. Students can only be in the lab outside of their regular lab time, if an instructor is present at all times. This is to help ensure that students keep required distances and disinfect their areas during these times. Capacities are limited to 50% normal + one instructor.

8. After-Hour Access to TA's. Are we going to have TA's for courses essentially work like they usually do – give them after-hour access or not?

Steps 2-5 are consistent with Dept. Chemistry and Physics. Signs that indicate these steps will be posted on lab doors.

Signs for Step 6 will be posted within each teaching lab room.

9. It is the faculty/instructor's responsibility to make sure the teaching lab they are using is stocked with paper towels, disinfectant spray, microscope disinfectant spray, soap, hand sanitizer, etc.

The following items can be found in 107 Holt:

- Paper towels
- Nitrile Gloves
- KimWipes
- Soap & Soap Refill
- Hand Sanitizer & Refill

The following items should be give to either Wendy or myself to refill:

- Disinfectant Spray Bottles
- Microscope Disinfectant Spray Bottles
- Disposable Face Masks

10. At the beginning of the Fall 2020 semester, each teaching lab has 10 disposable masks (in ziplock bag) that can be used in case a student forgot their mask, etc. This should be placed where anyone teaching in the lab can have access to it.

11. The statement below is one that I received from Chemistry/Physics (via legal) that you are welcome to include in syllabi or safety statements for your course. It is another statement that

emphasizes the fact that if anyone doesn't comply with these safety rules, they will be asked to leave the lab.

“Anyone deliberately violating safety rules may be asked to leave the lab and given a zero for that lab. Because of COVID-19 and the increased risk due to the close contact required between students and faculty, we reserve the right to check student's temperature. If the temperature is 100.4F or higher the student will be asked to leave the lab and a COVID-19 Illness/Travel Form will be submitted for that student.”

Appendix 1-A

	SLO1 Students are able to demonstrate knowledge of the natural world, within the context of key issues in environmental science (including human population increase, sustainability, resource depletion, urbanization, and environmental pollution).	SLO2 Students are able to demonstrate and apply knowledge in the core areas of the environmental science graduate program: natural resource management, statistics, environmental law and policy, and environmental pollution.	SLO3 Students are able to successfully defend their thesis, internship, or learned discourse, including giving a public presentation about their project and accurately answering audience questions.	SLO4 Students are able to gather, evaluate, and synthesize relevant scientific literature.	SLO5 Students are able to communicate scientific information effectively both in writing and orally.	SLO6 Students are able to apply their knowledge towards addressing environmental problems, in a manner consistent with recognizing the unique role humans play in the environment.	SLO7 Students are able to conduct themselves responsibly and recognize the importance of ethical professional behavior.
ENGR 5260 Wastewater	R/C	R/C				R/C	
ENGR 5280 Air Pollution	R/C	R/C				R/C	
GEOG 5150 R Env Man	R	R/C		R	R	R/C	
GEOG 5250 R Land Use	R	R/C		R	R	R/C	
POLS 5430 Nonprofit	R/C	R/C				R/C	
GEOL 5450 Hydrology	R					R	
BIOL 5160 Biogeography	R			R	R		
BIOL 5200 Ad Topic Phys	R					R	R
BIOL 5220 Mol Genetics						R	R
BIOL 5400 Ad Top Org Bio	R/C	R/C		R/C	R/C	R/C	R/C
BIOL 5560 Ichthyology	R/C			R/C	R/C	R/C	R/C
ESC 5010 SP Env. Scien	R/C	R/C		R/C	R/C	R/C	R/C
ESC 5020 Mechanisms	R	R		R	R	R	R
ESC 5030 Microbial E	R	R		R	R		R
ESC 5040 Bioremediation	R	R		R	R		R
ESC 5050 Bio Nat Res C	R	R/C		C	R	R/C	
ESC 5060 Ad Ecology	R	R/C		C	R	R/C	
ESC 5080 Limnology	R	R		C	C	R/C	R/C

ESC 5120 Applied Stat		R/C			R/C		
ESC 5140 Envir Law		C				C	
ESC 5170 Ad Envi Law	R	C			C	C	R
ESC 5180 Case Studies	R	R				C	R
ESC 5360 Env Ecol Gen	R			R	R	R	R
ESC 5610 Remote Sens		R		C	C	C	R
ESC 5660 GIS		R		C	C	C	R
ESC 5700 Seminar I		R		C	C	R/C	
ESC 5710 Seminar II		R		C	C	R/C	
ESC 5730 Plant Ecology	R/C	R/C		R/C	R/C	R/C	R/C
ESC 5996 Internship	C	C	C	C	C	C	C
ESC 5999 Thesis	C	C	C	C	C	C	C

Appendix 1-B

SLO	Year	ESC Course-R or C	ESC Course - R or C	ESC Course - R or C
1	2023-2024	ESC 5020 - Mechanisms	ESC 5180 - Case studies	
2	2023-2024	ESC 5050 - Natural resources conservation and management	GEOL 5250 - R Land Use	ESC 5610 - Remote Sensing
3	2024-2025	ESC 5999 - Thesis	ESC 5996 - Internship	ESC 5040 - Bioremediation
4	2024-2025	ESC 5700 - Seminar I	BIOL 5160 - Biogeography	ESC 5120 - Applied Statistics
1	2025-2026	ESC 5140 - Environmental Law and Policy	ESC 5070 - Plant Ecology	
2	2025-2026	ESC 5020 - Mechanisms	ESC 5030 - Microbial Ecology	BIOL 5220 - Molecular Genetics
3	2026-2027	ESC 5996 - Internship	ESC 5999 - Thesis	GEOL 5450 - Hydrology
4	2026-2027	ESC 5710 - Seminar II	BIOL 5560 - Ichthyology	
1	2007-2028	ESC 5120 - Natural resources conservation and management	ESC 5080 - Limnology	
2	2007-2028	ESC 5140 - Environmental Law and Policy	ESC 5060 - Ad Ecology	ESC 5120 - Applied Statistics

SLOs (updated spring 2024)

- 1 **SLO 1.** Core Knowledge. Students demonstrate mastery of core areas of environmental science (e.g., ecology, natural resources, law and policy, ethics, etc.) as they apply to understanding the natural world and addressing environmental issues, including human population growth, resource depletion, urbanization, pollution, and sustainability.
- 2 **SLO 2.** Resources and Tools. Students use resources effectively within an environmental science context to collect information, including literature, established methodologies and technologies, laboratory, field equipment, and/or computational tools.
- 3 **SLO 3.** Scientific/Research Process. Students can critically address and solve problems in environmental science by developing questions and/or hypotheses, designing and conducting relevant investigations with empirical, theoretical, and/or conceptual tests, and critically analyzing and interpreting results.
- 4 **SLO 4.** Communication and Engagement. Students disseminate environmental science information effectively using various formats (i.e., oral, written) and engage with various audiences (i.e., scientific, general) as is essential to career development in the discipline.

Appendix 2-A

Advanced Ecology Spring 2020

Biology, Geology and Environmental Science, ESC 5060, CRN, Face-to-Face, 3 credit hours

Instructor: Dr. Joshua R. Ennen

Email and Phone Number: jre@tnaqua.org, 423-785-3071

Office Hours and Location: By appointment only

Course Meeting Days, Times, and Location: W (6 – 8:30 PM); Holt Hall 208

Course Catalog Description: Study of ecological principles including ecosystem functioning, organismal interactions, and techniques used to model these functions and interactions.

Course Pre/Co Requisites: None

Course Student Learning Outcomes: ESC 5060, Advanced Ecology, will expose students to various key topics in ecology through lectures, reading selected primary literature, and a class project. Lectures are aimed to give students an overview on ecological topics and principles to assist in the comprehension of the primary literature reading assignment. ESC5060 covers physiological, macroecology and biogeography, behavioral, population and evolutionary ecology, community ecology, ecosystems stability and function, and climate change.

Required Course Materials: None

Technology Requirements for Course: You need access to a computer with a reliable internet connection to complete this course. Test your computer set up and browser for compatibility with UTC Learn at <http://www.utc.edu/learn/getting-help/system-requirements.php> [Links to an external site.](#). As there are videos with sound that you must watch, you will also need speakers or headphones. You should also have an updated version of Adobe Acrobat Reader, available free from <https://get.adobe.com/reader/Links to an external site.>.

Technology Skills Required for Course: Nothing specific

Technology Support: If you have problems with your UTC email account or with

UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements: There are several assessments used in this course, including paper reviews, paper discussions, class project, presentations, and exams.

Course Grading

Course Grading Policy: 90-100% = A; 80-89% = B; 70-79% = C, 60-69% = D; <60% = F

Paper Reviews (x4)	20%
Participation	10%
Class Project	
Written Portion	15%
Presentation Portion	15%
Two Exams	40%

Instructor Grading and Feedback Response Time: I will try my best to grade all assignments within one week of the due date and provide written feedback when necessary.

Course and Institutional Policies

Late/Missing Work Policy: I will not accept late assignments.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the Student Handbook (<https://www.utc.edu/dean-students/student-handbook.php>Links to an external site.).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: *Each student is expected to attend every class and maintain an environment conducive to learning. This means being respectful to fellow classmates, the instructor, and any visitors who may be present.*

Course Participation/Contribution: Every student is required to participate during the in-class discussion of ecological literature.

Course Learning Evaluation: Course evaluations are an important part of our

efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

UTC Bookstore: The UTC Bookstore will price match Amazon and [BN.comLinks to an external site.](#) prices of the exact textbook - same edition, ISBN, new to new format, used to used format, and used rental to used rental format, with the same rental term. For more information, go to the [Bookstore Price Match ProgramLinks to an external site.](#) webpage, visit the bookstore, email sm430@bncollege.com or call 423-425-2184.

Course Calendar/Schedule: The tentative weekly schedule for the course below. Some sections of might be omitted

1. January 8th *Course Introduction and What is Ecology?*

Course Introduction and “What is Ecology?” Group assignments and expectations of research

2. January 15th– *Scale in Ecology*

Reading assignment– TBA

Review assignment due January 29th: Ennen et al. – Barren’s Topminnow

3. January 22nd – *Biodiversity and Macroecology*

Reading assignment– TBA

3 min presentation on Class project due

4. January 29th– *Biodiversity-Stability*

Reading assignment– TBA

Review assignment #1 due

5. February 5th – *Biodiversity-Function*

Reading assignment –TBA

Review assignment due February 19th: Cecala et al. – Interference competition

6. February 12th – *Species Interactions: Consumptive Effects & Optimal Foraging*

Reading assignment – TBA

7. February 19th – Exam I

Review assignment #2 due

8. February 26th – *Species Interactions: Non-consumptive Effects*

Reading assignment – TBA

Review assignment due March 20th: Hyder et al. – Turtle movement

9. March 4th – *Evolutionary Outcomes to Species Interactions*

Reading assignment – TBA

10. March 11th – Spring Break

11. March 18th – *Food Webs: “Trophic Cascades”*

Reading assignment – TBA

Review assignment #3 due

12. March 25th – TBA

Review assignment due April 8th: Class project

13. April 1st Presentations

14. April 8th No Class; Work on your class project

15. April 15th – *Ecology and Climate Change*

Final Class project due April 17th

16. Week of April 22th –Final Exam

The University of Tennessee at Chattanooga

Advanced Applications of Remote Sensing and Geographic Information Systems Fall 2019

**Biology, Geology, and Environmental Science, ESC 5610/5610L, 49065/49067, Face-to-Face Lecture
& Laboratory, 3 credit hours**

Instructor: Thomas P. Wilson, Ph.D., GISP, UC Foundation Associate Professor, ESC Graduate Coordinator

Email and Phone Number: Thomas-wilson@utc.edu, 423-425-4713(Office) or 423-425-4341(BGE Main Office, Holt Hall 215)

Office Hours and Location: 1100-1200 MW, Holt Hall 306

Course Meeting Days, Times, and Location: MW 1200-1250, Holt Hall 208; M 1400-1550, SIMC 102

Course Catalog Description: Use of aerial photography and digital data for practical application and analysis of local environs. Primary systems are ERDAS ARC GIS, and Arcview. 3.000 TO 4.000 Credit hours 3.000 TO 4.000 Lecture hours

Course Pre/Co Requisites: Prerequisites: GEOG 4650 or GEOG 4660 or their equivalents. Crosslisted GEOG 5610. Laboratory/studio course fee will be assessed.

Course Student Learning Outcomes:

1. Students are able to formulate appropriate objectives and/or hypotheses, and use appropriate geospatial tools and methodologies, to collect, analyze, and interpret data within the context of environmental research.
2. Students are able to retrieve information relevant to geospatial & environmental research from the scientific literature and are able to evaluate the literature critically.
3. Students are able to conduct themselves in a professional manner while communicating geospatial & environmental information in both oral and written formats.

General Education Statement: *This course is not a general education course!*

Course Fees: *Laboratory/studio course fee will be assessed. Check with the Bursar's Office on costs.*

Required Course Materials: Horning, et al. 2012. Remote Sensing for Ecology and Conservation. Recommended Text: Lillesand, T.M, Kiefer, R.W, and J.W. Chipman. 2015. Remote Sensing and Image Interpretation. 7th edition. John Wiley & Sons, Hoboken, New Jersey. 736 pp.

Technology Requirements for Course: You will need to use a computer and associated software to analysis, compile, draft and edit your coursework. You should also have access to a modern up-to-date computer with a high speed internet connection, and a portable external hard-drive to store and back-up all of your necessary data and associated files. You should be able to adequately navigate technology and computers by being able to partition hard-drives, network connections, execute file transfer protocols,

manage databases, extract files with correct path destinations, write scripts using JAVA and Python or similar computer software. So your technology requirements go beyond using, UTC email, Blackboard, and your mobile phone.

Technology Skills Required for Course: This is a graduate level course that goes builds upon your prerequisite course work and the skills that you have mastered those undergraduate courses.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements:

General Expectations (A-E): General expectations: Advanced Applications of Remote Sensing and GIS is a graduate level course (with pre-requisites) and as such students will be expected to perform at a higher level than would be expected in an introductory undergraduate course. Where a student in an introductory undergraduate course would be expected to generally gain knowledge and comprehend its meaning with minimal to moderate application, as an upper-level to graduate student in this class you will be expected to analyze scenarios and real-life case studies with the goal of synthesizing information obtain in this course, other related courses and life experiences to provide cogent evaluation and recommendations that would result in positive, beneficial impact regarding an issue.

Course Objectives: In this class we will be involved with one of the most exciting and fastest growing fields related to geography. Integrated Geospatial Sciences are revolutionizing the decision making capabilities of resource managers and planners by giving a wealth of data at their fingertips. This class is designed to help you: Comprehend the theories behind geographic information systems and remote sensing, including their usefulness; Understand how to use GIS/RS as a planning tool; Gain practical “hands-on” experience in manipulating and analyzing data in a GIS/RS; Master GIS/RS concepts as part of an integrated Geospatial Sciences Framework via a project; During lecture we will talk about general theory behind GIS/RS concepts, discuss readings and assignments, have demonstrations on computer techniques, and troubleshoot problems from assignments. Therefore, you will be asked to participate in and lead discussions.

Reading assignments & Journal Briefs: Not only must you read appropriate text assignments, but literature in trade and scholar journals must be read and used in class discussions, examinations, and special projects and /or reports. Examinations will be primarily essay requiring the student to write lucid arguments and defenses for answers. Rote recall of textbook or journal reading assignments as responses for examination essays may be consider satisfactory but not evident of the higher order learning outcomes expected of students in this course.

Labs, Reports & Assignments: In the laboratory portion of this course, students are expected to self-instruct and in some cases use a team approach in mastering the material and completing assignments. The instructor and laboratory staff are available and will provide guidance as deemed necessary. However, unlike an introductory undergraduate lab where the student is guided mostly by the instructor to specific information or in conducting a lab experiment, as an advanced geospatial science student you are expected to function as a self-directed learner and researcher. Each student will be responsible for being a team leader and mentoring a group of peers during the course of the semester. Lab reports and assignments must be well-written and have a comprehensive analysis provided by each student.

GPS Project & Presentation: Students are expected to produce an advanced geospatial project that addresses a current problem in integrated geospatial sciences. The project should identify the need and state the problem and then provide detailed analysis (within the methods and materials) of the current problem and provide further directions of the proposed research. This course uses truncated collegiate straight grading scale.

Initial GPS Project Guidelines: Evaluation of Topology and Surface Assessment or similar. **This project must be executed using two different GIS software packages, Remote Sensing and Imagery Software, A Mobile Geospatial Technology device for data capture and statistical assessment).**

Milestones: The milestones serve to help you, the student, focus your project. The first milestone is the project proposal. The project proposal should, at a minimum, state the purpose of the project, the desired end state including any deliverables, and consists of detailed methods section that outlines the steps you will perform to achieve the end state. The methods section is the most important part of the proposal, it should serve to help you focus how to apply the knowledge learned in the course (and in previous courses) to the project in addition to identifying any gaps in that knowledge. The second milestone is a one-on-one session with the instructor. At this milestone it is required that you have all data needed to complete the project assembled and pre-processed. This session will help to insure that your project is on track and to identify any gaps in your knowledge base as it related to the project.

GPS Project and Research Grant Proposal Oral Presentations: Oral presentations will be allotted 15 minutes and 3 minutes for questions. Presenters of oral papers should have a complete story to tell. In essence, you are selling your idea to a prospective granting institution. Communicating effectively is the best way to achieve this goal. Your presentations should identify a specific question being addressed by your research, identify specific methods used to collect data to answer the question, specific methods of data analysis, present your possible outcomes and end with a discussion of those possible outcomes. Note: Over the years, I have come to realize that most students are not fully prepared when they give an oral presentation at a “scientific meeting”. Therefore, the only advice I can provide to you is that you must practice, practice and practice. Students should think of an oral presentation as a job interview! You would not present incomplete information at a job interview, and you do not help yourself by doing so in a course.

Research Grant Proposal: While analytical and writing abilities are not innate to everyone, a report will allow you to explore and communicate your ideas regarding Geospatial Sciences. It will also familiarize you with the preparation of a formal report. The idea of a proposal is to get funds needed for research. Competition for contracts is very rigorous and consequently, the report must be very well constructed to have a chance at continued support. You are expected to prepare a report that is appropriate for a local funding agency. Your report must be some subject within the framework of field based geospatial project. Ideally, your report should incorporate all of the aspects listed below. All reports should encompass good hypothesis testing and sound data handling practices. Despite your background, you will be assigned a project to execute carefully. You really need to search the literature carefully to see what has been done and what you can do. Make sure your report comprehensive.

The report should consist of the following:

1. **Cover page:** Give a concise title of the research, name of researcher and proposed length of study. In addition to the above, the cover of your final report should identify and briefly describe three funding agencies that may be appropriate for your project.

The University of Tennessee at Chattanooga

2. **Table of contents**: Show the location of each section of the report as well as major subdivisions.
3. **Project Summary**: Maximum of 200-300 words summarizing your work. It is functionally similar to an abstract.
4. **Project Description**: This is the main body of your report and should include:
 - A. Introduction to the problem, background and literature review.
 - B. Objectives of the research and expected significance.
 - C. Materials and methods- This is extremely important! What is your system of study? What experiment(s) do you plan to perform? What hypotheses do you plan on testing (outline those hypotheses!)? Present statistical analyses and sample sizes as appropriate!
 - D. Results
 - E. Applications and Conclusions
5. **Experimental Facilities Description**: Where was this study be done? Be specific about the details of the facility (i.e. Space, equipment, staff, resources, etc.).
6. **Project Time Line**: Give a detailed description of when the specific stages of the project were completed, along with all deliverables. This is extremely important because most studies last from 2-5 years.
7. **Bibliography**: A list of all cited literature, and this better be good! (At least 10 citations, and include a copy of each article that you do in fact cite)
8. **Appendices**: Pre-processed Data, AA, Source Info, Metadata, Ancillary Data, etc.

JOURNAL BRIEFS: Staying abreast of recently published literature is essential for becoming knowledgeable in the rapidly changing field of GIS. Besides you assigned readings, you are expected to peruse through recent books, journals or technical papers related to GIS. At predetermined intervals throughout the semester you will be required to turn in a typed journal brief on a particular aspect of GIS research or application. With each bibliographic reference, the student will submit a typed paragraph summarizing the information contained in the article. In addition, each student must complete a single summary table for their collection of research articles. Note: I will not accept duplicate research articles...so once an article has been used it cannot be submitted again during the semester. The specific details for the paragraph summary are outlined below. Instructions for Journal Briefs You have 5 paper assignments due this semester. You are to find a published journal article (since 1980) from a science journal (no magazine articles allowed) that focus on Landscape/Spatial Ecology using Drones to assessing wildlife and/or habitats. You must read this article, obtain background information on the application, ecosystem and species studied (etc.), evaluate the article, and provide me a copy of the journal article, your electronic excel table, and your paper by the **due date (8/26, 9/9, 9/23, 10/7,10/21)**. Note: Journal Briefs are not a reproduction of the author's abstract!! Finding papers: You cannot use any of the journal articles cited in your GIS textbooks or in their Bibliographies. Additionally, each of your journal articles should preferably be about different species, techniques, ecosystems or problems. The papers must be on the geospatial aspects of Landscape/Spatial Ecology of Amphibians or Reptiles, and should involve some sort of hypothesis testing or problem solving. To find an article you can look through the science and geography journals in the library. However, the best way to search for an article is to use one of the library databases. Please visit the library web page for further information on how to use the databases, and how to request journal articles that are not in our library collection. Because you are interested in a particular assessment tool, you may want to look at the journals dedicated to these

concepts. Also, look in Geo Info Systems, GIS World, Cartographica, Cartography & GIS, Photogrammetric Engineering and Remote Sensing, and ARC user. You might find good papers using Drones in Wildlife Ecology journals, such as, Ecology, and Journal of Wildlife Management, etc. You might find it helpful to browse the contents of journals in addition to or instead of doing big online Abstract search. Many journals now maintain home pages where you can browse the tables of contents of current and recent issues. Some even let you download copies, although most do not unless you have a membership. The UTC library web page has a section devoted to electronic journals with links to many of the journals home pages. Content of your papers: You should address, in prose format, the following questions:

1. What is the question being addressed?
2. What is the functional group being studied?
3. What technique(s) were used?
4. Was the sampling design appropriate and/ or adequate for the question being addressed? Why or why not?
5. Was the statistical analysis appropriate? Explain!
6. Were any useful methods developed that could be adapted to others research? Any new analytical tests or analyzing the data? If so, do the authors provide software for others to use?
7. What were the finding and conclusions? Were these significant? If so, why or why not?
8. What was your favorite part of this study? What was your least favorite part?

Format of your papers: Papers must be typed and laser printed on decent quality paper, paper size = 8.5 x 11, single line spacing, left, right, top, and bottom margins = 1", and printed on one side of the paper only. Papers must be at 1 page and cannot exceed 2 pages. Put your name at the top of the first page, followed by the title of your journal article. Staple your 1-2 pages paper and the journal article together. Do not use report covers or page titles please. Please include a PDF of your article(s). Format of your Summary Table: Tables must be formatted electronically using Microsoft Excel. Your table headings should minimally include those indicated in the sample excel file (please see me) but you should include additional fields.

RS Lecture and RS Laboratory: You have two lesson plans which you are to develop during the semester. Please see me for details on topics, etc.

Course Grading

GRADING: COURSE GRADE WILL BE BASED ON 800 POINTS for ESC 5610

Two written lecture exams @ 100 points each	200 points
Quizzes, TPSs, Assignments	045 points
Two laboratory practical exams @ 100 points each	200 points
Eight laboratory write-ups, exercises or modules @ 10 points each	080 points
Five journal briefs @ 10 points each	050 points
Research Project	050 points
<i>Grant Proposal/Project</i>	<i>100 points</i>
<i>Grant Proposal Oral Presentation</i>	<i>025 points</i>
<i>Design Your Own RS Lecture</i>	<i>025 points</i>
<i>Design Your Own RS Laboratory</i>	<i>025 points</i>

Exams will not be curved. In other words, the points that you earned reflect your score. Your letter grade will be determined by a straight-collegiate scale at the close of the semester (**ABSOLUTELY NO EXCEPTIONS**).

Grading SCALE – ESC 5610
A= 720 - 800
B= 640 – 719.99
F= 639.99 & BELOW

Course Grading Policy: This course uses a modified collegiate straight grading scale.

Instructor Grading and Feedback Response Time: The grading follows a truncated collegiate straight scale, and feedback is contingent on the length of the assignment. In other words, if you are given weeks to work on an assignment do not expect to get it back the next day. Most assignments are returned within 7-10 business days.

Course and Institutional Policies

Late/Missing Work Policy: You cannot make up assignments in the form of field trips, pop quizzes, projects, participation, or exams. These assignments are due on designated days but see schedule. A missed assignment counts as a ZERO, meaning that you must attend class and adhere to the schedule to receive any credit. TAKE HOME MESSAGE: Come to class, don't miss assignments.

Electronic Device Usage: I would like to discourage distractions during our meeting times. This course cannot be filmed or recorded electronically without the prior and written consent of the instructor. If you plan to use a computer or tablet to take notes, then you must sit in the row along the back wall of the classroom. Use of electronic cigarettes is prohibited. Please silence all mobile communication devices (e.g., cell or smart phones, etc.) and store them in your bag. They should remain stored for the entire class

The University of Tennessee at Chattanooga

period. These devices should not emit an audible noise during class time. If a pager, cellular telephone or other electronic device emits any audible noise during the class I will deduct 10 points for each incident. In short, any student (or the entire class) will be penalized ten (10) points for each incident involving disruption of the class.

Statement on Disruptive Students in the Classroom: The University will not tolerate disorderly or disruptive conduct which substantially threatens, harms, or interferes with university personnel or orderly university processes and functions. A faculty member may require a student to leave the class room when his/her behavior disrupts the learning environment of the class. A student found responsible for disruptive behavior in the classroom may be administratively withdrawn from the course. I hope to keep you excited and engaged in class so that your interest doesn't wander. But, I must ask that you avoid distractions during our class meetings such as the use of cell phones, texting, instant messaging, pager beeping, or the use of other unapproved electronic devices.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: *With the exception of school holidays, attendance is mandatory! You are responsible for the material covered whether you are in attendance or not, including any announcements made during class.*

Course Participation/Contribution: In short, you are expected to attend class and actually speak up and make a contribution to the course in the form of relevant discussion on a regular basis.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

The University of Tennessee at Chattanooga

Course Calendar/Schedule: See Tentative Schedule Below

Wk	Technical Lecture	Lay Readings & HWK	LABORATORY TOPIC
8/19	Remote Sensing of the Environment	Ch.1, 2	Procedures & Logins; Traditional Analogy Aerial Photography: Color, Black and White, and Color Infrared
8/26	Elements of Photographic systems, Electromagnetic Spectrum/ Energy Flow Profile	Appendix 1	ArcGIS Pro Basics https://www.esri.com/training/catalog/5cad02469b1f4010cad9ac46/arcgis-pro-basics/ Or https://learn.arcgis.com/en/projects/get-started-with-arcgis-pro/
9/2	(9/2) HOLIDAY NO CLASSES		Holiday No Classes
	Photointerpretation Principles and Spaceborne Photography	Ch. 3, Appendix 5	
9/9	Multispectral Scanners, Film Filter Combinations, Landsat Orbit and Sensors	Ch. 3.1	The Big 3 Resolutions - https://www.esri.com/content/dam/esrisites/en-us/media/pdf/teach-with-gis/spectral-spatial-temporal.pdf
9/16	Landsat <i>Grant Proposal Topics DUE</i>	Appendix 4	Obtaining information from imagery - https://www.esri.com/content/dam/esrisites/en-us/media/pdf/teach-with-gis/measuring-rondonia-rain.pdf
9/23	Visual Interpretation Techniques, Landsat Thematic Mapper		Classify Land Cover to Measure Shrinking Lakes - https://learn.arcgis.com/en/projects/classify-land-cover-to-measure-shrinking-lakes/
9/30	Landsat Image Analysis Presentations, SPOT		Laboratory Practical Exam (9/30)
	Lecture Midterm Exam (10/2)		
10/7	Continue- Landsat Image Analysis Presentations, SPOT Ultraviolet and Microwave		Calculate Impervious Surfaces from Spectral Imagery - https://learn.arcgis.com/en/projects/calculate-impervious-surfaces-from-spectral-imagery/
10/14	(10/14-15) HOLIDAY- FALL BREAK- NO CLASSES	Ch. 9.3	10/14 – 10/15 HOLIDAY- FALL BREAK- NO CLASSES
	Microwave, Radar and Sonar		
10/21	Microwave, Radar and Sonar		Assess Burn Scars with Satellite Imagery - https://learn.arcgis.com/en/projects/assess-burn-scars-with-satellite-imagery/
10/28	Thermal Sensors; Multistage and Double Sampling, Accuracy Assessments, Meteorological Satellites	Ch. 8, Appendix 6, Ch. 2.2	https://www.esri.com/training/catalog/5ce42f4388c6106da2d53044/image-classification-using-arcgis/ or another advanced exercise from < https://learn.arcgis.com/en/gallery/#?q=remote%20sensing >
11/4	Digital Image Processing; RS of Vegetation	Appendix 2, Ch. 4, 5, 10, 11	Research Project time
11/11	GIS/RS of Marine, Freshwater, Urban or Other	Ch. 6, 7, 11	
11/18	Imagery: Open and Interactive GIS Systems	Appendix 3	
11/25	Conservation Utility of RS	Ch. 12 - 15	
			Research Projects Due
			THANKSGIVING BREAK 11/26 – 12/1 – NO CLASSES
12/2	Graduate Student Presentations and Proposals		Final Laboratory Practical (12/2)

Final Exam Wednesday, December 4th from 1030-1230 in Holt Hall 208

Plant Ecology Lecture Fall 2021
BIOL 4540, CRN 43236, online, 4.0 credit hours

Instructor:

Jennifer Boyd

Email & Phone:

jennifer-boyd@utc.edu; 860-904-8060

Contact & Office Hours: Students are encouraged to contact me by email as my preferred method of correspondence. I aim to respond to emails within 24 hours on weekdays and within 48 hours on weekends. Face-to-face office hours will be from 10-11:30 am pm on Mondays in my office in Holt 219 and 12-2 pm on Thursday via the Zoom online meeting platform (<https://zoom.us/join>) accessed with the following meeting ID: 362 955 7870. Other meetings may be scheduled with individual students as needed.

Course Days, Times, and Location:

Plant Ecology (BIOL 4540) is an online lecture course that will be hosted in Canvas. (The corresponding lab course will be delivered face-to-face.) All lecture course content will be delivered *asynchronously* to allow for flexibility in choosing the days of the week and times that you access material in Canvas. However, you are expected to log into the course several times each week *at a minimum* to access course content, complete assessments, communicate with me as needed, and receive important announcements made during the term. Due dates for all assessments are provided in this syllabus and on Canvas.

Course Catalog Description:

Plant ecology is the study of relationships of plants with their living and non-living environment, explored from the levels of plant individuals, populations, and communities. Laboratory component includes hands-on activities focused on assessing plant responses to abiotic and biotic environmental conditions and the broader impacts of such research.

Prerequisite:

BIOL 3060 and BIOL 3250 and BIOL 3350 with a minimum grade of C

Corequisite:

BIOL 4540 and BIOL 4540L are corequisite courses that must be taken concurrently.

Course Student Learning Outcomes (CSLOs):

Upon successful completion of this course, students will be able to:

- CSLO 1.** Demonstrate understanding of multiple ways in which plants can interact with their abiotic and biotic environment at various levels of biological organization. *Assessed primarily through quizzes and exams.*
- CSLO 2.** Critically evaluate the relevance and impact of diverse scientific research to building a dynamic body of scientific knowledge of plant ecology. *Assessed primarily through graded material references and incorporating primary literature.*
- CSLO 3.** Formulate and articulate informed thought on specific plant ecology topics and associated contemporary concerns. *Assessed primarily through issue-based writing assignments and discussion board assignments.*
- CSLO 4.** Communicate plant ecological information effectively. *Assessed primarily through individual written work and a group-based presentation.*
- CSLO 5.** Apply knowledge and common methodologies used in plant ecological research and its broader impacts (e.g., phenology networks, citizen science, literature review, data analysis, outreach activities). *Assessed primarily through lab assignments.*

Course Materials:

Strongly Recommended Text – Gurevitch J, Scheiner SM, Fox GA (2006) *The Ecology of Plants, 2nd Edition*. Sinauer Associates, Sunderland, MA

Required Additional Readings – Relevant readings mainly from primary sources (scientific journals) are provided electronically in association with relevant lessons in the online course space in Canvas. At times, lessons may include supplementary videos and online content linked in the course space, which you will be expected to view.

Course Technology Requirements:

Hardware – You must have access to a computer with a reliable broadband Internet connection, a speaker (to listen to lectures and other audio content), and a working webcam and a microphone (to take exams) for this online course.

Software – Course materials and information will be made available in Canvas, and you must have access to and use your UTC email account for all correspondence associated with this course. You also should have access to the [Google Chrome](#) web browser to take exams in this course, to recent versions of Microsoft Word and Excel, and to [Google Docs](#) and [Google Slides](#) to complete various assignments and activities associated with this course. [Proctorio](#) software, which is a free extension for Google Chrome, will be used to proctor exams; this program must be installed on your computer prior to taking

the exams. Information about Accessibility in Canvas can be found here: <https://www.canvaslms.com/accessibility>. Information about Accessibility in Google products can be found here: <https://www.google.com/accessibility/>.

Information about Accessibility in Proctorio can be found here: <https://proctorio.com/accessibility>. Learn more about the use of Canvas at UTC here: <https://www.utc.edu/walker-center-teaching-learning/canvas.php>

Technology Skills Required:

You should be able to use Canvas, your MOCSNet email account, Google Chrome, Microsoft Word and Microsoft Excel, Google Docs and Google Slides, Proctorio, and a scholarly citations index (e.g., Web of Science or Google Scholar) for this course.

Technology Support:

If you have problems with your UTC email account, Canvas, or other software or tools used in this course contact the IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Software available to UTC students, including access to Microsoft Office products, is listed at <https://www.utc.edu/information-technology/services/software-students.php>.

If you have issues with Proctorio, you also are encouraged to contact Proctorio support at 1-877-687-6411.

Accessibility & Accommodation:

If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or a special accommodation in this class or any other class, contact the Disability Resource Center (DRC) at 425-4006. More information can be found at: <https://www.utc.edu/disability-resource-center/index.php>

Student Support Services:

The Student Support Services office at UTC offers students a range of support services, including tutoring, academic coaching, and writing assistance. You are encouraged to utilize these services toward facilitating your success in this course. Information about Student Support Services and a complete list of the services offered can be found at: <https://www.utc.edu/student-support-services/sss-services.php>

Course Organization:

Lecture – The lecture component of this course is structured into three main **Learning Units**, each covering four related lessons. Each **Lecture Unit** module focuses on topics relevant to various subdisciplines of plant ecology as differentiated by levels of biological

organization: **Lecture Unit 1 – Plant as Individuals** focuses on organismal-level plant ecology. **Lecture Unit 2 – Plant Populations & Species** focuses on population and species dynamics. **Lecture Unit 3 – Communities & Ecosystems** continues from the community level to ecology-level plant ecology. Each **Lecture Unit** will comprise approximately 1 month of the course.

Laboratory – The laboratory component of this course is described in a separate syllabus.

Course Assessments and Requirements:

Exams – Each Lecture Unit will end with an exam consisting of multiple-choice questions, terms to define, and short essay questions to assess your understanding of material specific to that Learning Module. A cumulative final exam of similar style also will be given to assess your understanding of collective course material at the end of the course. Students must *complete* (not just begin) each *regular* exam between 8 AM and 8 PM EST on the due date specific in this Syllabus and the Course Schedule; the Final Exam for this course has been scheduled by UTC for 1-3 PM EST on December 4th. All exams will be administered through Canvas and will require the use of Proctorio, which is an online proctoring system associated with the Google Chrome web browser. You will not be able to take an exam if you do not have Proctorio and Google Chrome installed, a working webcam and microphone associated with your computer, and/or if you do not take the exam during the specified exam time. You will have 1 hour to complete each of the three regular exams in this course and 2 hours to complete the final exam. No notes, electronic devices other than your computer, or other materials can be visible or accessed while you are taking an exam. Proctorio will utilize video and audio recordings of you and your test environment and of all activity on your computer screen to determine suspicious behavior. You may study for exams with other students. However, once you begin taking an exam, you may NOT discuss exam material with anyone else prior to 8 PM EST that day. All violations of these policies will be reported to the UTC Honor Court.

Quizzes – Each Lecture Unit will include four short quizzes consisting of some combination of multiple choice and true/false questions to assess your understanding of material. Each quiz will be specific to a Lesson. Proctorio will NOT be used to take quizzes. You must complete all four quizzes in each Lecture Unit before 8 AM EST on the corresponding exam date for that Learning Module. Once you begin a quiz, you will have 15 minutes to complete it.

Writing Assignments – Each Lecture Unit will include a short (~500 words) writing assignment asking you to apply your knowledge to a defined issue of topical relevance. You will be expected to use both information presented in class and independent research to complete these assignments as instructed. Writing assignments are to be completed as an individual without assistance or input from other students. You must complete written assignments by 8 PM EST on the due dates specified in this syllabus and the course schedule.

Discussion Board Assignments – Each Lecture Unit will include two opportunities to contribute in a meaningful way to course discussion boards as instructed. Discussion board contributions will consist of informed opinion-based answers to questions and feedback to the responses of your peers to these questions as instructed. You must complete Discussion board assignments as an individual without assistance or input from other students. Discussion board contributions must be made by 8 PM EST on the due dates specified in this syllabus and the course schedule.

Course Grading:

Course Grading Policy – Your grade will be based on the points you earn on exams, quizzes, writing assignments, discussion board assignments, and lab assignments, which will comprise the approximate weighted percentages shown. Grades will be assigned using the standard letter scale (90-100% = A, 80-89.9% = B, 70-79.9% = C, 60-69.9% = D, lower than 60% = F) No extra credit will be awarded, and grades will not be adjusted (e.g., curved or rounded up).

3 Regular Exams (40 points each)	~20% of total points
1 Final Exam (80 points)	~15% of total points
12 Quizzes (10 points each)	~20% of total points
3 Writing Assignments (20 points each)	
~10% of total points	6 Discussion Board Assignments (10 points each)
~10% of total points	Lab Assessments (150 total points)
~25% of total points	

Instructor Feedback & Grading Response Time – I aim to grade all exams, quizzes, and other assessments within one week of the due date and provide feedback when necessary.

Grade Availability – Grades will be made available after I have reviewed and assessed your material submitted for grading. Your grades will be entered in the Grades section of the course space in Canvas.

Course and Institutional Policies:

Course Participation/Contribution – Although this course is being offered online, it is NOT a self-paced course. The lecture component of the course will be delivered *asynchronously*, which means that you have flexibility in choosing the days of the week and times that you access materials in Canvas. However, you are expected to login to the course several times per week *at a minimum* to read your weekly course content and complete assessments as scheduled. You are expected to complete all scheduled activities by their due dates specified in this syllabus and the course schedule. The lab component of the course will be delivered *synchronously* on Tuesdays from 12:20–3:10 PM EST. Lab meetings are mandatory and will be hosted via the ZOOM online meeting platform (<https://zoom.us/join>) with Meeting ID: 891 7193 7892. Lab activities will be

team-based, and you are expected to communicate actively with your research team and participate fully in lab activities. Unexcused absences from lab meetings will result in you receiving a 25% deduction on the total points earned by your lab team on associated assignments.

Late/Missing Work – You are strongly encouraged to complete all assessments prior to their due dates to avoid the negative impact of missed assessments on your final grade. **Make-up assessments will be permitted without penalty only for *legitimate* excuses (e.g., those supported by a note from a doctor, dean, athletic director, or academic advisor or due associated with COVID) that prohibit your ability to participate in an online course environment.** If you know ahead of time that you will not be able to take a quiz or exam or complete an assignment by the time that it is due for a *legitimate* reason, you must let me know ahead of time so that we can arrange an alternative time for you to take it. If you miss a quiz or exam or assignment due date due to a *legitimate* but unexpected reason, then you must let me know as soon as possible so that we can reschedule. If the reason is *legitimate*, you may make up the quiz or exam or assignment without penalty. Unexcused late quizzes and exams will not be accepted; 0 points will be earned for any unexcused quiz or exam not complete by its due date. Unexcused late writing assignments, discussion board assignments, and lab assignments will result in a deduction of points equal to one-quarter of the total points possible for the assessment for each day of lateness.

University Delays and Closures – If UTC is closed due to the COVID-19 pandemic, inclement weather, or other reasons, this online course will proceed as usual.

UTC Policy on COVID Absences – Students **must complete the [COVID-19 Notification form](#)** if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support. Students will not be penalized for COVID-19 absences or late course assessments due to a COVID-19 related illness unless they are unable to complete course learning outcomes. Faculty will work reasonably with students to identify ways to complete course requirements.

Students must, if they are asymptomatic or if their symptoms do not interfere with their ability to participate in the course, **continue to participate in the online course.**

If COVID-19 related illness results in any missed course work, **students must contact the instructor within 48 hours of recovering to plan make-up work.** Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. But please realize that class will continue, and students may find themselves in the situation where they are unable to complete all work by the end of the semester. In such a case, students should consider a late withdrawal or an incomplete grade. Please contact the

Records Office (423-425-4416) to learn more about the late withdrawal process.

If students have COVID-19 disability related risk factors that may affect attendance, students are strongly encouraged to register with the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's [General Student Grievance \(Complaint\) Procedure](#) by filling out the [Student Complaint Form](#) and submitting to the Office of the Dean of Students.

Student Conduct – Students are required to be familiar with and abide by UTC's Academic Integrity Policy, which is stated in the [Student Handbook](#).

Honor Code Pledge – As a UTC student, you are required to abide by its Honor Code: *I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.*

Plagiarism – Written assignments and discussion board entries may be screened with text- matching software that helps to identify plagiarism. To avoid plagiarizing someone else's work, do not copy directly from any information source, including the Internet. Write in your own words and properly cite your sources. For first offenses, you will fail the assignment. For second offenses, you will fail the course and the offense will be brought to the attention of the UTC Honor Court.

Unauthorized Aid – You must complete quizzes, exams, writing assignments, and discussion board assignments as an individual. You may NOT obtain assistance or utilize input from other students on these assessments. You may prepare/study for exams with other students.

However, once you begin taking an exam, you may NOT discuss its content (or lack of content) with other students until after 8 pm on the exam due date. You may not utilize any outside materials when taking exams in this course including those that may be accessed through your computer. Any offenses to these course policies will result in failure from the course and will be brought to the attention of the UTC Honor Court.

Course Learning Evaluations:

Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. I value your feedback and appreciate you taking time to complete these anonymous evaluations.

LECTURE SCHEDULE

Course Introduction

<i>Date</i>	<i>Topic</i>	<i>Materials & Assignments</i>
Aug 16-18	Welcome!	• Welcome Video • Discussion Board Intro – <i>due Aug 18</i> • Read Syllabus • Read 'Start Here!' materials

Lecture Unit #1 – Plants as Individuals

<i>Dates</i>	<i>Lesson</i>	<i>Materials & Assignments</i>
Aug 19-26	1.1 Photosynthesis & Pathways	• Lectures (in Canvas) • Chapter 2 (in textbook) • Wand et al. 1999 • Quiz 1 • Writing Assignment 1 – <i>due Sept 2</i>
Aug 26-Sept 2	1.2. Light Adaptations	• Lectures • Chapter 2 • Boyd et al. 2016 • Quiz 2
Sept 3-9	1.3. Water Relations	• Lectures • Chapter 3 • Koch et al. 2004 • Quiz 3 • Discussion Board 1 – <i>due Sept 9</i>
Sept 10-16	1.4. Soil & Belowground Interactions	• Lectures • Chapter 4 • Von Holle et al. 2013 • Van der Heijden et al. 1998 • Quiz 4 • Discussion Board 2 – <i>due Sept 16</i>
Sept 20	Exam 1	<i>Available from 8 AM – 8 PM EST</i>

Learning Unit #2 – Plant Populations & Species

Dates	Lesson	Materials & Assignments
Sept 21-27	2.1. Population Dynamics	• Lectures • Chapter 5 • Thomson & Schwartz 2006 • Quiz 5 • Writing Assignment 2 – <i>due Oct 4</i>
Sept 28-Oct 4	2.2. Evolution & Natural Selection	• Lectures • Chapter 6 • Clausen et al. 1941 • Quiz 6
Oct 5-13	2.3. Growth & Reproduction	• Lectures • Chapter 7 • Biesmeijer et al. 2006 • Quiz 7 • Discussion Board 3 – <i>due Oct 13</i>
Oct 14-20	2.4. Life Histories	• Lectures • Chapter 8 • Grime 1977 • Quiz 8 • Discussion Board 4 – <i>due Oct 20</i>
Oct 22	Exam 2	<i>Available from 8 AM – 8 PM EST</i>

Learning Unit #3 – Plant Communities & Ecosystems

Dates	Lesson	Materials & Assignments
Oct 25-29	3.1. Competition	• Lectures • Chapter 10 • Brown et al. 2002 • Quiz 9 • Writing Assignment 3 – <i>due Nov 5</i>
Nov 1-Nov 5	3.2. Herbivory	• Lectures • Chapter 11 • Benson & Boyd 2014 • Quiz 10

Nov 8-12	3.3. Disturbance & Succession	• Lecture • Chapter 12 • Johnson & Miyanishi 2008 • Quiz 11 • Discussion Board 5 – <i>due Nov 12</i>
Nov 15-19	3.4. Relative Abundance	• Lectures • Chapter 13 • Rabinowitz 1981 • Quiz 12 • Discussion Board 6 – <i>due Nov 19</i>
Nov 23	Exam 3	<i>Available from 8 AM – 8 PM EST</i>
Dec 3	Final Exam	<i>Available from 1 – 3 PM EST</i>

MICROBIAL ECOLOGY – Lecture & Lab

**ESC 5030, 4010, BIOL 4530, & ESC 5030L, 4010L,
BIOL 4530L -**

CRN#s (Lec) 43238, 44238, 44513, (Lab) 44104, 44239, 44515, face to face, 4 credit hours

Instructor: Henry ("Rardy") Spratt; Office - Holt Hall Rm. 351-D

Email and Phone Number: henry-spratt@utc.edu; Office phone # 423-425-4383

Office Hours and Location: Zoom meetings will be set up for Tues 11 AM to 12 PM, and Fri 3 PM to 4 PM (email Zoom links will be sent out the morning of the office hour). In person Office hour meetings will be on Thurs from 11 AM to 12 PM in Holt Hall 351-D. Individual appointments will be made by request for either Zoom or in person meetings.

Course Meeting Days, Times, and Location: Lecture, Tues 3:05 PM to 4:35 PM, Holt Hall Room# 204 Holt Hall; Lab, Thurs 3:05 PM to 6:05 PM, Holt Hall Room #331.

Course Catalog Description: A study of microorganisms in their natural environment with regard to microbial evolution, growth, interactions, dispersal mechanisms, ecological significance, and biotechnology applications. Laboratory fee will be assessed.

Course Pre/Co Requisites: Prerequisites: BIOL 3060, BIOL 3150, BIOL 3250, BIOL 4220, and CHEM 3010, all with minimum grades of C, or department head approval. Corequisite: BIOL 4530L, or ESC 5030L, or ESC 4010L.

Course Student Learning Outcomes:

Course Objectives - Lecture:

- A) To discuss the importance of bacterial metabolism to ecosystem processes.
- B) To describe the overall process of prokaryotic growth in natural communities.
- C) To discuss the evolution of modern prokaryotic communities.
- D) To introduce the types of interactions that may occur within natural ecosystems.
- E) To discuss the importance of elemental cycling to microbial ecology and biogeochemistry.
- F) To discuss examples of elemental cycling in aquatic, soil, sediment habitats.
- G) To relate microbial elemental cycling to global environmental concerns.

Course Objectives - Lab: The primary objective of the laboratory portion of this course is to provide hands on examples of tools used by microbial ecologists to study microbial systems in various habitats. Techniques used to document microbial activities in different habitats will be utilized to help describe the microbial systems under study. Studies conducted in the lab will include hypothesis-driven research projects conducted by small groups. Additional detail regarding the laboratory is available in the portion of the microbiology lab manual available at the UTC Bookstore. If you have taken BIOL 4220 here at UTC since 2019 and you have kept

your lab manual from that course, there is no need to purchase a new version of the manual.

Student Learning Outcomes – Graduate Students: In this upper-level undergraduate/graduate-level course, graduate students are expected to self-instruct and in some cases use a team approach in mastering the material and completing assignments. Graduate students will take a leadership role in group exercises, both in and out of class. Graduate students must also read and synthesize scholarly journal articles and lead class discussions relating to the articles. The instructor will provide guidance as deemed necessary. Graduate students are expected to function as self-directed learners, synthesizing information from this course and other courses and life experiences, and engage in substantial critical analysis with the goal of providing innovative perspectives on the field of microbial ecology. As for exams, graduate students are expected to demonstrate a strong understanding of the lecture objectives covered on exams. Additionally, graduate students will be required to complete one additional question (not required of undergraduate students) on each exam designed to emphasize understanding and application of key concepts covered. Lastly, graduate students will also be required to write a detailed proposal based on one of the lab projects, or an article presented in the lecture. This proposal will require detailed introduction, literature review, objective, methodology, expected outcomes, budget, budget justification, and reference sections. This proposed work should be completely feasible using resources available in UTC. Additional information on this proposal will be provided prior to mid-term.

Student Learning Outcomes – All Students:

Lecture - Much of the lecture will be used to introduce new topics. Discussions of any topics at the time they are introduced are welcomed. Students will demonstrate that they understand the above course objectives by exhibiting satisfactory performance on examinations.

Laboratory - The laboratory section of this course will include the completion of complex exercises that may require some time outside of scheduled lab time. Actual times in the lab working on projects will be determined by group project needs. The class will be subdivided into small groups to conduct studies of microbial ecology. Note that these groups will be assigned based (hopefully) on having at least one graduate student per group to serve as that group's leader. Topics for study in the laboratory will be discussed during the first lab meeting. One characteristic of the topics of study is that they be brief enough to be accomplished in the time frame of the semester. The specifics of the lab exercises are detailed in the microbial ecology exercises in the lab manual for this course. Group projects will be designed to allow for three distinct exercises based on "canned" procedures. A final group project, which will be hypothesis driven, will be conducted as the culminating project of the laboratory. This final project will be based on techniques learned in one or more of the "canned" exercises conducted earlier in the semester. Three, brief laboratory reports (five typed, double-spaced pages) will be due during the semester (see below for actual due dates) describing the exercises conducted. A final lab report (10 to 12 pages) describing the hypothesis-based group project conducted (written as a scientific report – see writing guide to be handed out later) will be turned in during the final lab period at the end of the semester.

Required Course Materials: [Click here to enter text..](#)

Lecture Text Book: Madsen, E. L. 2016. Environmental microbiology: From genomes to biogeochemistry. Second Edition. John Wiley & Sons/Blackwell, Hoboken, NJ. 592 pg. ISBN 978-1-118-43963-0

Primary Literature: Periodically, articles on topics covered in lecture (or of greater interest to microbial ecologists) will be posted on the Canvas course website. These articles will provide the basis for class discussions of the particular topic. If graduate students are enrolled, each graduate student will be given the responsibility of giving one or two 15-minute summary reports of these articles (based on the number of graduate students enrolled) to the class (the schedule of who and when will be determined by the second week of class).

Laboratory - Manual: Spratt, H.G. 2019. Laboratory microbiology for biology majors. 2nd Ed. Kendall Hunt Publ. Dubuque, IA. ISBN: 9781524987930. Available at the UTC bookstore.

Technology Requirements for Course: No specific devices or skills are required for this course regarding technology other than having computer access to the course's Canvas web page.

Technology Skills Required for Course: The ability to use Microsoft Word and Excel will be important.

COVID-19 Absence Policy: COVID Absence Statement – Fall 2021 Revised

COVID Absences (face-to-face class) Students must complete the COVID-19 Notification form if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support.

Students who are instructed by university administration to stay home due to their responses are not to come to campus or attend face-to-face classes. Students who are cleared to be on campus and attend class are required to attend face-to-face class sessions. Students will not be penalized for COVID-19 related absences or late course assessments due to a COVID-19 related concerns unless they are unable to complete course learning outcomes. Faculty will work reasonably with students to identify ways to complete course requirements.

Students must, if they are asymptomatic or if their symptoms do not interfere with their ability to participate in the course, continue to participate in the course using the online assets and tools that the instructor may make available through UTCLearn including: Canvas and Zoom meetings.

The University of Tennessee at Chattanooga

If COVID-19 related illness results in any missed course work, students must contact the instructor within 48 hours of recovering to plan make-up work. Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time.

But please realize that class will continue, and students may find themselves in the situation where they are unable to complete all work by the end of the semester. In such a case, students should consider a late withdrawal or an incomplete grade. Begin by talking with your instructor if you think that one of these options would be helpful. Please contact the Records Office (423-425-4416) to learn more about the late withdrawal process.

If students have COVID-19 disability related risk factors that may affect attendance, students are strongly encouraged to register with the Disability Resource Center (423- 425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's General Student Grievance (Complaint) Procedure by filling out the Student Complaint Form and submitting to the Office of the Dean of Students.

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, [submit a request \(https://new.utc.edu/information-technology/learning-from-home\)](https://new.utc.edu/information-technology/learning-from-home) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the [Disability Resource Center \(https://www.utc.edu/disability-resource-center/index.php\)](https://www.utc.edu/disability-resource-center/index.php) at 423-425-4006 or email DRC@utc.edu.

Course Assessments and Requirements: Quizzes and Exams will be scheduled for regular lecture periods. Students will be given 30 to 35 minutes to take quizzes. For exams, students will be given the equivalent of 75 minutes.

Course Grading Course Grading Policy:

LECTURE	(total pts)	LABORATORY	(total pts)	GRAND TOTAL
3 Exams	300	Lab Reports (1 – 3)	300	
Final Exam	150	Final Lab Report	150	
Inst. Derived Part.	25	Inst. Derived Part.	25	
TOTAL	475	TOTAL	475	950
		GRAND TOTAL = 50% Lecture + 50% Laboratory		
		Note: Grad Students will have a 100 point proposal due at the time of the final exam, increasing their total		

The University of Tennessee at Chattanooga

		points available for the course to 1050. Details on this proposal will be provided in a handout at mid term.

FINAL COURSE GRADE (Any adjustments will be announced)

Undergraduate Students (950 pts)

A = 950-855 pts.

B = 854-760 pts.

C = 759-665 pts.

D = 664-570 pts.

F < 570 pts.

Graduate Students (1050 pts)*

A = 1050-945 pts.

B = 944-840 pts.

C = 839-735 pts.

D = 734-630 pts.

F < 630 pts.

*) Included for grad students = 100 pt. proposal

Grading Details: All exams will be emailed to students by the end of the day on Monday of the week that the exam is noted on the schedule. These exams will be considered to be of an “open book” nature. All questions will be of an essay nature, and will require both information presented in lectures and possibly some searching to find scientific articles that will help support your arguments in your answers. Students will be expected to answer the questions independently. References must be cited for all answers. The completed exams will be due the Friday of the week slated for the exam, by 5PM. Lab reports will be due at the lab meeting time indicated on the schedule.

Response Time: Graded quizzes and exams will be returned within one week of the date on which they are taken.

Course and Institutional Policies

Late/Missing Work Policy: (Note: due to the CoVid-19 pandemic exceptions for late work will be considered if the student can make a valid case to the instructor – usually in the form of a letter from the Dean of Students Office.)

The penalty for any work turned in past the due date will be minus 5% per school day the work is late. Make-up exams will only be given in exceptional cases, or when official University business is involved. Such make-up exams for official university functions will only be allowed if the following conditions are met:

- Notification of the instructor by the student about being absence from class must occur before the absence
- A request must be made in writing (on paper or electronically)
- The request should include the event/conference and the name of the faculty advisor/sponsor (when possible the faculty sponsor should probably contact instructors on behalf of students who will be absent for educational/scholarship reasons)
- For lab reports, unless there are exceptional circumstances approved by Dr. Spratt, the late work penalty (see above) will apply.

Student Conduct Policy: UTC's Student Code of Conduct and Honor Code (Academic Integrity Policy) can be found on the [Student Conduct Policy page](https://www.utc.edu/student-conduct/codes.php) (<https://www.utc.edu/student-conduct/codes.php>).

Honor Code Pledge: As a student at the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to ensure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity

Course Attendance Policy: Students in any senior-level or graduate-level course are expected to understand the need to take part in course activities. Due to the CoVid-19 pandemic it is possible we will need to have occasional Zoom meetings or discussions. Students will be expected to take part in these Zoom meetings. Excessive absences from these meeting will be cause for reductions in student "Instructor Derived Participation" scores.

Course Participation/Contribution: See above.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

UTC Bookstore: The UTC Bookstore will price match Amazon and Barnes and Noble (<https://www.barnesandnoble.com/>) prices of the exact textbook - same edition, ISBN, new to new format, used to used format, and used rental to used rental format, with the same rental term. For more information, go to the [Bookstore Price Match Program](https://bnc.pgtb.me/MMt77F) (<https://bnc.pgtb.me/MMt77F>), visit the bookstore, email sm430@bncollege.com or call 423-425-2184.

COVID Absences

Students **must complete the [COVID-19 Notification form](#)** if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support.

If COVID-19 related illness or quarantine results in any missed classes or course work, **[students must contact the instructor within 48 hours of completing the COVID-19](#)**

Notification form to plan make-up classes and course work. Where possible, faculty will work with students to identify ways to complete course requirements but are not required to change or offer additional modalities. Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. Please realize that class will continue, and students may find themselves in the situation where they are unable to complete work in a timely manner. In such a case, students may consider requesting an [Exception to the Withdrawal Deadline](#) or an incomplete grade. Please contact the Office of the University Registrar (423-425-4416) to learn more about the late withdrawal process. Some departments may have department bylaws or student handbook requirements that specify a limit to the number of classes or amount of work that can be missed. In these cases the department requirements take precedence.

If students have COVID-19 disability-related risk factors that may indicate a need for additional academic accommodations, students are strongly encouraged to register with and/or contact the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's [General Student Grievance \(Complaint\) Procedure](#) by filling out the [Student Complaint Form](#) and submitting to the Office of the Dean of Students.

Biology, Geology & Environmental Science

COVID-19 Related Safety Protocols

- 1. Vaccines:** Vaccination is strongly encouraged for all faculty, staff and students.
- 2. Capacities:** Teaching labs are at full capacities. All classrooms are at full capacities. All course modalities are taught as stated on the course schedule.
- 3. Face Masks:** All faculty, staff and students are required to wear face masks, at all times, in all UTC instructional spaces. Masks should cover both the mouth and nose. Instructional spaces in BGE include the following, but are not limited to:

- [Teaching Labs](#)
- [Prep Labs:](#) Intro Biology Prep Lab, ESC Prep Lab, Microbiology Prep Lab, Geology Prep Labs, etc.
- [Research Labs and Museum Spaces:](#) When students are present, all personnel in the lab/museum space are required to wear masks.
- [Student Study Rooms \(4\)](#)
- [Graduate Teaching Assistant Office](#)

- Offices (In-Person Office Hours): Faculty and staff can require students to wear masks in your offices.
- All faculty, staff and students should default to wearing masks when students are present in indoor BGE spaces.

Mask use by anyone, anywhere on campus, regardless of vaccination status, is encouraged.

4. Disposable Nitrile Gloves: Access to disposable nitrile gloves should always be available in research spaces and teaching labs in case students and faculty want to wear them, regardless of lab activity.

5. Seating Charts: It is recommended that seating charts be kept for classrooms and teaching labs to aid in contact tracing by UTC.

6. Cleaning work areas and equipment in Research Spaces and Teaching Labs: In accordance with appropriate lab safety protocols, teaching lab workspaces and equipment should be cleaned after every lab meeting. Research spaces should be cleaned before finishing for the day.

- Microscopes: Microscopes should be disinfected before and after use. In each teaching lab, there is a designated spray bottle to use for microscopes. This solution is a combination of alcohol, vinegar and water. For research spaces, please request a spray bottle from Cheryl if needed.
 - Students should NOT touch the glass of the eyepieces.
 - Spray some of the microscope disinfectant on KimWipes.
 - Use the KimWipes to wipe off the microscope – everywhere that was touched and especially between the eyepieces where students breathe onto.
 - DO NOT wipe the glass of the oculars with the disinfectant if at all possible. The alcohol could dissolve any adhesives, etc. in the eyepieces.
 - If instructors need to help students with their microscopes, make sure to disinfect the microscope before and after use.
- Run out of Disinfectant Spray? Bring the empty spray bottles to either Wendy or Cheryl. We will exchange the spray bottles and get the empty ones refilled.
 - This applies for both the general disinfectant spray and the microscope cleaner.

7. Card-Swipe/After-Hour Access to Teaching Labs for Students: Students enrolled in courses will not be given card-swipe access to any teaching labs. Students can only be in the lab outside of their regular lab time, if an instructor is present at all times. This is to ensure students are adhering to COVID safety protocols.

If you would like assistance in proctoring labs after-hours, inquire with Dr. Potts and Kelly Locke about the options that are available.

8. Card-Swipe/After-Hour Access to Teaching Labs for course TA's. Card-swipe and after-hour access will be given to lab TAs that are helping with the course. Instructors are responsible

The University of Tennessee at Chattanooga

for making sure their TA's abide by the safety guidelines for the course and Department, including the protocols outlined here.

9. No approval forms are required for students working in research spaces.

10. It is the faculty/instructor's responsibility to make sure the research space and teaching lab they are using is stocked with paper towels, disinfectant spray, microscope disinfectant spray, soap, hand sanitizer, etc.

The following items can be found in the Holt 3rd Floor Office Suite:

- Paper towels
- Nitrile Gloves
- KimWipes
- Soap & Soap Refill
- Hand Sanitizer & Refill

The following items should be given to either Wendy or Cheryl to refill:

- Disinfectant Spray Bottles
- Microscope Disinfectant Spray Bottles
- Disposable Face Masks

11. Each teaching lab has been replenished with disposable masks (in Ziplock bag) that can be used in case a student forgot their mask, etc. These should be placed where anyone teaching in the lab can have access to it. If you need more disposable masks, ask Wendy or Cheryl.

12. Anyone deliberately violating safety rules may be asked to leave the BGE academic space.

Course Calendar/Schedule: TENTATIVE SCHEDULES:

LECTURE

DATE	DAY	SUBJECT	READING
8/17	TU	Class Introduction, Review of Prokaryotic Biology	Madsen Chpt #1
8/24	TU	Hist. of Environ. Micro., Formation of the Biosphere	Madsen Chpt #2
8/31	TU	Biosphere Formation & Microbial Evolution	“
9/7	TU	EXAM #1, “	“
9/14	TU	Microbial Interactions – Abiotic & Biotic	Madsen Chpt #3,5
9/21	TU	Organic Matter Biodegradation	Madsen Chpt #3,7

The University of Tennessee at Chattanooga

9/28	TU	“	Madsen Chpt #3,7
10/5	TU	Elemental Cycles – Global Perspective	Madsen Chpt #7
10/12	TU	FALL VACATION	Handout
10/19	TU	EXAM #2 , Elemental Cycling – Aquatic Environments	Madsen #3,7
10/26	TU	Elemental Cycling – Soils	Madsen #3,7
11/2	TU	Elemental Cycling – Aquatic Sediments	Madsen #3,7
11/9	TU	Elemental Cycling – Extreme Environments	Handout
11/16	TU	EXAM #3 , Elemental Cycling – Atmospheric Components	Handout
11/23	TU	The Case for Terraforming Mars	Handout
11/30	TU	Reading Day	
12/7	TU	FINAL EXAM DUE (5:30 PM)	

LABORATORY

DATE	DAY	SUBJECT	READING
8/19	TH	Introduction, Lab Safety, Development of Group Plans	Lab Manual, pgs. ix to x, 135-138
8/26	TH	Methodology Demonstrations, initiation of 1 st Group Project	Handout
9/2	TH	1 st Group Project – Group Work	Lab Manual, Exercise #15
9/9	TH	1 st Group Project – Group Work	“
9/16	TH	2 nd Group Project set up, Discussion of 1 st Lab Report	“, Exercise #16
9/23	TH	1st LAB REPORT DUE , 2 nd Group Project – Group Work	Lab Manual, Exercise #16
9/30	TH	2 nd Group Project – Group Work	“
10/7	TH	3 rd Group Project set up, Discussion of 2 nd Lab Report	“, Exercise #17
10/14	TH	2nd, LAB REPORT DUE , 3 rd Group Project – Group Work	Lab Manual, Exercise #17
10/21	TH	3 rd Group Project – Group Work, Planning for Final Project	“
10/28	TH	Final project set up, Discussion of 3 rd Lab Report	“
11/4	TH	3rd LAB REPORT DUE , Final Project – Group Work	Lab Manual & Handouts
11/11	TH	Final Project – Group Work	“
11/18	TH	Final Project – Group Work, Discussion of Final Report	“
11/25	TH	THANKSGIVING HOLIDAY	

The University of Tennessee at Chattanooga

11/30	TU	Reading Day	
12/7	TU	FINAL LAB REPORT DUE (5:30 PM)	

The University of Tennessee at Chattanooga

Course Title

Limnology and Reservoir Ecology

Fall 2021

ESC 5080, CRN 41055, Face-to-Face, 4 credit hours;

(Laboratory: ESC 5080L, CRN 41056, Face-to-Face, 0 credit hours)

Instructor: Dr. Mark Schorr

Email and Phone Number: Mark-Schorr@utc.edu; 423-425-4149

Office Hours and Location: In-person: Tue & Thu 11-11:50 am in Holt 217 or 232D

Course Meeting Days, Times, and Location: Lecture -- MWF 10:00-10:50 am, Holt 208; Laboratory – Fri 2:00-4:50 pm, Holt 123 or field sites (directions will be provided)

Course Catalog Description: Chemical, physical, and biological processes in lake and reservoir systems (nutrient budgets and cycling, hydrodynamics, phytoplankton/ zooplankton/benthic dynamics, and physical similarities and differences in lakes and reservoirs). Lecture 3 hours, laboratory 3 hours. May be registered as BIOL 5080. Credit not allowed in both BIOL 5080 and ESC 5080. Laboratory/studio course fee will be assessed.

Course Pre/Co-Requisites: Corequisite: ESC 5080L

Course Student Learning Outcomes: Students will be able to (1) demonstrate in-depth knowledge of the physical, chemical, and biological characteristics of inland water systems; (2) demonstrate in-depth knowledge of the ecological structure and function of freshwater lakes, streams, and reservoirs; (3) demonstrate and apply knowledge of limnological equipment and techniques used for measuring physicochemical conditions and sampling biological populations in freshwater ecosystems; and (4) conduct research or other scholarly work in limnology.

Course Fees: Laboratory/studio fee will be assessed.

Required Course Materials: Required Book – Cole GA, Weihe PE (2016) Handbook of Limnology, 5th edition. Waveland Press., Inc. Long Grove, IL. ISBN 978-1-4786-2307-6

Technology Requirements for Course: You should have access to a computer with a reliable internet connection for this course. Test your computer setup and browser for compatibility with UTC Learn at <http://www.utc.edu/learn/getting-help/system-requirements.php>. Course materials and information will be made available throughout the semester in UTC Learn. You also should have access to and use your UTC email account for all correspondence associated with this course.

Technology Skills Required for Course: You should be able to use Microsoft Word, Microsoft Excel, UTC Learn and MOCSNet email, and the *Web of Science* literature database.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements: A graduate student will be graded based on his/her performance on lecture/laboratory exams, laboratory/field notebook, and an individual project (research or pedagogical). Graduate student exams (ESC 5080/5080L) will be more rigorous than undergraduate exams; for example, lecture exams will often have additional calculations and essay questions; lab exams/assignments will contain more complex analyses/interpretations. The student's course grade will be computed with the lecture average, laboratory average, and individual project score accounting for 50 %, 40 %, and 10%, respectively. The course average is based on three lecture exams (50%), two lab exams (20%), an individual field notebook (20%), and an individual project (10%).

Course Grading

Course Grading Policy: Grading scale: A = 90-100 %; B = 80-89 %; C = 70-79 %; D = 60-69 %; F = 0-59 %.

Instructor Grading and Feedback Response Time: I will try my best to grade all exams, quizzes, and assignments within one week of the due date and provide feedback when necessary.

Course and Institutional Policies

Late/Missing Work Policy: Make-up exams and quizzes and late assignments will be permitted only for *legitimate* absences (i.e., those supported by a note from your doctor, dean, athletic director, or academic advisor). If you know ahead of time that you will miss an exam or a quiz, you must let me know before your absence so that we can arrange an alternative time for you to take the make-up test. If you are not in class on the date that an assignment is due, you remain responsible for submitting that assignment to me on paper by that date.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: Each student is expected to attend every lecture and lab and maintain an environment conducive to learning. This means being respectful to fellow classmates, the instructor, and any visitors who may be present.

Course Participation/Contribution: The course contains several learning objectives that are critical to building a foundation of knowledge and skill set in Limnology. For this reason, several methods will be employed, including (but not limited to): lecture, group discussions, and post-class work. To be successful in this course, I recommend that you engage in all methods. Your participation will be factored into your grade.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Course Calendar/Schedule: Tentative weekly lecture schedule for the Limnology course. Read all textbook chapters, lecture notes/handouts, and posted notes. Some sections of chapters will be omitted. Schedule is subject to change; in this event, you will be made aware of changes.

Lecture Schedule

Learning Unit I

1. Week of August 16 (MWF)
Course Overview and Chapter 1: Introduction
2. Week of August 23 (MWF)
Chapter 2: Survey of Limnological Biodiversity
3. Week of August 30 (MWF)
Chapter 3: The Limnetic Communities
4. Week of September 6 (WF)
Chapter 4: Ecosystems, Energy, and Production
Chapter 5: Lake Origins
5. Week of September 13 (MWF)
Chapter 5 (Continue)
EXAM 1 (Chapters 1 – 5)

Learning Unit II

6. Week of September 20 (MWF)
Chapter 6: Shapes and Sizes of Lakes
Chapter 7: Wetlands
7. Week of September 27 (MWF)
Chapter 8: Streams: The Lotic Ecosystem
8. Week of October 4 (MWF)
Chapter 9: Light and the Aquatic Ecosystem
9. Week of October 11 (WF)
Chapter 10: Density, Layering, and Lake Mixing
10. Week of October 18 (MWF)
EXAM 2 (Chapters 6 – 10)

Learning Unit III

11. Week of October 25 (MWF)
Chapter 11: Heat Energy and Water Movements
Chapter 12: Oxygen and Other Dissolved Gases
12. Week of November 1 (MWF)
Chapter 13: Carbon Dioxide, Alkalinity, pH: The CO₂ System
13. Week of November 8 (MWF)
Chapter 14: The Major Ions in Inland Waters
14. Week of November 15 (MWF)
Chapter 15: Redox, Metals, Nutrients, and Organic Substances
15. Week of November 22 (M)
Chapter 15 (Continue)
16. Week of November 29 (M)
Review for Exam 3

FINAL EXAM (Exam 3: Chapters 11 – 15)

December 3 (Friday): 8-10 am

The University of Tennessee at Chattanooga

Tentative weekly laboratory schedule for the Limnology course. Read all board notes, handouts, and posted materials for the laboratory. The laboratory schedule is subject to change; in this event, you will be made aware of changes.	
Week / Date / Location	Laboratory/Field Work, Assignment, Exam
Laboratory Learning Unit I	
Week 1 / Aug. 20 / Holt 123 lab	<u>Lab</u> : 1) Overview of laboratory; 2) Ecology of lakes, streams, reservoirs; 3) Watersheds; 4) Geology, physiographic provinces; 5) Major river drainages in TN; 6) Reservoirs on Tennessee River. Read lab/posted notes.
Week 2 / Aug 27 / Holt 123 lab	<u>Lab</u> : 1) Physicochemical water quality – temperature, dissolved oxygen, pH, conductivity, turbidity; 2) Aquatic microbiota - study prepared slides/specimens of algae/protozoans, microinvertebrates; 3) Identify selected taxon groups. Read lab/posted notes.
Week 3 / Sept 3 / Holt 123 lab	<u>Lab</u> : 1) Aquatic macrofauna -- study preserved specimens of macroinvertebrates, fishes, amphibians; 2) Identify selected taxon groups; Read lab/posted notes.
Week 4 / Sept 10 / Field work -- Reservoir on Tennessee River	<u>Field Work</u> : 1) Water quality profiles – measure physicochemical conditions (temperature, dissolved oxygen, pH, conductivity, turbidity) at different depths in a reservoir (from surface to bottom); 2) Record field data and notes; 3) Discuss/interpret data; 4) Sketch map of field site; 5) Prepare graphic data summaries. Read lab/posted notes.
Week 5 / Sept. 17 / Field work – Cumberland Plateau streams	<u>Field Work</u> : 1) Sample water quality, habitat, and macrofauna in Cumberland Plateau streams (mining-impacted and control sites); 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 6 / Sept. 24 / Field work – Cumberland Plateau streams	<u>Field Work</u> : 1) Sample water quality, habitat, and macrofauna in Cumberland Plateau streams (mining-impacted and control sites); 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 7 / Oct. 1 (Fri.) / Holt 123	Lab Exam I

The University of Tennessee at Chattanooga

Laboratory Learning Unit II	
Week 8 / Oct. 8 / Field work – Ridge and Valley streams	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in Ridge and Valley streams; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 9 / Oct. 15 / Field work – Ridge and Valley streams	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in Ridge and Valley streams; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 10 / Oct. 22 / Field work – Reservoir on Tennessee River	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in a reservoir; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 11 / Oct. 29 / Field work – Reservoir on Tennessee River	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in a reservoir; 2) Record field data/notes; 3) Discuss/ interpret data; 4) Prepare graphic/tabular data summaries. Read lab/posted notes.
Week 12 / Nov 5 / Field work – Ridge and Valley streams	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in urban and non-urban streams in Ridge and Valley; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 13 / Nov. 12 / Field work – Ridge and Valley streams	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in urban and non-urban streams in Ridge and Valley; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 14 / Nov 19 (Fri.) / Holt 123	Lab Exam II; Field Notebook (compilation of student's data sheets, map sketches of all study sites; field records/notes, graphic/tabular data summaries) due.

COVID Absence Statement – Fall 2021 Revised

COVID Absences (face-to-face & blended hybrid version – 3rd person)

Students **must complete the** [COVID-19 Notification form](#) if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support.

Students who are instructed by university administration to stay home due to their responses are not to come to campus or attend face-to-face classes. Students who are cleared to be on campus and attend class are required to attend face-to-face class sessions. Students will not be penalized for COVID-19 related absences or late course assessments due to a COVID-19 related concerns unless they are unable to complete course learning outcomes. Faculty will work reasonably with students to identify ways to complete course requirements.

Students must, if they are asymptomatic or if their symptoms do not interfere with their ability to participate in the course, **continue to participate in the course using the online assets and tools that the instructor may make available through UTC Learn (Canvas) including:**

- Lecture/lab notes and related materials (posted in Canvas);
- Lecture/lab assignments and field data (posted in Canvas);
- Examples of completed assignments (posted in Canvas);
- Online assistance in the course (email, zoom).

If COVID-19 related illness results in any missed course work (face-to-face or online), **students must contact the instructor within 48 hours of recovering to plan make-up work.** Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. But please realize that class will continue, and students may find themselves in the situation where they are unable to complete all work by the end of the semester. In such a case, students should consider a late withdrawal or an incomplete grade. Please contact the Records Office (423-425-4416) to learn more about the late withdrawal process.

If students have COVID-19 disability related risk factors that may affect attendance, students are strongly encouraged to register with the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's [General Student Grievance \(Complaint\) Procedure](#) by filling out the [Student Complaint Form](#) and submitting to the Office of the Dean of Students.

BIOREMEDIATION

Fall 2022

BGES, BIOL 4430, CRN# 45267, ESC 4430, CRN# 45260, ESC 5040, CRN# 45321, Face to Face, 4 crt hrs

Instructor: Henry ("Rardy") Spratt; Office - Holt Hall Rm. 351-D

Email and Phone Number: henry-spratt@utc.edu; Office phone # 423-425-4383

Office Hours and Location: Zoom meetings will be set up for Wed 3 PM to 4 PM (email Zoom links will be sent out the morning of the office hour). In person Office hour meetings will be on Tues from 2 PM to 3 PM and Fri from 2 PM to 3 PM in Holt Hall 351-D. Individual appointments will be made by request for either Zoom or in person meetings. If any changes in this office hour schedule occur announcements will be made both in class and online.

Course Meeting Days, Times, and Location: Lecture = Tu 10:50 AM to 12:05 PM; Lec/Lab = Th 10:50 AM to 12:05 PM, Holt Hall Rm. 203. Lab = Th 1:40 PM to 4:30 PM, Holt Hall Rm. 331.

Course Catalog Description: A study of the potential use of biological systems in the remediation of areas contaminated with toxic pollutants. Lecture 3 hours, laboratory 3 hours.

Course Pre/Co Requisites: BIOL 3060 and BIOL 3250 and BIOL 3350 with minimum grades of C; and BIOL 4220; and CHEM 3010; or department head approval. Corequisites: either BIOL 4430L, ESC 4430L, or ESC 5040L, or department head approval. Laboratory/studio course fee will be assessed.

Course Student Learning Outcomes:

Course Objectives - Lecture:

- A) To discuss the nature of problems that might be candidates for bioremediation.
- B) To introduce the history of bioremediation.
- C) To introduce the biology of bioremediation.
- D) To consider enzymes that are important to bioremediation.
- E) To discuss the bioremediation of toxic wastes in aquatic ecosystems.
- F) To discuss the bioremediation of toxic wastes in aquatic ecosystems.
- G) To discuss the future of bioremediation and how this might link to human sustainability.

Course Objectives - Lab:

The primary objective of the laboratory portion of this class is to provide students the opportunity to develop experience with systems used to biologically remove contaminants from soil or aquatic systems. Through the use of hands-on examples of tools used in bioremediation to study microbial

The University of Tennessee at Chattanooga
remediation of various toxins in different habitats, students should be able to appreciate potential applications of this field of science. Studies conducted in the lab will be hypothesis-driven research projects conducted by small groups.

GRADUATE STUDENTS:

In this upper level undergraduate/graduate level course, graduate students are expected to self-instruct and in some cases use a team approach in mastering the material and completing assignments. Graduate students will take a leadership role in group exercises. Graduate students must also read and synthesize scholarly journal articles and lead class discussions in the lecture related to the articles. The instructor will provide guidance as deemed necessary. Graduate students are expected to function as self-directed learners, synthesizing information from this course and other courses and life experiences, and engage in substantial critical analysis with the goal of providing innovative perspectives on the field of bioremediation. As for exams, graduate students are expected to demonstrate a strong understanding of the lecture objectives covered on exams. Additionally, graduate students will be required to complete one additional question (not required of undergraduate students) on each exam designed to emphasize understanding and application of key concepts covered. Lastly, graduate students will also be required to write a detailed proposal based on one of the lab projects, or an article presented in the lecture. This proposal will require detailed introduction, literature review, objective, methodology, expected outcomes, budget, budget justification, and reference sections. This proposed work should be completely feasible using resources available at UTC. Additional information on this proposal will be provided prior to mid-term.

ALL STUDENTS:

Lecture - Much of the lecture will be used to introduce new topics. Discussions of any topics at the time they are introduced are welcomed. Students will demonstrate that they understand the above course objectives by exhibiting satisfactory performance on examinations and quizzes. Note that this semester we will have one meeting period on Tuesdays, and two meeting periods on Thursdays. The Tuesday meeting period will be devoted to the lecture. On Thursday, the earlier meeting period will be used both for lecture (to finish any unfinished items from the Tuesday lecture) and as a question/answer session for the labs. Thursday afternoon periods will be devoted to lab work necessary to conduct the assigned exercises.

Laboratory - The laboratory section of this course will include the completion of complex exercises that may require some time outside of scheduled lab period on Thursday afternoons. Actual times in the lab working on projects will be determined by group project needs. The class will be subdivided into small groups to conduct studies of bioremediation. Depending on enrollment in the course, these groups will be assigned based on having at least one graduate student per group to serve as that group's leader. Topics for study in the laboratory will be discussed during the first lab meeting. One characteristic of the topics of study is that they be brief enough to be accomplished in the time frame of the semester. The specifics of the lab exercises are detailed in the lab manual assigned for this course (see Course Materials below for details). Group projects will be designed to allow for three distinct exercises based on "canned" procedures. Note that due to the fact that the liquid scintillation counter in the Biology Department's Radioactive Materials Lab (Holt Hall Rm. 301) has malfunctioned and cannot be repaired will limit our ability to conduct the mineralization of herbicides lab exercise. A work around exercise will be established during the first week meeting of the lab. A final group

project, which will be hypothesis driven, will be conducted as the culminating project of the laboratory. This final project will be based on techniques learned in one or more of the “canned” exercises conducted earlier in the semester. Three, brief laboratory reports (three to five typed, double-spaced pages) will be due during the semester (see below for due dates) describing the exercises conducted. A final lab report (10 to 12 pages) describing the hypothesis-based group project conducted (written as a scientific report – more information on this will be presented later) will be turned in with the final exam at the end of the semester.

Course Fees: A laboratory fee of \$50 will be assessed for the lab section of Bioremediation.

Required Course Materials:

LECTURE: Spratt, H. G., Jr. 2022. Bioremediation: Cleaning toxic waste with a little help from nature. Kendall Hunt Publ. Dubuque, IA. 164 pg. ISBN 978-8-7657-0772-2.

LAB MANUAL: Spratt, H.G. 2019. Laboratory microbiology for biology majors. 2nd Ed. Kendall Hunt Publ. Dubuque, IA. ISBN: 978-1-5249-8793-0.

Supplemental/Optional Course Materials: Periodically, articles on topics covered in lecture (or of greater interest to Bioremediation experts) will be posted on the UTC Learn Canvas course website. These articles will provide the basis for class discussions of the particular topic. Each graduate student (the schedule of who and when will be determined by the second week of class and will be based on the number of graduate students taking the class) will be given the responsibility of giving one or two 15-minute summary reports of these articles to the class.

Technology Requirements for Course: No specific devices or skills are required for this course regarding technology other than having computer access to the course’s UTC Learn web page. If you have technology needs to access your courses and/or complete course requirements in Canvas, [submit a request \(https://new.utc.edu/information-technology/learning-from-home\)](https://new.utc.edu/information-technology/learning-from-home) with Information Technology. If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Technology Skills Required for Course: The ability to use Microsoft Word and Excel will be important.

COVID-19 Policy, Student Accommodations, and Other University Policies: Please see the “Campus Syllabus - Fall 2022”, which is also posted in the BIOL 4720 Syllabus site on Canvas for details related to CoVid-19 and other University-wide policies. [Click here to enter text.](#)[Click here to enter text.](#)

Course Grading [Click here to enter text.](#)

Grading:

The University of Tennessee at Chattanooga

LECTURE	(total pts)	LABORATORY	(total pts)	GRAND TOTAL
3 Exams	300	Lab Reports (1 – 3)	300	
Final Exam	150	Final Lab Report	150	
Inst. Derived Part.	25	Inst. Derived Part.	25	
TOTAL	475	TOTAL	475	950
GRAND TOTAL = 50% Lecture + 50% Laboratory				

FINAL COURSE GRADE (Any adjustments will be announced)

Undergraduate Students (950 pts)

A = 950-855 pts.

B = 854-760 pts.

C = 759-665 pts.

D = 664-570 pts.

F < 570 pts.

Graduate Students (1050 pts)*

A = 1050-945 pts.

B = 944-840 pts.

C = 839-735 pts.

D = 734-630 pts.

F < 630 pts.

*) Included for grad students = 100 pt. proposal

Course Grading Policy: All exams will be emailed to students by the end of the Monday of the week that the exam is scheduled. All questions will be of an essay nature. Students will be expected to answer the questions independently, citing references for all answers. The completed exams will be due the Friday of the week slated for the exam, by 5PM. Lab reports will be due at the lab meeting time indicated on the schedule.

Instructor Grading and Feedback Response Time: Graded exams will be returned the first meeting of the lecture on the week following the due date for the exams. Graded lab reports will be returned at the next meeting of the lab section the week following submission of the reports.

Course Policies

Late/Missing Work Policy: [Click here to enter text.](#)

Late Work & Make-up Policy – The penalty for any work turned in past the due date will be minus 5% per school day the work is late. Make-up exams will only be given in exceptional cases, or when official University business is involved. Such make-up exams for official university functions will only be allowed if the following conditions are met:

- Notification of the instructor by the student about being absence from class must occur before the absence
- A request must be made in writing (on paper or electronically)
- The request should include the event/conference and the name of the faculty advisor/sponsor (when possible the faculty sponsor should probably contact instructors on behalf of students who will be absent for educational/scholarship reasons)
- For lab reports, unless there are exceptional circumstances approved by Dr. Spratt, the late work penalty (see above) will apply.

The University of Tennessee at Chattanooga

Course Attendance Policy: Students in any senior level or graduate level course are expected to understand the need to take part in course activities. So, taking part lectures and lab sessions, and any Zoom meetings we might have will be expected of all students. Excessive absences from these meeting will be cause for reductions in student “Instructor Derived Participation” scores.

Course Participation/Contribution: See above.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Course Calendar/Schedule: TENTATIVE SCHEDULE:

LECTURE – FA 2022

ot	DAY	SUBJECT	READING
8/23	TU	Class Introduction, Scope of Bioremediation	Chapt #1
8/30	TU	Natural Toxins, Historical Attempts at Bioremediation – Human Wastes	“ Chapt #2
9/6	TU	Modern Sewage Treatment, The Biology of Bioremediation	Chapts #2, #3
9/13	TU	EXAM #1 , The Biology of Bioremediation	Chapt #3
9/20	TU	Enzymes Involved in Bioremediation	Chapt #4
9/27	TU	Enzymes, Mineralization of Organic Matter, Options for Inorganics	Chapt #4
10/4	TU	Bioremediation of Toxic Organic Matter in Aquatic Ecosystems	Chapt #5
10/11	TU	Bioremediation OM & Inorganic Compounds in Aquatic Ecosystems	Chapts #5, #6
10/18	TU	FALL BREAK	-----
10/25	TU	EXAM #2 , Bioremediation of Inorganic Compounds in Aquatic Ecosystems	Chapt #6
11/1	TU	Bioremediation of Toxic Chemicals in Soils	Chapt #7
11/8	TU	Bioremediation of Toxic Chemicals in Soils	Chapt #7
11/15	TU	EXAM #3 , Future of Bioremediation	Chapt #8
11/22	TU	Future of Bioremediation & Human Sustainability, Review	Chapt #8
12/13	TU	FINAL EXAM DUE (5 PM)	-----

LABORATORY – FA 2022 (Thursday Lab Work Day)

The University of Tennessee at Chattanooga

DATE	DAY	SUBJECT	READING
8/25	TH	Introduction, Lab Safety	Spratt Lab Manual (p. 135-140)
9/1	TH	Initiation of 1 st Group Projects – Degradation of Waste Oil	Spratt Lab Manual (Ex. 20)
9/8	TH	Group Work – Degradation of Waste Oil	“
9/15	TH	“ – Degradation of Waste Oil	“
9/22	TH	FIRST LAB REPORT DUE , Initiation of 2 nd Group Project	Spratt Lab Manual (Ex. 18)
9/29	TH	Group Work – Microbial Dye Degradation	“
10/6	TH	“ – Microbial Dye Degradation	“
10/13	TH	SECOND LAB REPORT DUE , Initiation of 3 rd Group Project	Spratt Lab Manual (Ex. 20)
10/20	TH	Group Work – Degradation of Waste Oil – Enrichment Cultures	“
10/27	TH	“ – Degradation of Waste Oil – Enrichment Cultures	“
11/3	TH	THIRD LAB REPORT DUE , Initiation of Final Group Project	Spratt Lab Manual (Ex. 18 - 20)
11/10	TH	Group Work	“
11/17	TH	“	“
11/22	TH	Discussions on Final lab report	“
12/13	TU	FINAL LAB REPORT DUE WITH FINAL EXAM (5 PM)	

Applied Statistics for Environmental Scientists Fall 2022

ESC 5120, crn 40504, face-to-face, 4 credit hours

Instructor: Dr. Hope Klug

Email and Phone Number: hope-klug@utc.edu

Office Hours and Location: Tuesday and Thursday 12-1 PM and MWF by appointment; in-person or Zoom office hours are available (email for Zoom link)

Course Meeting Days, Times, and Location: Tuesday and Thursday, 9-11:50 AM

Course Catalog Description: Application of statistical methods to biological and environmental problems, including sampling designs, hypothesis testing, analysis of variance and nonparametric statistics. Laboratory includes using the Statistical Analysis System (SAS) and other software to analyze scientific data. Lecture 3 hours, laboratory 3 hours. Standard letter grade. Laboratory/studio course fee will be assessed.

Course Pre/Co Requisites: N/A

Course Student Learning Outcomes: . Students are able to demonstrate and apply their knowledge of experimental design in relation to environmental science. 2. Students are able to demonstrate and apply their knowledge statistics as relevant to environmental science (e.g., descriptive statistics, non-parametric statistics, univariate and multivariate analyses). 3. Students are able to demonstrate and apply their knowledge of the appropriate interpretation of environmental data. 4. Students are able to design an environmental science study, utilize the primary scientific literature to develop appropriate hypotheses, gather relevant field or laboratory data, analyze and interpret their data, and effectively communicate the results of their study.

Course Fees: \$50 Biology & Environmental Science lab fee.

Required Course Materials: None

Supplemental/Optional Course Materials: A primer of ecological statistics, N. Gotelli and A. M. Ellison. Sinauer, 1605350648

Technology Requirements for Course: The following technology is mandatory for participation in this course: 1) Computer with a built-in or external USB webcam, microphone,

The University of Tennessee at Chattanooga and speakers; 2) access to Microsoft Office and Excel, SPSS, and Chrome or FireFox; and 3) a reliable internet connection. Technology needs for on-campus course participation are met by way of computer labs located in the UTC Library and short-term equipment circulation provided by the library. Remote course participation requires a home set-up. If you have long-term hardware or software needs for remote course participation, please submit a Library Technology Request in advance of the fall semester or as needs arise. Students are expected to check the course on UTC Learn and their UTC student email account daily.

Technology/Digital Literacy Skills Required for Course: You are expected to have working knowledge and capability with your computer hardware and a variety of software applications before entering this class. Class participants must know how to use and check their e-mail on a daily basis. You will need to know your UTC ID user name and password to access the UTC Learn online password-protected system. If you do NOT know your UTC ID user name and password, please contact the [Solutions Center](#) at (423)-425-4000. You must be able to save word processing files in a .doc/.docx (Microsoft Word), .rtf (Rich Text Format), or .txt (Text) format for sharing files. You must be able to perform basic applications in Microsoft Excel.

Course Assessments and Requirements: [Click here to enter text.](#)

Course Grading

Course Grading Policy:

The overall grade (i.e. the combined lecture and lab grade) will be based on weekly in-class and/or out-of-class assignments (20% of final grade), three examinations (20% each = 60% total) and an Independent or Small-Group Project (20% of final grade).

Each week, there will be in-class and/or out-of-class assignments. To complete the assignments, you must be present in class. There will be a total of 13 assignments (1 per week), and your best 12 will count towards your final grade. This means that your lowest assignment grade will be dropped. No make-up assignments will be allowed. If, for any reason, class is cancelled by UTC or by Dr. Klug, an alternative assignment will take the place of the missed assignment. If you miss class on the date that an assignment was assigned, you will not be able to complete that assignment.

Each Exam will take place during class meeting. If you miss an in-class examination and provide an excuse that is acceptable to the instructor within 24 hours, the final examination grade will be substituted for the missed exam grade.

Independent projects will be carried out over several weeks and require you to apply your knowledge of a range of topics covered in the class. Details of the independent projects will be provided in class.

Grading Summary: In summary, your grade is calculated as follows:

The University of Tennessee at Chattanooga

Final Grade = (Overall Assignment Percentage)*0.2 + (Overall Final Project)*0.2 + (Exam 1 Percentage)*0.2 + (Exam 2 Percentage)*0.2 + (Exam 3 Percentage)*0.2.

The grading scale is as follows: 90-100% = A, 80-89.9% = B, 70-79.9% = C, 60-69.9% = D, lower than 60% = F

Instructor Grading and Feedback Response Time: Feedback will be provided on assignments and exams within 2 weeks.

Course Policies

Late/Missing Work Policy: If you miss an in-class examination and provide an excuse that is acceptable to the instructor within 24 hours, the final examination grade will be substituted for the missed exam grade. No late assignments will be accepted and make-up assignments will not be accepted since one assignment can be dropped.

Course Attendance Policy: Attendance is not explicitly a component of your grade. However, to receive credit for the assignments, you will have to attend class. Students are therefore strongly encouraged to attend all classes. If you miss class on the date that an assignment was given, you will not be able to complete or make up that assignment.

Course Participation/Contribution: All students and Dr. Klug are expected to actively participate in the course.

Course Calendar/Schedule:

Important dates (Full Tentative Schedule Provided on Next Page)

August 22	Classes begin
September 5	No Class/Holiday
September 20	Exam 1 (Tuesday)
October 17-18	No Class/Fall Break
October 20	Exam 2 (Thursday)
November 23-27	No class/Thanksgiving Break
December 1	Final Exam (Thursday)
December 8	Project Due by 10 AM

Week of:	Topic
August 22	Welcome, Introduction to Environmental Science Data Analysis, & Experimental Design (Ch. 6-7); Stats Programs No quizzes & No writing assignment
August 29	Experimental design; Organizing & visualizing data (Ch. 6-8); Independent Project Discussion Assignment 1
September 5	Organizing & visualizing data; Summary statistics (Ch. 8, 3); Independent Project Discussion Assignment 2
	Monday: Labor Day/No Class
September 12	Fundamentals of probability; Probability distributions; Framing & testing hypotheses (Ch. 1, 2, 4); Independent Project Planning Assignment 3
September 19	Non-parametric statistics (Handout) Assignment 4
	Exam I (Tuesday September 20th)
September 26	Regression (Ch. 9); Independent Project Planning & Data Collection Assignment 5
October 3	Analysis of Variance (Ch. 10); Putting it all together: Independent projects—Design & data collection Assignment 6
October 10	Analysis of Variance; Bonferroni corrections & the problem with multiple tests (Ch. 10); Analysis of categorical data; Putting it all together: Independent projects—Design & data collection (Ch. 11) Assignments 7 & 8
October 17	Exam II (Thursday October 20) Monday-Tuesday: No Class/Fall Break
October 24	Analysis of multivariate data (Ch. 12) Assignment 9
October 31	Analysis of multivariate data (Ch. 12) Assignment 10
November 7	Putting it all together: Independent projects—Design & data collection Assignment 11
November 14	Putting it all together: Independent projects—Data organization & visualization; summary statistics Assignment 12

November 21 The University of Tennessee at Chattanooga
Putting it all together: Independent projects—Data analysis,
conclusions, write-up, & presentation
Wednesday-Friday: Thanksgiving Break/No Class

Week of: **Topic**

November 28 Putting it all together: Independent projects—Data analysis,
conclusions, write-up, & presentation
Assignment 13

December 8 **Final Exam December 1**
(Thursday) Project Due 10 AM
Dec 8

The University of Tennessee at Chattanooga

ENVIRONMENTAL LAW AND REGULATIONS

Fall 2022

Department of Biology, Geology, and Environmental Science
ESC 5140, CRN No. 41214, Face-to-Face Course, 3 credit hours

Assignments
Overview of Agency Responsibilities
Public Lands Chart
NEPA Flowchart
ESA Flowchart
Law Links

Instructor: John C. Tucker

Email and Phone: John-Tucker@utc.edu; 423-425-4341

Office Hours and Location: T, Th 1:40-2:30pm; W 4:00-4:50 pm, F 10:30 pm-11:20 am, and by advance appointment. Location: 232K Holt Hall

Course Meeting Days, Time, and Location: Wednesday, 6:00-8:30, Room 204 Holt Hall.

Course Catalog Description: Study of the principal pollution control and natural resource laws, including environmental impact assessment and planning laws; laws regulating air pollution, water pollution, and hazardous wastes; law protecting endangered species and wetlands; and international environmental law.

Course Pre/Co Requisites: None. Graduate student status required.

Course Student Learning Outcomes (SLOs)

After completing this course students will be able to:

1. Synthesize case briefs summarizing key components of judicial decisions.
2. Describe the role and authority of the legislative, executive, and judicial branches of government in development, implementation, and enforcement of environmental law and policy.
3. Describe the general structure and implementation programs of selected federal pollution control and natural resource laws.
4. Critically analyze the effectiveness of environmental laws and policy in written and verbal form.

5. Demonstrate the ability to identify and analyze environmental law issues.
6. Demonstrate the ability to present and defend an oral argument involving environmental law issues.

Required Course Materials

Ferrey, Steven, Examples & Explanations for Environmental Law (EL) (8th Ed. 2019) (ISBN 9781543802290) (available in UTC bookstore).

Supplemental Course Materials

Additional Materials will be posted on the class CANVAS site.

Technology Requirements for Course: Computer and internet.

Technology Skills Required for Course: CANVAS, word processing, internet use, and Zoom.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements: All students are expected to attend and participate in class. You should be prepared to discuss assigned readings and other matters in class. There will be two exams during the semester and a final exam at the end of the semester. Exam questions may be multiple choice, fill in the blank, short answer, and essay. You are required to participate in in-class exercises including the capstone assignment, contribute to in-class critical thinking question discussions, and complete homework and other assignments.

All homework answers must be typed and turned in online through CANVAS. Assessments include

- **Homework Assignments:** This course covers a large volume of material. Homework assignments are intended to engage you in the course content and build your critical thinking skills. Homework assignments will be announced in class and on CANVAS at least one week prior to the due date. All homework answers must be typed and turned in online through CANVAS.
 - o **Plagiarism - If plagiarism is detected, you will receive a zero for the assignment. If detected a 2nd time, you will fail the course.** To avoid plagiarizing, write using your own words, properly cite your sources, and never copy and paste from the internet or from the work of others.
- **Exams:** There are two exams during the semester and a final exam at the end of the semester.
- **In-class Exercises:** There will be several in-class exercises throughout the semester. These will be announced ahead of time. There are no in-class exercise makeups.
- **Capstone Assignment:** There will be a major in-class exercise near the end of the semester simulating a federal appellate court proceeding. You will be provided materials and roles for the exercise. You must participate and speak during this exercise to receive credit. You must also submit an outline of the major points you intend to make during the exercise.

Your final grade is based on the following components and weights:

2 Exams (25% each)	50%

Homework Assignments	5%
Capstone Assignment and Exercises	10%
Final Exam	35%
Total	100%

Course Grading

Course Grading Policy: Grades are based upon the two exam scores, homework, exercises, and general class participation.

A 90 - 100 points, B 80-89 points, C 70-79 points, D 60-69 points, F 0-59 points

Instructor Grading and Feedback Response Time: Exams will be graded and returned within two weeks of being administered.

Course and Institutional Policies

Missed/Makeup Exams:

There will be NO EARLY EXAMS OR MAKE UP EXAMS, except under extenuating circumstances as determined by the professor and **ONLY** if you **are granted permission from the professor prior to the exam**. Otherwise, you will earn a zero for missed work.

Late or Missed Assignments:

A zero will be recorded for missed homework assignments and included in final course grade calculation. Late assignments are not allowed without approval of the instructor. There are no exercise makeups.

Student Conduct Policies: Students must comply with UTC's [Honor Code](#) and [Code of Conduct](#).

Honor Code Pledge: As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity.

Honor Code Violations: Violation of the honor Code will result in an automatic zero on the assignment or exam, an F in the class, and referral to UTC Honor Court.

Course Attendance Policy: Students must attend class regularly and be prepared to discuss assigned readings and other matters in class in order to do well in this course.

Cell Phones & Other Electronic Equipment

Turn off your cell phone or other electronic equipment before you enter class. Sending or receiving text messages or calls is distracting and you will be asked to leave class if you engage in this activity. You may use a laptop to take notes.

Course Participation/Contribution: In the classroom, students are expected to arrive on time to every class and stay until dismissal, ask and answer questions, and keep phones on silent and out of sight. In-class exercises and other activities will count toward your final grade. Out of the classroom, students are expected to regularly check the Canvas Announcements and MOCSNet email, read relevant textbook pages, complete all homework assignments, and study a minimum of 6 hours per week. See course assessments and requirements section of this syllabus.

Student Accommodations: If you have accessibility and accommodation requests, contact the [Disability Resource Center](#) at 423-425-4006 or email DRC@utc.edu.

Course Calendar/Schedule:

**Environmental Law and Regulations
Course Outline**

This outline is subject to change and it is the responsibility of the student to keep informed of changes, new materials, missed content.

- I. Introduction
 - A. History of Environmental Law
 - B. Rational for Environmental Law
 - C. Institutional & Legal responses to Environmental Problems
- II. Administrative Law
 - A. Agency Authority
 - B. Rulemaking
 - C. Judicial Review
- III. Common Law
 - A. Nuisance
 - B. Trespass
 - C. Negligence
 - D. Strict Liability
- IV. Environmental Assessment
 - A. National Environmental Policy Act – National Environmental Policy Act (NEPA)
 - B. Environmental Justice
- V. Natural Resource Conservation and Protection
 - A. Biodiversity Conservation - Endangered Species Act (ESA)
 - B. Wetlands - Clean Water Act (CWA) Section 404))
 - C. Public Lands Management - Multiple Use Sustained Yield Act (MUSY), National Forest Management Act (NFMA)
- VI. Pollution Control
 - A. Water Quality - Clean Water Act (CWA)
 - B. Air Quality - Clean Air Act (CAA)
 - C. Solid and Hazardous Wastes - Resource Conservation and Recovery Act (RCRA))
 - D. Hazardous Substance Releases - Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
 - E. Pesticides – Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

VII. Oral Arguments

**Environmental Law and Regulations
TENTATIVE CLASS SCHEDULE***

Week	Date	
1	8/24	Course Overview & Intro to Law - Terminology, Institutions, and Relationships, Rationale and History Read Ferrey, Steven, Examples & Explanations for Environmental Law (EL) Chapter 1 - pp 1-37 or read Kubasek and Silverman, Environmental Law pp 1-40
2	8/31	Introduction continued, Administrative and Common Law How to brief a case Handout, CUNY Read EL Chapter 2 – pp 41-90 or read Kubasek and Silverman, Environmental Law pp 57-62 (thru ripeness), 68-75, 79-109
3	9/7	Mock Appellate Hearing Read Broadened Horizons Riverkeepers v. Army Corps & TVA (Links to an external site.), 8 F. Supp. 2d 730 (E. Dist. Tenn 1998) Prepare for In-Class Broadened Horizons Riverkeepers v Army Corps of TVA Mock Appellate Hearing. You will serve as an appellant attorney, an appellee attorney, or a judge for the hearing. More info will be provided. National Environmental Policy Act (NEPA)
4	9/14	NEPA cont'd Read EL Chapter 3 – pp 93-159 or read Kubasek and Silverman, Environmental Law pp 117-148 Read NEPA §§ 2, 101, 102 (42 U.S.C. §§ 4321, 4331, 4332) EPA Office of Inspector General 2006 EJ Evaluation Report
5	9/21	EXAM 1 Biodiversity and the Endangered Species Act (ESA)
6	9/28	ESA continued Read EL Chapter 13 – pp 651-671 or read Kubasek and Silverman, Environmental Law pp 367-373 Read 16 U.S.C. §§ 1531, 1532, 1536, 1538, 1539. <u>Homework 1</u> – Write a brief of Babbitt v. Sweet Home, 115 S.Ct. 2407 (1995) and turn in electronic brief through Canvas Assignments (one page single spaced typed maximum)

7	10/5	Wetlands – Clean Water Act (CWA) § 404 Read EL Chapter 11 – pp 563- 588 or read Kubasek and Silverman, Environmental Law pp 357-364 EPA Wetlands Internet Site Why Protect Wetlands? (Review all) Section 404 Permitting Wetlands Mitigation Banking GAO Compensatory Mitigation Report GAO Wetland Jurisdiction Report
		<u>Homework 2</u> : turn in brief of <u>Rapanos v U.S.</u> , 126 S.Ct. 2208 (2006)
8	10/12	CWA Clean Water Act NPDES Permits (CWA) Read EL Chapter 6 – pages 281-320 or read Kubasek and Silverman, Environmental Law pp 196, 208-225, 232-3
9	10/19	CWA cont'd <u>Homework 3</u> : turn in brief of <u>County of Maui v. Hawaii Wildlife Fund</u> , 140 S.Ct. 1462 (2020)
10	10/26	EXAM 2 Clean Air Act (CAA)
11	11/2	CAA continued Read EL Chapter 5 – pages 197-254, 263-279 or Kubasek and Silverman, Environmental Law pp 153-188 <u>Homework 4</u> : turn in brief of <u>Massachusetts v. EPA</u> , 127 S.Ct. 1438 (2007)
12	11/9	Resource Conservation and Recovery Act (RCRA) Read EL Chapter 8 pages 363-393, 409-413 or read Kubasek and Silverman, Environmental Law pp 270-288 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Read EL Chapter 9 – 415-432, 440-470, 487-490 or read Kubasek and Silverman, Environmental Law pp 288-304
13	11/16	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Read EL Chapter 14 – pages 684-691 or read Kubasek and Silverman, Environmental Law pp 250-259
14	11/23	Holiday
15	11/30	Appellate Oral Arguments, Review
16	12/7	FINAL EXAM, 6:00 p.m. – 8:00 p.m.

*This schedule may be adjusted depending upon the progress of the class, student needs, and new developments in environmental law. It is the responsibility of the student to keep informed of changes, new materials, and missed content.

Seminar I

Fall 2022

Biology, Geology, and Environmental Science, ESC 5700, Face-to-Face Lecture, 1 credit hour

Instructor: Thomas P. Wilson, Ph.D., GISP, UC Foundation Professor, ESC Graduate Coordinator

Email and Phone Number: Thomas-wilson@utc.edu, 423-425-4713(Office) or 423-425-4341(BGE Main Office, Holt Hall 215)

Office Hours and Location: 1000-1100 MWF, Holt Hall 306A

Course Meeting Days, Times, and Location: W 1700-1750, Holt Hall 124

Course Catalog Description: Presentation of programs of current environmental interest by students, faculty, and visiting speakers. Each student will be required to present or take part in discussion of a topic each week. Required during first year in graduate program.

1.000 Credit hours

1.000 Lecture hours

Course Pre/Co Requisites: Prerequisite: Graduate Standing.

Course Student Learning Outcomes: 1. Be able gather, synthesize, and evaluate information pertaining to environmental science and present it in written and oral form; 2. Be able to accurately answer audience questions following an oral presentation; 3. Be able to critique presentations oral presentations given by others.

General Education Statement: *This course is not a general education course!*

Course Fees: *No laboratory/studio course fee will be assessed.*

Required Course Materials: NONE

Technology Requirements for Course: You will need to use a computer and associated software to analysis, compile, draft and edit your coursework. You should also have access to a modern up-to-date computer with a high-speed internet connection, and a portable external hard-drive to store and back-up all of your necessary files. In general, your technology requirements in this course do go beyond using UTC email, Blackboard, and your mobile phone.

Technology Skills Required for Course: This is a high-5000 level science majors course and does build upon your prerequisite course work and the skills that you have mastered in life and those underclassman courses.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements:

General Expectations: In a graduate level course, students will be expected to perform at a higher level than would be expected in an undergraduate course. Where a student in an undergraduate course would be expected to generally gain knowledge and comprehend its meaning with minimal to moderate application, as a graduate student in this class you will be expected to critically analyze information in the context of real-life scenarios. You are expected to function as a self-directed learner and researcher. Each student will be responsible for being a leader and contributing to the class discussion.

Course Grading

GRADING: COURSE WILL BE BASED ON 150 POINTS for ESC 5700.

8/24

Welcome to ESC and UTC!
Syllabus and Course Overview.

Reflections (How are you? Who are you? Why are you here? Why ESC? Why UTC?)

250 words for each; 5 points each, **Due 8/31**)

25 points

8/31

Academic Policies (<http://catalog.utc.edu/content.php?catoid=24&navoid=817>),
Graduate Catalog (<http://catalog.utc.edu/index.php?catoid=24>),

UTC Graduate School Forms (<https://www.utc.edu/graduate-school/student-resources/forms.php>),

IACUC (<https://www.utc.edu/research-integrity/institutional-animal-care-use-committee/iacuc-committee.php>)
IRB

9/7

Master's in Environmental Science Program (<https://www.utc.edu/biology-geology-environmental-science/graduate/about-the-program.php>)

ESC MS Forms (<https://www.utc.edu/biology-geology-environmental-science/graduate/graduate-student-forms.php>)
(Capstone Form **Due 9/14; 10 points**),

ESC Handbook

9/14

Continued from previous, plus

Know your Graduate School Calendar! <https://www.utc.edu/research/graduate-school/student-resources/thesis-and-dissertation>
Important Academic Calendars and Schedules!

Due 9/21 (w/discussion)

Forward Thinking-

What is Graduate School? Who is it for and why go?

What do you get from going to Graduate School? What are the challenges of Graduate School?

How do you overcome these challenges? (250 words for each; 5 points each)

25 points

The University of Tennessee at Chattanooga

Due 9/28 but continued on 10/05 (w/discussion)

Share with your Classmates-

12 Environmental Science Dream Jobs that Require a Master's Degree!
(Tell me about these jobs! Rank these jobs from High (the Dreamiest) to Low (the least Dreamy) and justify your rankings!

Remember to research these positions (by geography, KSA, organization, etc.)!

(1000 words total)

20 points

Due 10/12 but continued on 10/19

Using the previous list of your 12 Dream Jobs...please reduce this list to your top **6** job prospects!
(Why would these programs be of Interest to you the potential candidate? How and why?

What strengths do you bring to each position? How and why?
What are your weaknesses for each position?

(1000 words total)

20 points

10/26

What are your deficiencies?

Due 11/02

From your work that you submitted on 10/26. Please address the following-

During your tenure at UTC, how will you use this time to overcome your “deficiencies?”

10 points

Due 11/09

Discuss the job search process. What are the steps? FAQs?

10 points

Due 11/16

Submit a copy of your current resume, and solicit feedback from your classmates.

20 points

11/23 No Class

Due 11/30

Submit a revised copy of your resume; recap & Q/A

10 points

Graduate Grading SCALE – ESC 5700
A= 135 - 150
B= 120 – 134.999
<i>F= 119.999 and Below</i>

Course Grading Policy: This course uses a modified collegiate straight scale, and integrates Self-Evaluation, Peer-Evaluation, Reflective Practices and Journaling.

Instructor Grading and Feedback Response Time: The grading follows a truncated collegiate straight scale, and feedback is contingent on the length of the assignment. In other words, if you are given weeks to work on an assignment do not expect to get it back the next day. Most assignments are returned within 7-10 business days.

Course and Institutional Policies

Late/Missing Work Policy: You cannot make up assignments in any form. These assignments are due on designated days but see schedule. A missed assignment counts as a ZERO, meaning that you must attend class and adhere to the schedule to receive any credit. TAKE HOME MESSAGE: Come to class, don't miss assignments.

Electronic Device Usage: I would like to discourage distractions during our meeting times. This course cannot be filmed or recorded electronically without the prior and written consent of the instructor. If you plan to use a computer or tablet to take notes, then you must sit in the row along the back wall of the classroom. Use of electronic cigarettes is prohibited. Please silence all mobile communication devices (e.g., cell or smart phones, etc.) and store them in your bag. They should remain stored for the entire class period. These devices should not emit an audible noise during class time. If a pager, cellular telephone or other electronic device emits any audible noise during the class I will deduct 10 points for each incident. In short, any student (or the entire class) will be penalized ten (10) points for each incident involving disruption of the class.

Statement on Disruptive Students in the Classroom: The University will not tolerate disorderly or disruptive conduct which substantially threatens, harms, or interferes with university personnel or orderly university processes and functions. A faculty member may require a student to leave the classroom when his/her behavior disrupts the learning environment of the class. A student found responsible for disruptive behavior in the classroom may be administratively withdrawn from the course. I hope to keep you excited and engaged in class so that your interest doesn't wander. But I must ask that you avoid distractions during our class meetings such as the use of cell phones, texting, instant messaging, pager beeping, or the use of other unapproved electronic devices.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: *With the exception of school holidays, attendance is mandatory! You are responsible for the material covered whether you are in attendance or not, including any announcements made during class.*

Course Participation/Contribution: In short, you are expected to attend class and actually speak up and make a contribution to the course in the form of relevant discussion on a regular basis.

The University of Tennessee at Chattanooga

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Please review to the Campus Syllabus for other policies and procedures (shared as a separate document).

Course Calendar/Schedule: See Tentative Lecture Schedule Below

Week	Dates	Week When Topic is Due
1	8/24	Welcome, Overview
2	8/31	Academic Policies
3	9/7	ESC MS Program
4	9/14	Graduate School & Academic Calendars
5	9/21	Forward Thinking
6	9/28	Twelve Dream Jobs
7	10/5	Twelve Dream Jobs, Continued
8	10/12	Six Dream Jobs
9	10/19	Six Dream Jobs, Continued
10	10/26	Identifying your deficiencies
11	10/26	Overcoming your deficiencies
12	11/9	Job Search Process
13	11/16	Draft Resume
14	11/23	No Class
15	11/30	Final Resume; Recap & Q/A

Biodiversity and Natural Resource

Conservation Spring 2020

ESC 5050, 20014, Online, 3 Credits

Instructor: David A. Aborn

Email and Phone Number: david-aborn@utc.edu, 425-5236

Office Hours and Location: 232F Holt Hall, Tu 1-2, W 11-12, R 1-2, or by appointment

Course Meeting Days, Times, and Location: N/A

Course Catalog Description: Study of the ecological principles of natural resources conservation and management, using a problem-solving approach. Scientific assessment of the condition of ecosystems and appropriate management strategies.

Course Pre/Co Requisites: Prerequisite: None

Course Student Learning Outcomes:

1. Understand the principles of ecosystem management
2. Understand the concept and methodology of adaptive management
3. Understand the role of stakeholders in both the creation and resolution of ecosystem degradation
4. Be able to apply the principles of ecosystem management, adaptive management, and stakeholder involvement by writing an ecosystem management plan

Course Fees: None required

Required Course Materials: Meffe, G. K., L. A. Nielson, R. L. Knight, and D. A. Schenborn. 2002. Ecosystem Management: adaptive, community-based conservation. Island Press, Washington, DC

Technology Requirements for Course: None

Technology Skills Required for Course: Canvas

Technology Support: If you have problems with your UTC email account or with Canvas, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements: Your grade will be based on the number of points attained on three lecture exams. The format of the exams will be short answer and discussion questions. The discussion questions will take a problem-based approach, where you will have to

The University of Tennessee at Chattanooga take the knowledge you have learned (hopefully) and apply it to a real-world or hypothetical situation. In addition, there will be a series of 10-point exercises for you to turn in that will be based on the hypothetical PDQ scenario that can be found in your text. Last, since ecosystem management is a very hands-on process, I will try to give you the opportunity to develop an actual ecosystem management plan.

Course Grading

Course Grading Policy: Grading will be on the standard A-F scale (A = 90-100, B = 80-89, C = 70-79, D = 60-69, F = 59 or below)

Instructor Grading and Feedback Response Time: I will strive to get all exams and assignments graded and grades posted within 1 week of the exam or assignment due date.

Course and Institutional Policies

COVID-19 Absence Policy:

If you are positive for COVID-19; symptomatic for COVID-19; have been exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; have potentially been exposed to a known case of COVID-19 / someone positive for COVID-19; or have traveled internationally or via cruise ship you **must complete the [COVID-19 Notification form](#)**. You will not be penalized for COVID-19 absences or late course assessments due to a COVID-19 related illness unless you are unable to complete course learning outcomes. I will work with you to identify ways to complete course requirements.

You must, if you are asymptomatic or if your symptoms do not interfere with your ability to participate in the course, **continue to participate in the online course**.

If COVID-19 related illness results in any missed course work, **you must contact me within 48 hours of recovering to plan make-up work**. Makeup work must be completed according to the plan devised by me in coordination with you. It remains your responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. But please realize that class will continue, and you may find yourself in the situation where you are unable to complete all work by the end of the semester. In such a case, you should consider a late withdrawal or an incomplete grade. Please contact the Records Office (423-425-4416) to learn more about the late withdrawal process.

If you have COVID-19 disability related risk factors that may affect attendance, you are strongly encouraged to register with the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If you believe I have not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, you have the right to appeal according to UTC's [Policies and Procedures for Student Complaints](#) by filling out the [Student Complaint Form](#) and submitting to the Office of the Dean of Students.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#). Even though the exams will be given online, **YOU ARE STILL EXPECTED TO FOLLOW THE HONOR CODE PLEDGE! YOU ARE NOT TO USE YOUR TEXTBOOK, NOTES, ONLINE MATERIALS, OR SEEK HELP FROM OTHERS! ANY EVIDENCE OF CHEATING WILL RESULT IN THAT PERSON/THOSE PERSONS FAILING THE COURSE!**

Honor Code Pledge: As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity.

Course Attendance Policy: Attendance is your own responsibility. This class is very conceptually oriented and augmented by examples. It is not an easy subject to learn strictly by memorization. On tests, you may be asked to interpret examples not given in class or in the text. Therefore, you may find it difficult to do well if you do not watch my lectures. If you choose not to watch my lectures, that is your decision, and it will be your responsibility to get the information from someone else; I am not going to repeat my lectures for you. There will be a lot of information covered in the course, and it will benefit you to keep up with the lectures and ask questions.

Course Participation/Contribution: Since lecture is online, it will be up to you to watch my recorded lectures; I am not going to check in with you to see if you are keeping up with them. If you have any questions about the material I cover, please do not hesitate to contact me by phone or e-mail.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Course Calendar/Schedule:

Week 1	Introduction; What is ecosystem Management?	Meffe Ch. 1& 2
Week 2	Uncertainty and complexity	Meffe Ch. 3
Week 3	Adaptive management	Meffe Ch. 4
Week 4	Genetic Diversity and management	Meffe Ch. 5
Week 5	EXAM 1	
Week 6	Species, population and community Management	Meffe Ch. 6, 7
Week 7	Landscape-level conservation	Meffe Ch. 8
Week 8	Landscape-level conservation	Meffe Ch. 8
Week 9	EXAM 2	

The University of Tennessee at Chattanooga

Week 10	Managing biodiversity	Meffe Ch. 9
Week 11	Ecological Restoration	
Week 12	Working with people	Meffe Ch. 10
Week 13	Strategic management project evaluation	Meffe Ch. 11 & 12
Week 14	Project evaluation	Meffe Ch. 11 & 12
Week 15	Putting it all together: USFWS video	
Week 16	EXAM 3 6:00-8:00 PM	

This schedule is tentative and subject to change

Mechanisms in the Environment Spring 2022

Department:	Biological, Geological, and Environmental Sciences
Course:	5020
CRN:	20060
Credit:	3 h
Instructor:	Dr. Sean Richards
Office Phone:	423-425-4324
E-mail:	seanrichards.utc@gmail.com
Office Hours:	MWF 10am-12pm, by appointment
Office Location:	319 Holt Hall
Class Schedule:	6:00-8:30pm
Class Location:	Holt 208
Course Description:	Biological and chemical mechanisms that control terrestrial, aquatic, and atmospheric structure and function. Evaluation of mechanisms will include both organismal, ecological, and global perspectives.
Prerequisites:	Must be enrolled in one of the following Programs: MS Environmental Science Must be enrolled in one of the following Levels: Graduate

Course Student Learning Outcomes:

- (1) Students will understand the source and production of environmental pollutants.
- (2) Students will be able to define the importance of physicochemical properties in assessing environmental distribution and fate of contaminants.

- (3) Students will be able to define the importance of physicochemical properties to estimating transport processes such as volatilization, leaching, and runoff of environmental contaminants.
- (4) Students will understand concepts and be able to predict contaminant distributions and movement amongst the various environmental compartments.

Course Fee: Laboratory/studio course fee will not be assessed.

Required Course Materials:

Environmental Chemistry, Baird, 2005, Volume 3 or later.
ISBN: 0716731533

Note: I STRONGLY recommend additional texts, such as: Basic chemistry texts and Dodd, J. S., editor. 1997. The ACS Style Guide, 2nd edition. American Chemical Society, Washington, D.C. I have numerous other texts in my office that are available for you to borrow. Do not consider the required text as your only source of information.

There may be supplemental materials distributed in class.

Technology Requirements for Course: Access to a personal computer.

Technology Skills Required for Course: Ability to check your e'mail daily for communications to and from Dr. Richards; ability to use the internet to access UTC Learn and supplement lecture and text material.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements:

Presentation	13.4%
Manuscript	20.0%
Exams (3 total):	66.6%

Exams will cover material both from lectures and student presentations. The final is comprehensive. Science is an extremely exact, picky, particular discipline. My exam questions and your correct answers will reflect this. Be prepared. You will be challenged with scenarios that ask you to use what you have *learned* to answer the question. Be prepared. You will *not* be asked to just regurgitate information. Be prepared. You will be asked to *apply* your knowledge to unfamiliar settings. Be prepared. At first glance, the test question may seem unfamiliar, *but* if you apply what you have been taught, the answer can be determined. Be prepared. The final is **comprehensive**.

Grading Scale: A= 89.5%-100%
 B= 79.5% – 89.4%
 C= 69.5% – 79.4%
 D= 59.5% - 69.4%
 F= <59.5%

Attendance: Attendance is essential for success in this class. If you miss a class, work with your fellow students to obtain notes for the missed lectures. Only University approved absences will be accepted for missing exams (however, it is strongly discouraged).

Office Hours: DUE TO COVID, ALL OFFICE VISITS ARE VIRTUAL. I am in my office and (or) laboratory often, feel free to drop by any time after 10 am. I will do my best to accommodate a “drop-in”. *But*, the best way to guarantee my undivided attention (and presence) is to schedule an appointment via e’mail. Even if you verbally make an appointment with me, please send an e’mail to confirm.

Ideal Preparation/Prerequisites:

Two semesters of General Chemistry.

As this is a graduate-level course, I expect a minimum comprehension of chemistry terms and reactions. Although General Chemistry is not required to take or excel in this course (many students have been successful), it will be the responsibility of the student to catch up or learn basic chemistry terminology outside of the lecture.

TENTATIVE* Lecture Schedule

		Topic
January	10	Introduction and overview of toxicants, <i>compounds assigned</i>
	17	MLK Holiday, no lecture
	24	Atmospheric Fate and Transport
	31	Atmospheric Fate and Transport
February	7	Atmospheric Fate and Transport
	14	Exam I
	21	Aquatic Fate and Transport
	28	Aquatic Fate and Transport
March	7	Aquatic Fate and Transport
	14	Spring Break, no lecture
	21	Aquatic Fate and Transport (<i>optional Rough Draft due</i>)
	28	Exam II
April	4	Soil Fate and Transport (<i>3 people will present</i>)
	11	Soil Fate and Transport (<i>3 people will present</i>)

	17	Soil Fate and Transport (<i>3 people will present</i>)
	25	Soil Fate and Transport, <i>Last Day of Class, Final draft of manuscript due</i> , (<i>3 people will present</i>)
May		Monday, May 2: 6-8 pm

*This is a very tentative schedule. It is the responsibility of each student to keep track of topics covered each week.

**Exams are permanently retained by Dr. Richards, but may be viewed and reviewed at anytime.

Course Grading Policy: All exams will be graded for accuracy of answer and correct grammar.

Instructor Grading and Feedback Response Time: Because of the class size, length of exam, expected detail of correct answer, it may take up to 10 business days to return the exams.

Course and Institutional Policies

Late/Missing Work Policy: Attendance is essential for success in this class. If you miss a class, work with your fellow students to obtain notes for the missed lectures. Only University approved absences will be accepted for missing exams (however, it is strongly discouraged).

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: Attendance is essential for success in this class. If you miss a class, work with your fellow students to obtain notes for the missed lectures. Only University approved absences will be accepted for missing exams (however, it is strongly discouraged and frowned upon).

Course Participation/Contribution: Participation and contribution are encouraged but not mandatory.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Policy Statements:

Faculty members retain their traditional authority to take disciplinary action in the event of academic misconduct. Acts of academic misconduct for which students are subject to sanctions include, without limitation, plagiarism, cheating, failure or refusal to follow clinical practice standards, falsifying or manufacturing scientific or scholarly experiments or research, and soliciting, aiding, abetting, concealing, or attempting such acts.

Plagiarism is defined as including, without limitation, the act of representing the work of another as one's own. Plagiarism may consist of copying, paraphrasing, or otherwise using written or oral work of another without proper acknowledgment of the source or presenting oral or written material prepared by another as one's own.

You should realize that I am VERY familiar with much of the research out there (and many times know the scientists personally). I also have electronic copies of all ESC 5020 student reviews that have come before you...

Students who violate the Honor Code of the University (a.k.a. cheat) WILL receive an "F" for the course and will be subject to additional punishment according to the rules and regulations of UTC for misconduct. No exceptions will be given for a violation.

ADA STATEMENT: Attention: If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or a special accommodation in this class or any other class, call the Disability Resource Center (DRC) at 425-4006 or come by the office, 102 Frist Hall <http://www.utc.edu/disability-resource-center/>.

If you find that personal problems, career indecision, study and time management difficulties, etc. are adversely affecting your successful progress at UTC, please contact the Counseling and Career Planning Center at 425-4438 or <http://www.utc.edu/counseling-personal-development-center/index.php>.

Review-Manuscript and Platform Presentation Instructions

Each person will write a scientific review of a compound or class of compounds. Your information will be gathered from peer-reviewed, primary literature. Books are also a useful source of information, but these are not often peer-reviewed, nor are they primary literature. Use books sparingly. The internet may be used – sparingly. You cannot use webpages for more than 5% of your references. You cannot use review articles, books, or other sources of secondary literature for more than 10% of your sources. Your task is to do a review of data, not a review of review documents. Quality webpages cite the original work, so go to that source for your information. Citation of webpages will be highly scrutinized. It is in your best interest to use only peer-reviewed literature (which books, reviews, ATSDR reports,

and EPA reviews are not). Be aware! You may have to gain most of your journal articles through interlibrary loan. This process may take 2-3 weeks. I strongly suggest immediately getting started on the process of locating articles and ordering them through the library. Please consider yourself advised; the excuse of: “my articles haven’t arrived, yet” will not be accepted.

You must always use the primary source of information. Citing review articles or ATSDR or EPA reports is rarely acceptable as they are not the source of the data. Go to the source that the reviewer or reviewing body uses - always.

The following manuscript guideline is not all-inclusive; you will undoubtedly find additional information during your research. The following topics should be covered in your manuscript. Each underlined topic should be a major heading with each point included as a sub-topic. Use heading and sub-headings – this will help you organize your thoughts.

Abstract: A summary of your manuscript. In 300 words or less, provide a summary of the entire manuscript (Hint, this is often the last portion to be written).

Introduction: A review of “who, what, why, when, where, and how” of your compound. For Example: Who/What produces it? When is it produced? What is the significance of this compound? Why is there reason for concern of the fate and transport (toxicity)? You should provide a one to two paragraph overall description of where it comes from and where it goes from release on its way to the sink. In other words, provide a layman’s description of the entire path the compound takes after release and on the way to the sink. Throughout the documents, all figures and tables must have captions and references for information that is not original.

Compound Properties: Collect chemical-physical parameters for your compound. Parameters of interest include, but are not limited to: structure, molecular weight, melting point, boiling point, partition coefficients (K_{ow}, K_p, K_{oc}, etc.), water solubility, vapor pressure, and Henry’s Law constant, etc. Report these data in tabular form, but include the compound properties in the description and discussion of the compound. In other words, you need to relate to the reader what these parameters mean in real-world terms. Find half-life information for your compound for as many media (soils, water, air) as possible. Record compound properties in tabular form, but also include these values in the text as part of your introduction and discussion. Finally, discuss the relevance of these properties and how they contribute to their fate and transport.

Data Review: A *specific* discussion of “who, what, why, when, where, and how” of your compound. For Example: Who has done the majority of the research concerning fate and transport (this is a minor point, but may be relevant in some cases)? What is (are) the major metabolite(s)? Where does it partition? When is it transported / partitioned? Why does it partition in specific sinks? How does it transport / break down? What type of chemical interactions does it undergo? Why? What kinds of experiments were used to determine fate and transport (specific examples)? What concentrations have been found? What type of analytical machine/technique was used to determine the concentrations? How sensitive was their methodology (i.e., what was their detection limit)?

Case studies for each medium: I want specific, detailed, and described examples of research conducted to determine fate and transport. Dedicate a paragraph to descriptions of one group’s research and findings into the fate and transport of your compound. Do this at least twice for EACH environmental compartment (air, water, soil). Indicate the information not available in the literature (but don’t give up easily, I know

what's out there!). Determine the source for your compound, its primary uses (if any), and likely pathway of entry into the environment. Based on your information and acquired knowledge, discuss the primary sink for the compound and its primary metabolites.

Discuss which process most affects the compound's fate and transport through the environment. Indicate which data were not present in the literature. State which processes do not apply to your compound and why.

Describe methods used to remove the compound from the primary sink (i.e., remediation techniques). Bioaccumulation should be addressed, but toxicological responses are not the focus of this manuscript. Describe the mode of action (the introduction would be a good place to do this), but do not devote more than a paragraph to the toxicity of the parent compound or its metabolites.

Summary and Conclusions: Similar in nature to the Abstract, but whereas the Abstract simply states the facts associated with fate and transport of the compound, the Summary and Conclusions sections should *briefly* list the reasons why the fate and transport occurs. You should provide a summary that condenses all of the information contained in your data review (including the citations). This section also requires some original thinking by the writer. Give some informed opinions about what you have found in your review of the data and hypothesize about data gaps.

As this is a graduate-level science course, I expect all of you to be able write a comprehensive science-based review manuscript, following standard formats. If you are unsure about how to write a scientific review, I suggest visiting me, reading a couple of review manuscripts, and also referencing numerous writing guides. One such guide is the American Chemical Society's (ACS) publication, the ACS Style Guide (1997). That publication describes a review in the following manner:

"Reviews integrate, correlate, and evaluate results from published literature on a particular subject. They seldom report new experimental findings. Effective review articles have a well-defined theme, are usually critical, and present novel theoretical interpretations. Ordinarily, they do not give experimental details, but in special cases (as when a technique is of central interest), experimental procedures may be included. An important function of reviews is to serve as a guide to the original literature; for this reason, accuracy and completeness of references cited are essential. Reviews critically analyze the literature.

A good review collects a large amount of related information in one place, and therefore, helps the reader get an overall picture of a topic. At the same time, a review provides the reader with references to primary sources and possibly to other reviews. The list of references may be comprehensive or selective, depending on the intentions of the author and the amount of literature on the topic under review.

Reviews serve both "historical" and "contemporary" functions. The historical functions contribute to the development of science, whereas the contemporary functions benefit the individual scientists. Historical functions include the role of the review journal in providing a second level of peer evaluation. That is, the review journal takes the refereeing process one step further by recording the significance of a contribution. Other historical functions include the achievement of a unified picture of the state of knowledge on a topic, the compaction of knowledge by leaving out many of the details that are essential in the primary literature, and the suggestion of new areas for research. The individual scientist benefits from the contemporary

functions in a number of ways: The scientist can concentrate his or her energies on reading and studying the most worthwhile contributions on a topic; timely reviews can help the scientist keep current on topics that are not at the core of his or her research interests; a review paper may help ensure that a scientist has not missed anything significant in the normal course of keeping up with the primary literature; the science student may be educated by a good review."

Below are a couple of sources to guide you through proper writing, figure, table, and caption development and citation techniques, however, there are many more.

<http://pubs.acs.org/books/references.shtml>

http://owl.english.purdue.edu/handouts/research/r_mla.html#Electronic

Dodd, J. S., editor. 1997. The ACS Style Guide, 2nd edition. American Chemical Society, Washington, D.C.

Below are some electronic databases at UTC that may be of use:

- Web of Science (best)
- Agricola
- Basic Biosis
- Biology Digest
- Toxline

The final manuscript should be 10-15 pages in length (of text), 12-point font, 1.5-spaced with 1.0-inch margins. Refer to The ACS Style Guide (Dodd, 1997) on how the manuscript should be composed, figures and table formatted, and the references cited. ***However, I want you to use the Author-Date format for your in-text citations. The ability to follow directions is imperative and will greatly influence your final score.***

I will create a place at UTC Learn for you to upload your Mechanisms review . Under Course Materials, you will see a heading entitled Mechanisms Compound Review. The manuscripts are due by 5pm on the last day of class. You will need to upload your manuscript there and click on: I agree to submit my paper(s) to the [Global Reference Database](#). I also want you to email me a copy of your manuscript.

The platform-style electronic presentation is 15 minutes with 5 minutes for questions. Per normal conference proceedings, you will be strictly regulated (i.e., asked to sit down if you are not completed within 17 minutes). You will also be penalized if the talk is less than 13 minutes. You must provided a handout with comprehensive notes for your presentation (much more comprehensive than just copies of your slides). Points will be deducted for deviations from these guidelines. Please see me if you are unfamiliar with electronic presentations software (e.g., Microsoft Powerpoint). Due to time constraints, you will not be able to cover all of the material presented in your manuscript. I leave the amount of material you cover to your discretion. However, the presentation **MUST** include the following points: Is the compound lipophilic or hydrophilic? General structure and characteristics of that structure. Primary Sink. How it gets from the source to the sink. Primary Use/Source. Class of Compound. Is it still produced? If so, where and how (generally speaking).

Cited Reference:

Dodd, J.S. Ed.; *The ACS Style Guide*; American Chemical Society: Washington, DC, 1997; 264 pp. ISBN: 0841234620

Compound Assignments:Compound or Class of Compound

Aldrin
Arsenic
Atrazine
Benzo(a)pyrene

Bisphenol A
Chromium
Gadolinium
Carbaryl
Chlorpyrifos
o,p'-DDT
Glyphosate
Lead
Mercury
Methoxychlor
MTBE
Nanoparticles
Pentachlorophenol
Perchlorate
Perfluro Chemicals
Polybrominated Diphenyl Ethers
Polychlorinated Biphenyls
Pharmaceuticals or Personal Care
Products (choose one class)
Chlorinated Disinfectant By-products
TCDD
Trichloroethylene
Trinitrotoluene
Trinitrofluorine
Other: Student's suggestion

The University of Tennessee at Chattanooga
Geographic Information Systems

Spring 2022

**Biology, Geology, and Environmental Science, ESC 5660/5660L, 24128/24129, Face-to-Face Lecture
& Laboratory, 3 credit hours**

Instructor: Thomas P. Wilson, Ph.D., GISP, UC Foundation Professor

Email and Phone Number: Thomas-wilson@utc.edu, 423-425-4713(Office) or 423-425-4341(BGE Main Office, Holt Hall 215)

Office Hours and Location: 1100-1150 MW, Holt Hall 306A

Course Meeting Days, Times, and Location: MW 1200-1250, Holt Hall 125; M 1400-1550, SIMC 102

Course Catalog Description: Introduction to fundamental principles of geographic information systems (GIS). Applications, data structures and basic functions of GIS. GIS computer programs are used to demonstrate basic GIS functions. Lecture 2 hours, laboratory 2 hours.

Course Pre/Co Requisites: Prerequisite: Department Head approval. Corequisite: ESC 5660L.

Course Student Learning Outcomes: 1. Students are able to formulate appropriate objectives and/or hypotheses, and use appropriate geospatial tools and methodologies, to collect, analyze, and interpret data within the context of environmental research. 2. Students are able to retrieve information relevant to geospatial & environmental research from the scientific literature and are able to evaluate the literature critically. 3. Students are able to conduct themselves in a professional manner while communicating geospatial & environmental information in both oral and written formats.

Course Fees: *Laboratory/studio course fee will be assessed. Check with the Bursar's Office on costs.*

Required Course Materials: Access to a computer and the internet.

Technology Requirements for Course: You will need to use a computer and associated software to analysis, compile, draft and edit your coursework. You should also have access to a modern up-to-date computer with a high-speed internet connection, and a portable external hard drive to store and back-up all of your necessary data and associated files. You should be willing to adequately navigate technology and computers by being understand the process involved in partitioning hard drives, networking connections, executing file transfer protocols, managing databases, extracting files with correct path destinations, scripting using JAVA and Python (or similar computer software). So, your technology requirements in this course do go beyond using UTC email, Blackboard, and your mobile phone.

Technology Skills Required for Course: This is a 5000 level science majors course and does build upon your prerequisite course work and the skills that you have mastered in those underclassman courses.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

The University of Tennessee at Chattanooga

COVID-19 Absence Policy: COVID Absences Students must complete the COVID-19 Notification form if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support.

If COVID-19 related illness or quarantine results in any missed classes or course work, students must contact the instructor within 48 hours of completing the COVID-19 Notification form to plan make-up classes and course work. Where possible, faculty will work with students to identify ways to complete course requirements but are not required to change or offer additional modalities. Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. Please realize that class will continue, and students may find themselves in the situation where they are unable to complete work in a timely manner. In such a case, students may consider requesting an Exception to the Withdrawal Deadline or an incomplete grade. Please contact the Office of the University Registrar (423-425-4416) to learn more about the late withdrawal process. Some departments may have department bylaws or student handbook requirements that specify a limit to the number of classes or amount of work that can be missed. In these cases, the department requirements take precedence.

If students have COVID-19 disability-related risk factors that may indicate a need for additional academic accommodations, students are strongly encouraged to register with and/or contact the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's [General Student Grievance \(Complaint\) Procedure](#) by filling out the [Student Complaint Form](#) and submitting to the Office of the Dean of Students.

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, [submit a request](#) (<https://new.utc.edu/information-technology/learning-from-home>) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the [Disability Resource Center](#) (<https://www.utc.edu/disability-resource-center/index.php>) at 423-425-4006 or email DRC@utc.edu.

Course Assessments and Requirements:

General Expectations (A-E): **General expectations:** Advanced Applications of Remote Sensing and GIS is an upper-level to graduate level course and as such students will be expected to perform at a higher level than would be expected in an introductory undergraduate course. Where a student in an introductory undergraduate course would be expected to generally gain knowledge and comprehend its meaning with

minimal to moderate application, as an upper-level student in this class you will be expected to analyze scenarios and real-life case studies with the goal of synthesizing information obtain in this course, other related courses and life experiences to provide cogent evaluation and recommendations that would result in positive, beneficial impact regarding an issue.

Course Objectives: In this class we will be involved with one of the most exciting and fastest growing fields related to geography. Integrated Geospatial Sciences are revolutionizing the decision-making capabilities of resource managers and planners by giving a wealth of data at their fingertips. This class is designed to help you: Comprehend the theories behind geographic information systems and remote sensing, including their usefulness; Understand how to use GIS as a planning tool; Gain practical “hands-on” experience in manipulating and analyzing data in a GIS; Master GIS concepts as part of an integrated Geospatial Sciences Framework; During lecture we will talk about general theory behind GIS concepts, discuss readings and assignments, have demonstrations on computer techniques, and troubleshoot problems from assignments. Therefore, you will be asked to participate in and lead discussions.

Reading assignments & Journal Briefs: Not only must you read appropriate text assignments, but literature in trade and scholar journals must be read and used in class discussions, examinations, and special projects and /or reports. Examinations will be primarily essay requiring the student to write lucid arguments and defenses for answers. Rote recall of textbook or journal reading assignments as responses for examination essays may be consider satisfactory but not evident of the higher order learning outcomes expected of students in this course. **Design Your Own Geospatial Study** – This semester, you will design your own geospatial study. Your proposal must integrate the geospatial sciences (i.e., GIS and Remote Sensing) to demonstrate your knowledge of the core areas of environmental science (i.e., including ecology, survey methodology, environmental resources, environmental law and policy, and environmental ethics) as they exemplify the interdisciplinary nature of the field. In short, you must follow the scientific method and be cautious of data/knowledge gaps, sample size, procedures/methods and bias/inconsistencies. Please clearly state your objectives, outline your methods and materials, and provide a short description of your projected outcomes, timeline and budget. You are required to make your project feasible and be geospatially and environmentally relevant. You will provide me with a typed document not to exceed 500 words about your geospatial study. In addition, to the 500 word essay, you must also include a flow chart that outlines your thought process on how you will carry out this proposed study and you must have 10 references that tie GIS & Remote Sensing to the 5 core areas of Environmental Science (Due March 7th).

ESRI GIS Modules, Labs, Reports & Assignments: In the laboratory portion of this course, students are expected to self-instruct and in some cases use a team approach in mastering the material and completing assignments. The instructor and laboratory staff are available and will provide guidance as deemed necessary. However, unlike an introductory undergraduate lab where the student is guided mostly by the instructor to specific information or in conducting a lab experiment, as an advanced geospatial science student you are expected to function as a self-directed learner and researcher. Each student will be responsible for being a team leader and mentoring a group of peers during the semester. Lab reports and assignments must be well-written and have a comprehensive analysis provided by each student.

Course Grading

GRADING: COURSE WILL BE BASED ON 700 POINTS for ESC 5660.

Two written lecture exams @ 100 points each	200 points
Comprehensive laboratory practical exam @ 100 points	100 points
Ten laboratory exercises/modules @ 10 points each	100 points*
Four journal briefs @ 25 points each	100 points
GIS Grant Proposal (see me for details)	100 points
GIS Grant Proposal Presentation (see me for details)	50 points
Design a GIS Lecture in Powerpoint	25 points
Design a GIS Laboratory in ArcGIS	25 points
(*) Must include at least two modules from each transcript sessions	

Exams will not be curved. In other words the points that you earned reflect your score. Your letter grade will be determined by a straight-collegiate scale at the close of the semester (**ABSOLUTELY NO EXCEPTIONS**).

Graduate Grading SCALE – ESC 5660
A= 630 - 700
B= 560 – 629.999
<i>F= 559.99 and Below</i>

Course Grading Policy: This course uses a collegiate straight scale.

JOURNAL BRIEFS: Staying abreast of recently published literature is essential for becoming knowledgeable in the rapidly changing field of GIS. Besides you assigned readings, you are expected to peruse through recent books, journals or technical papers related to GIS. At predetermined intervals throughout the semester, you will be required to turn in a typed journal brief on a particular aspect of GIS research or application. With each bibliographic reference, the student will submit a typed paragraph summarizing the information contained in the article. In addition, each student must complete a single summary table for their collection of research articles. Note: I will not accept duplicate research articles...so once an article has been used it cannot be submitted again during the semester. The specific details for the paragraph summary are outlined below. Instructions for Journal Briefs You have 5 paper assignments due this semester. You are to find a published journal article (since 1980) from a science journal (no magazine articles allowed) that focus on Landscape/Spatial Ecology using Drones to assessing wildlife and/or habitats. You must read this article, obtain background information on the application, ecosystem and species studied (etc.), evaluate the article, and provide me a copy of the journal article, your electronic excel table, and your paper by the **due date (1/24, 1/31, 2/14, 2/28)**. Note: Journal Briefs are not a reproduction of the author's abstract!! Finding papers: You cannot use any of the journal articles cited in your chosen GIS textbooks or in their Bibliographies. Additionally, each of your journal articles should preferably be about different issues, species, techniques, ecosystems, or problems, etc. The papers must be on the geospatial aspects of Landscapes/Spatial Ecology/Urban Planning/Human

The University of Tennessee at Chattanooga

Health/Transportation/Business and should involve some sort of hypothesis testing or problem solving. To find an article you can look through the science and geography journals in the library. However, the best way to search for an article is to use one of the library databases. Please visit the library web page for further information on how to use the databases, and how to request journal articles that are not in our library collection. Because you are interested in a particular assessment tool, you may want to look at the journals dedicated to these concepts. Also, look in Geo Info Systems, GIS World, Cartographica, Cartography & GIS, Photogrammetric Engineering and Remote Sensing, and ARC user. You might find good papers using Drones in Wildlife Ecology journals, such as, Ecology, and Journal of Wildlife Management, etc. You might find it helpful to browse the contents of journals in addition to or instead of doing big online Abstract search. Many journals now maintain home pages where you can browse the tables of contents of current and recent issues. Some even let you download copies, although most do not unless you have a membership. The UTC library web page has a section devoted to electronic journals with links to many of the journals home pages. Content of your papers: You should address, in prose format, the following questions:

1. What is the question being addressed?
2. What is the functional group being studied?
3. What technique(s) were used?
4. Was the sampling design appropriate and/ or adequate for the question being addressed? Why or why not?
5. Was the statistical analysis appropriate? Explain!
6. Were any useful methods developed that could be adapted to others research? Any new analytical tests or analyzing the data? If so, do the authors provide software for others to use?
7. What were the finding and conclusions? Were these significant? If so, why or why not?
8. What was your favorite part of this study? What was your least favorite part?

Format of your papers: Papers must be typed and laser printed on decent quality paper, paper size = 8.5 x 11, single line spacing, left, right, top, and bottom margins = 1", and printed on one side of the paper only. Papers must be at 1 page and cannot exceed 2 pages. Put your name at the top of the first page, followed by the title of your journal article. Staple your 1-2 page paper and the journal article together. Do not use report covers or page titles please. Please include a PDF of your article(s). Format of your Summary Table: Tables must be formatted electronically using Microsoft Excel. Your table headings should minimally include those indicated in the sample excel file (please see me) but you should include additional fields.

Instructor Grading and Feedback Response Time: The grading follows a truncated collegiate straight scale, and feedback is contingent on the length of the assignment. In other words, if you are given weeks to work on an assignment do not expect to get it back the next day. Most assignments are returned within 7-10 **business days**.

Course and Institutional Policies

Late/Missing Work Policy: You cannot make up assignments in the form of field trips, pop quizzes, projects, participation, or exams. These assignments are due on designated days but see

The University of Tennessee at Chattanooga
schedule. A missed assignment counts as a ZERO, meaning that you must attend class and adhere to the schedule to receive any credit. TAKE HOME MESSAGE: Come to class, don't miss assignments.

Electronic Device Usage: I would like to discourage distractions during our meeting times. This course cannot be filmed or recorded electronically without the prior and written consent of the instructor. If you plan to use a computer or tablet to take notes, then you must sit in the row along the back wall of the classroom. Use of electronic cigarettes is prohibited. Please silence all mobile communication devices (e.g., cell or smart phones, etc.) and store them in your bag. They should remain stored for the entire class period. These devices should not emit an audible noise during class time. If a pager, cellular telephone or other electronic device emits any audible noise during the class I will deduct 10 points for each incident. In short, any student (or the entire class) will be penalized ten (10) points for each incident involving disruption of the class.

Statement on Disruptive Students in the Classroom: The University will not tolerate disorderly or disruptive conduct which substantially threatens, harms, or interferes with university personnel or orderly university processes and functions. A faculty member may require a student to leave the class room when his/her behavior disrupts the learning environment of the class. A student found responsible for disruptive behavior in the classroom may be administratively withdrawn from the course. I hope to keep you excited and engaged in class so that your interest doesn't wander. But I must ask that you avoid distractions during our class meetings such as the use of cell phones, texting, instant messaging, pager beeping, or the use of other unapproved electronic devices.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: *With the exception of school holidays, attendance is mandatory! You are responsible for the material covered whether you are in attendance or not, including any announcements made during class.*

Course Participation/Contribution: In short, you are expected to attend class and actually speak up and make a contribution to the course in the form of relevant discussion on a regular basis.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

The University of Tennessee at Chattanooga

Course Calendar/Schedule: See Tentative Lecture & Laboratory Schedules Below

Week	Dates	Lecture Topic
1 & 2	1/10 & 18	Introduction, Logistics & Course Outline. GIS Data and Maps 1/17 Holiday- No Classes
3 & 4	1/24 & 31	Managing GIS Data
5 & 6	2/7 & 14	Coordinate Systems
7 & 8	2/21 & 28	Mapping GIS Data
9, 10, & 11	3/7 & 21 3/14 - 20	2/26 Midterm Exam Presenting GIS Data, Attribute Data, Basic Editing SPRING BREAK-NO CLASSES
12 & 13	3/28 & 4/4	Geospatial Data Quality and Analysis- Queries, Joins, Overlays & Geoprocessing Raster Analysis, Functions & Capabilities
14	4/11	Editing & Topology Geodatabases & Metadata
15	4/18	Continued from previous
16	4/25	Graduate Presentations

Final Exam Wednesday, April 27, 2022, from 1030-1230 in Holt Hall 125

The University of Tennessee at Chattanooga

Week	Dates	Laboratory Module or Topic
1	1/10	<u>Beginning GIS- Set 1</u> ArcGIS Pro Tutorial (30 Minutes) – 3 Goals: A geographic information system (GIS) is a way to display and analyze data using maps. In this lesson, you'll learn the basics of ArcGIS Pro, a desktop GIS application. https://www.esri.com/training/catalog/57660c6ebb54adb30c945412/get-started-with-arcgis-pro/ and Lesson Path Below Getting Started with ArcGIS Pro (for ArcMap users only; 5.5 hours) - 4 Goals: Learn the essential concepts that you need to jumpstart your productivity with ArcGIS Pro. This course introduces the ribbon-style interface, project-based organization, key capabilities, and ArcGIS Pro terminology. https://www.esri.com/training/catalog/57630435851d31e02a43f007/getting-started-with-arcgis-pro/ or ArcGIS Fundamentals (7.5 hours)- 3 Goals: ArcGIS combines the science of geography with powerful GIS technology to help you make smarter decisions. Discover how to use maps to explore data in new ways and gain deeper understanding. Learn how to share these insights and collaborate with others through web maps and apps, all built with ArcGIS. https://www.esri.com/training/catalog/618ac4474a893555070a7101/arcgis-fundamentals/
2	1/17	<u>MLK Holiday NO CLASSES</u>
3	1/24	<u>Continue with your training... Getting Started with GIS (see above) with 5 exercises.</u>
4	<u>1/31*</u>	<u>All Modules and Exercises Due 1/31*</u>
5	2/7	<u>Beginning GIS- Set 2</u> Getting Started with Data Management (1.25 hours) with 2 goals. High-quality GIS analysis requires high-quality GIS data. But what makes GIS data unique? Explore how GIS data is structured, stored, and accessed in this entry-level course. https://www.esri.com/training/catalog/5c9a7395190cf23eac62a998/getting-started-with-data-management/ and Getting Started with Mapping and Visualization (1.25 hours) with 2 goals. In this course, you will explore 2D and 3D information products that you can create using ArcGIS. You will learn how to identify and choose the best information product for your audience and needs. https://www.esri.com/training/catalog/5c9a7354190cf23eac62a92f/getting-started-with-mapping-and-visualization/ and Getting Started with Spatial Analysis (1.25 hours) with 2 goals. Spatial analysis helps you to understand your world. Explore how the six categories of spatial analysis can help you answer geographic questions. Navigate these questions using the spatial analysis workflow and learn how to apply it to your own projects. https://www.esri.com/training/catalog/5bca58f8f77b99238f845e1c/getting-started-with-spatial-analysis/
6	2/14	
7	<u>2/21*</u>	
8	2/28	<u>Above Modules/Exercises are Due 2/21*</u> <u>Beginning GIS- Set 3</u>
9	<u>3/7*</u>	Editing Basics in ArcGIS Pro (2 hours) with 2 goals. As a GIS professional, you want to be confident that your data is up to date and accurate. ArcGIS Pro provides editing tools that allow you to update existing features or create new features. Using editing functionality in ArcGIS Pro, you can change the geometry of features or the informational attributes. This course will teach you editing basics and how to use workflows. https://www.esri.com/training/catalog/5a9f11d1c5c7c34872fcc218/editing-basics-in-arcgis-pro/ Getting Started with the Geodatabase (3.5 hours) with 4 goals. The geodatabase is the native data storage format for ArcGIS. Learn about geodatabase components and functionality as well as steps to create and add data to a file geodatabase. This course prepares you for courses that focus on advanced geodatabase components. https://www.esri.com/training/catalog/57630436851d31e02a43f19e/getting-started-with-the-geodatabase/
10	3/14	<u>Above Modules/Exercises are Due 3/7*</u> <u>SPRING BREAK-NO CLASSES</u>

The University of Tennessee at Chattanooga

11	3/21	<u>Intermediate level GIS Modules/Exercises (Due 4/11*):</u> - Building Geoprocessing Models using ArcGIS Pro: https://www.esri.com/training/catalog/57630433851d31e02a43eebc/building-geoprocessing-models-using-arcgis-pro/ - Basics of Geographic Coordinate Systems ArcGIS: https://www.esri.com/training/catalog/57630435851d31e02a43efe7/basics-of-geographic-coordinate-systems/ <u>Advanced level GIS Modules/Exercises (Due 4/18*):</u> 3D Visualization and Analytics Fundamentals: https://www.esri.com/training/catalog/60d1f986b588b75ae084bc59/3d-visualization-and-analytics-fundamentals/ or - Crime Analysis Solution: Cell Phone Analysis: https://www.esri.com/training/catalog/5e8ce8d81fe054449dca1c90/crime-analysis-solution%3A-cell-phone-analysis/ - Basics of Python (ArcGIS): https://www.esri.com/training/catalog/57630436851d31e02a43f13c/python-for-everyone/ - Work Flows using Python: https://www.esri.com/training/catalog/5763042c851d31e02a43ed84/python-scripting-for-geoprocessing-workflows/
12	3/28	
13	4/4	
14 & 15	<u>4/11*</u> & <u>4/18*</u>	
16	<u>4/25</u>	<u>Comprehensive Laboratory Practical (Module 1 through Advanced)</u>
(*) Indicates when ESRI modules and transcript are due. Transcript must be ESRI valid and include all proceeding modules and associated scores. For example, on 1/31 Modules 1-5 due, on 2/21 Modules 6- 10 are due, on 3/7 Modules 11-13 are due, on 4/11 two intermediate modules are due, and on 4/18 two advanced modules are due.		

For access to current ArcPro references please see the following website-

[Esri Documentation | Up-to-date documentation for ArcGIS and more | ArcGIS](#)

For access to older ArcGIS references please see the following website-

[Archive—Links to archived documentation for ArcGIS 10.2 and earlier](#)

For access to an excellent online reference for ArcGIS 10.X please see the following website-

<http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html>

The University of Tennessee at Chattanooga

CASE STUDIES IN ENVIRONMENTAL PROBLEMS

Spring 2023

Department of Biology, Geology, and Environmental Science
ESC 5180, CRN No. 25048, Face-to-Face Course, 3 credit hours

Instructor: John C. Tucker

Email and Phone: John-Tucker@utc.edu; 423-425-4341

Office Hours and Location: Tuesday 3:00-3:50, Wednesday 10:30-11:20, Thursday 3:00-3:50, and by advance appointment, 232K Holt Hall

Course Meeting Days, Time, and Location: T,Th 10:50a.m. - 12:05p.m., Room 229, Holt Hall

Course Catalog Description

In depth study of the application of environmental law and policy to specific environmental problems using the case study method. Course will focus on four factors in each case study: 1) characterize the environment, 2) identify human modification to the environment, 3) examine law and policy responses to modification of the environment, and 4) critique the responses. Examples of potential case studies include South Chattanooga, Tellico Dam, Pigeon River, Florida Everglades, New Jersey Pinelands, Pacific Northwest Forests, and the Brazilian Pantanal.

Course Pre/Co Requisites: None

Course Student Learning Outcomes (SLOs)

After completing this course students will be able to:

1. Demonstrate knowledge of social, economic, and environmental impacts of human activities on natural systems.
2. Demonstrate knowledge of how society responds to degraded natural systems through law and policy.
3. Demonstrate knowledge of scientific, social, economic, policy, and law tools to protect and restore natural systems.
4. Apply law and policy concepts from case studies to resolve real-world and hypothetical scenarios.
5. Research, develop, and present an environmental case study to upper-level undergraduate environmental science students that involves scientific, social, economic, policy, and law issues.

6. Create and administer an interactive capstone exercise that engages upper-level undergraduate environmental science students in critical analysis of scientific, social, economic, policy, and law issues toward resolving an environmental situation.

Required Course Materials

The instructor will post materials on the class Canvas site. The instructor may also provide in class handouts.

Technology Requirements for Course: Computer, CANVAS, internet, email, and possibly Zoom.

Technology/Digital Literacy Skills Required for Course: Ability to use and communicate effectively using the technology listed above (computer, word processing, CANVAS, internet, email, and Zoom).

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Course Assessments and Requirements

The course will examine case history studies of problems in environmental management. Students will explore the role of science, society, law and policy in management and regulation of natural resources and the environment. For each case study we will characterize the environment, identify human modifications to the environment, examine law and policy responses to modification of the environment, and critique the responses. The course requires substantial in-class participation and internet research.

Students must attend class regularly, be prepared to discuss assigned readings and other matters in class, and participate in in-class exercises in order to do well in this course. There will be three examinations. Exam questions may be multiple choice, fill in the blank, short answer, and essay. There will be homework assignments and in-class exercises.

All homework answers and the take home final exam must be typed and turned in online through CANVAS. Assessments include

- **Homework Assignments:** Homework assignments are intended to engage you in the course content and build your critical thinking skills. Homework assignments will be announced in class and on CANVAS at least one week prior to the due date. All homework answers must be typed and turned in online through CANVAS.
 - **Plagiarism - If plagiarism is detected, you will receive a zero for the assignment. If detected a 2nd time, you will fail the course.** To avoid plagiarizing, write using your own words, properly cite your sources, and never copy and paste from the internet or from the work of others.
- **Exams:** There are two exams during the semester. Exam questions may be multiple choice, fill in the blank, short answer, and essay. There is no final exam.
- **In-class Exercises and Class Participation:** There will be several in-class exercises throughout the semester. These will be announced ahead of time. There are no in-class exercise makeups. Class participation includes your attendance and contribution to in-class discussions.
- **Case Study 7:** Graduate students will develop and present to the class a case study concerning a real-world environmental situation. The topic must be approved by Professor Tucker. You

should provide background reading materials to the undergraduate students.

- **Capstone Assignment:** Graduate students will develop and oversee a major in-class exercise near the end of the semester. The capstone exercise may, but is not required to, relate to one or more of the case studies covered in class. You should provide materials and roles for the exercise.
- **Reflection Assignment:** Your essay must be typed and turned in through Canvas.

Your final grade in the class is based on the following components and weights:

2 Exams (20% each)	40%
Homework Assignments	10%
Exercises & Class Participation	10%
Case Study 7	20%
Capstone Assignment	15%
Reflection Assignment	5%
Total	100%

Course Grading

Course Grading Policy: Grades are based upon the three exam scores, homework assignments, in-class quizzes and exercises, and participation in the in-class capstone assignment.

A 90 - 100 points, B 80-89 points, C 70-79 points, D 60-69 points, F 0-59 points

Instructor Grading and Feedback Response Time: Exams will be graded and returned within two weeks of being administered. I will try my best to grade quizzes and homework within 1-1.5 weeks of the due date.

Course and Institutional Policies

Missed/Makeup Exams:

There will be NO EARLY EXAMS OR MAKE UP EXAMS, except under extenuating circumstances as determined by the professor and **ONLY** if you **are granted permission from the professor prior to the exam**. Otherwise, you will earn a zero for missed work.

Late or Missed Assignments:

A zero will be recorded for missed homework assignments and included in final course grade calculation. Late assignments are not allowed without approval of the instructor. There are no exercise makeups.

Student Conduct Policies: Students must comply with UTC's [Honor Code](#) and [Code of Conduct](#).

Honor Code Pledge: As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure

that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity.

Honor Code Violations: Violation of the honor Code will result in an automatic zero on the assignment or exam, an F in the class, and referral to UTC Honor Court.

Course Attendance Policy: You are required to attend face-to-face class meetings and participate in class discussions during class meetings, including the in-class capstone assignment.

Cell Phones & Other Electronic Equipment: Turn off your cell phone or other electronic equipment before you enter class. Sending or receiving text messages or calls is distracting and you will be asked to leave class if you engage in this activity. You may use a laptop to take notes.

Course Participation/Contribution: In the classroom, students are expected to arrive on time to every class and stay until dismissal, ask and answer questions, and keep phones on silent and out of sight. Participation in in-class activities will count toward your final grade. Out of the classroom, students are expected to regularly check the Canvas Announcements and MOCSNet email, read relevant textbook pages, complete all homework assignments, and study a minimum of 6 hours per week. See course assessments and requirements section of this syllabus.

Student Accommodations: If you have accessibility and accommodation requests, contact the [Disability Resource Center](#) at 423-425-4006 or email DRC@utc.edu.

UTC Campus Syllabus: Students must review and comply with all provisions of the UTC Campus Syllabus. The UTC Campus Syllabus is posted in the CANVAS site for this course.

Course Calendar/Schedule:

CASE STUDIES IN ENVIRONMENTAL PROBLEMS COURSE OUTLINE

This outline is subject to change and it is the responsibility of the student to keep informed of changes, new materials, missed content.

Introduction

Course Overview

Tools for environmental protection
Policy Development Approaches

U.S. Institutions and Authority
Sources of Law

Water Pollution and Management

Case Study 1: Intrastate Natural System - The Everglades

Case Study 2: International Natural System - Pantanal and Hidrovia

Case Study 3: Interstate Natural System - Apalachicola/Flint/Chatahoochee System

Biodiversity Conservation

Case Study 4: Commercial Fish and Shrimp Harvests and the Issue of By-Catch in the Southeast

Case Study 5: Cherokee National Forest

Natural System Conservation

Case Study 6: Riparian Habitat Protection- The Wekiva/Econlockhatchee/Tomoka Rivers

Case Study 7: TBA – Developed and presented by Graduate Students

Capstone Exercise

Developed and administered by graduate students.

CASE STUDIES IN ENVIRONMENTAL PROBLEMS

ESC 5180, T,Th 10:50a.m. - 12:05p.m.

Room 229, Holt Hall

DRAFT SCHEDULE (readings will be posted in Canvas)

Wk	Day	Date	Topic
1	T	1/10	Introduction & Background
	Th	1/12	Background
2	T	1/17	<u>Case Study 1</u> : Intrastate Natural System – The Kissimmee/Lake Okeechobee/Everglades (KLOE) System
	Th	1/19	KLOE
3	T	1/24	KLOE
	Th	1/26	KLOE
4	T	1/31	KLOE
	Th	2/2	KLOE
5	T	2/7	<u>Case Study 2</u> : International Natural System - Pantanal and Hidrovia
	Th	2/9	Pantanal
6	T	2/14	Pantanal
	Th	2/16	<u>Case Study 3</u> : Interstate Natural System - Apalachicola/Flint/Chatahoochee System
7	T	2/21	ACF
	Th	2/23	ACF
8	T	2/28	EXAM 1
	Th	3/2	<u>Case Study 4</u> : Commercial Fish and Shrimp Harvests and the Issue of By-Catch in the Southeast
9	T	3/7	Coastal Fisheries
	Th	3/9	Coastal Fisheries

10	T	3/14	HOLIDAY
	Th	3/16	HOLIDAY
11	T	3/21	<u>Case Study 5</u> : Cherokee National Forest and Ruth's Golden Astor
	Th	3/23	Ruth's Golden Astor
12	T	3/28	EXAM 2
	Th	3/30	Case Study 6: Riparian Habitat Protection- The Wekiva/Econlockhatchee/Tomoka Rivers Wekiva River
13	T	4/4	Riparian Habitat
	Th	4/6	Riparian Habitat
14	T	4/11	Riparian Habitat
	Th	4/13	Case Study 7: TBA – Developed & Presented by Graduate Students
15	T	4/18	TBA – Developed & Presented by Graduate Students
	Th	4/20	Capstone Exercise – Developed and Led by Graduate Students
		TBA	Reflection Assignment

This schedule may be adjusted depending upon the progress of the class and student needs.

The University of Tennessee at Chattanooga

Seminar II

Spring 2023

Biology, Geology, and Environmental Science, ESC 5710 (CRN 20870), Face-to-Face Lecture, 1 credit hour

Instructor: Thomas P. Wilson, Ph.D., GISP, UC Foundation Professor

Email and Phone Number: Thomas-wilson@utc.edu, 423-425-4713(Office) or 423-425-4341(BGE Main Office, Holt Hall 215)

Office Hours and Location: TR 1000-1050 and other hours by appointment, Holt Hall 306A

Course Meeting Days, Times, and Location: T 1500-1550, Holt Hall 204

Course Catalog Description: Presentation of programs of current environmental interest by students, faculty, and visiting speakers. Each student will be required to present or take part in discussion of a topic each week. Required during first year in graduate program.

1.000 Credit hours

1.000 Lecture hours

Course Pre/Co Requisites: Prerequisite: Graduate Standing.

Course Student Learning Outcomes: 1. Be able gather, synthesize, and evaluate information pertaining to environmental science and present it in written and oral form; 2. Be able to accurately answer audience questions following an oral presentation; 3. Be able to critique presentations oral presentations given by others.

General Education Statement: *This course is not a general education course!*

Course Fees: *No laboratory/studio course fee will be assessed.*

Required Course Materials: NONE

Technology Requirements for Course: You will need to use a computer and associated software to analysis, compile, draft and edit your coursework. You should also have access to a modern up-to-date computer with a high-speed internet connection, and a portable external hard-drive to store and back-up all of your necessary files. In general, your technology requirements in this course do go beyond using UTC email, Blackboard, and your mobile phone.

Technology Skills Required for Course: This is a high-5000 level science majors' course and does build upon your prerequisite course work and the skills that you have mastered in life and those underclassman courses.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT

Course Assessments and Requirements:

General Expectations: In a graduate level course, students will be expected to perform at a higher level than would be expected in an undergraduate course. Where a student in an undergraduate course would be expected to generally gain knowledge and comprehend its meaning with minimal to moderate application, as a graduate student in this class you will be expected to critically analyze information in the context of real-life scenarios. You are expected to function as a self-directed learner and researcher. Each student will be responsible for being a leader and contributing to the class discussion.

Course Grading

GRADING: COURSE WILL BE BASED ON 250 POINTS for ESC 5710.

Due 1/17/23

Six Job Searchers & Advertisements from Govt., NGO & Academic

(Candidate Meets Qualifications; Why & How? 250 words for each) 15 points

(Is of Interest to the Candidate; Why & How? 250 words for each) 15 points

Due 1/24/23

Objectives Statement (Who are you? 300 Words or Less) 10 points

Due at Interview and Starting 2/28/23

Cover Letters (Govt., NGO, & Academic) (2-3pages, single spaced for each) 30 points

Curriculum Vitae (CV) (Minimum 5 pages, 11-12 pt font, single spaced, 1" margins) 50 points

You will write Three Letters of Reference for a Peer (or similar) 30 points

Mock Job Interview (i.e., Presentation, Plus Question & Answer; 15min pres+ 10min QA) (~2 pr/wk) 100 points

Graduate Grading SCALE – ESC 5710
A= 225 - 250
B= 200 – 224.999
<i>F= 199.999 and Below</i>

Course Grading Policy: This course uses a modified collegiate straight scale, and integrates Self-Evaluation, Peer-Evaluation, Reflective Practices and Journaling.

Instructor Grading and Feedback Response Time: The grading follows a truncated collegiate straight scale, and feedback is contingent on the length of the assignment. In other words, if you are given weeks to work on an assignment do not expect to get it back the next day. Most assignments are returned within 7-10 **business days**.

Course and Institutional Policies

Late/Missing Work Policy: You cannot make up assignments in any form. These assignments are due on designated days but see schedule. A missed assignment counts as a ZERO, meaning that you must attend class and adhere to the schedule to receive any credit. TAKE HOME MESSAGE: Come to class, don't miss assignments.

Electronic Device Usage: I would like to discourage distractions during our meeting times. This course cannot be filmed or recorded electronically without the prior and written consent of the instructor. If you plan to use a computer or tablet to take notes, then you must sit in the row along the back wall of the classroom. Use of electronic cigarettes is prohibited. Please silence all mobile communication devices (e.g., cell or smart phones, etc.) and store them in your bag. They should remain stored for the entire class period. These devices should not emit an audible noise during class time. If a pager, cellular telephone or other electronic device emits any audible noise during the class I will deduct 10 points for each incident. In short, any student (or the entire class) will be penalized ten (10) points for each incident involving disruption of the class.

Statement on Disruptive Students in the Classroom: The University will not tolerate disorderly or disruptive conduct which substantially threatens, harms, or interferes with university personnel or orderly university processes and functions. A faculty member may require a student to leave the class room when his/her behavior disrupts the learning environment of the class. A student found responsible for disruptive behavior in the classroom may be administratively withdrawn from the course. I hope to keep you excited and engaged in class so that your interest doesn't wander. But, I must ask that you avoid distractions during our class meetings such as the use of cell phones, texting, instant messaging, pager beeping, or the use of other unapproved electronic devices.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: *With the exception of school holidays, attendance is mandatory! You are responsible for the material covered whether you are in attendance or not, including any announcements made during class.*

Course Participation/Contribution: In short, you are expected to attend class and actually speak up and make a contribution to the course in the form of relevant discussion on a regular basis.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

The University of Tennessee at Chattanooga

Course Calendar/Schedule: See Tentative Lecture Schedule Below

Week	Week When Topic is Due
1/10	Welcome, Overview
1/17	Six Job Searchers & Advertisements from Govt., NGO & Academic (15pts total) (Candidate Meets Qualifications; Why & How?) (Is of Interest to the Candidate; Why & How?)
1/24	Objectives Statement (Who are you?) (10 points)
1/31	Cover Letters (Govt., NGO, & Academic) (30 points)
2/7	Curriculum Vitae (CV) (50 points)
2/14	
2/21	Writing Letters of Reference & Selecting Referees (30 points)
2/28	<i>Mock Job Interview (Presentation, Plus Question & Answer) 100 points</i>
3/7	<i>Mock Job Interview (Presentation, Plus Question & Answer) 100 points</i>
3/14	SPRING BREAK-NO CLASSES
3/21	<i>Mock Job Interview (Presentation, Plus Question & Answer) 100 points</i>
3/28	<i>Mock Job Interview (Presentation, Plus Question & Answer) 100 points</i>
4/4	<i>Mock Job Interview (Presentation, Plus Question & Answer) 100 points</i>
4/11	<i>Mock Job Interview (Presentation, Plus Question & Answer) 100 points</i>
4/18	<i>Mock Job Interview (Presentation, Plus Question & Answer) 100 points</i>

Appendix 2-B

Advanced Ecology Spring 2020

Biology, Geology and Environmental Science, ESC 5060, CRN, Face-to-Face, 3 credit hours

Instructor: Dr. Joshua R. Ennen

Email and Phone Number: jre@tnaqua.org, 423-785-3071

Office Hours and Location: By appointment only

Course Meeting Days, Times, and Location: W (6 – 8:30 PM); Holt Hall 208

Course Catalog Description: Study of ecological principles including ecosystem functioning, organismal interactions, and techniques used to model these functions and interactions.

Course Pre/Co Requisites: None

Course Student Learning Outcomes: ESC 5060, Advanced Ecology, will expose students to various key topics in ecology through lectures, reading selected primary literature, and a class project. Lectures are aimed to give students an overview on ecological topics and principles to assist in the comprehension of the primary literature reading assignment. ESC5060 covers physiological, macroecology and biogeography, behavioral, population and evolutionary ecology, community ecology, ecosystems stability and function, and climate change.

Required Course Materials: None

Technology Requirements for Course: You need access to a computer with a reliable internet connection to complete this course. Test your computer set up and browser for compatibility with UTC Learn at <http://www.utc.edu/learn/getting-help/system-requirements.php>Links to an external site.. As there are videos with sound that you must watch, you will also need speakers or headphones. You should also have an updated version of Adobe Acrobat Reader, available free from <https://get.adobe.com/reader/>Links to an external site..

Technology Skills Required for Course: Nothing specific

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements: There are several assessments used in this course, including paper reviews, paper discussions, class project, presentations, and exams.

Course Grading

Course Grading Policy: 90-100% = A; 80-89% = B; 70-79% = C, 60-69% = D; <60% =

F	Paper Reviews (x4)	20%
	Participation	10%
	Class Project	
	Written Portion	15%
	Presentation Portion	15%
	Two Exams	40%

Instructor Grading and Feedback Response Time: I will try my best to grade all assignments within one week of the due date and provide written feedback when necessary.

Course and Institutional Policies

Late/Missing Work Policy: I will not accept late assignments.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the Student Handbook (<https://www.utc.edu/dean-students/student-handbook.php>[Links to an external site.](#)).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: *Each student is expected to attend every class and maintain an environment conducive to learning. This means being respectful to fellow classmates, the instructor, and any visitors who may be present.*

Course Participation/Contribution: Every student is required to participate during the in-class discussion of ecological literature.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

UTC Bookstore: The UTC Bookstore will price match Amazon and [BN.com](#)[Links to an external site.](#) prices of the exact textbook - same edition, ISBN, new to new format, used to used format, and used rental to used rental format, with the same rental term. For

more information, go to the [Bookstore Price Match Program](#)[Links to an external site.](#) webpage, visit the bookstore, email sm430@bncollege.com or call 423-425-2184.

Course Calendar / Schedule: The tentative weekly schedule for the course below. Some sections of might be omitted

1. January 8th *Course Introduction and What is Ecology?*

Course Introduction and “What is Ecology?”

Group assignments and expectations of research

2. January 15th – *Scale in Ecology*

Reading assignment– TBA

Review assignment due January 29th: Ennen et al. – Barren’s Topminnow

3. January 22nd – *Biodiversity and Macroecology*

Reading assignment– TBA

3 min presentation on Class project due

4. January 29th – *Biodiversity-Stability*

Reading assignment– TBA

Review assignment #1 due

5. February 5th – *Biodiversity-Function*

Reading assignment –TBA

Review assignment due February 19th: Cecala et al. – Interference competition

6. February 12th – *Species Interactions: Consumptive Effects & Optimal Foraging*

Reading assignment – TBA

7. February 19th –Exam I

Review assignment #2 due

8. February 26th – *Species Interactions: Non-consumptive Effects*

Reading assignment – TBA

Review assignment due March 20th: Hyder et al. – Turtle movement

9. March 4th – *Evolutionary Outcomes to Species Interactions*

Reading assignment – TBA

10. March 11th – Spring Break

11. March 18th – *Food Webs: “Trophic Cascades”*

Reading assignment – TBA

Review assignment #3 due

12. March 25th – TBA

Review assignment due April 8th: Class project

13. April 1st Presentations

14. April 8th No Class; Work on your class project

15. April 15th – *Ecology and Climate Change*

Final Class project due April 17th

16. Week of April 22th –Final Exam

Advanced Applications of Remote Sensing and Geographic Information Systems Fall 2019

**Biology, Geology, and Environmental Science, ESC 5610/5610L, 49065/49067, Face-to-Face Lecture
& Laboratory, 3 credit hours**

Instructor: Thomas P. Wilson, Ph.D., GISP, UC Foundation Associate Professor, ESC Graduate Coordinator

Email and Phone Number: Thomas-wilson@utc.edu, 423-425-4713(Office) or 423-425-4341(BGE Main Office, Holt Hall 215)

Office Hours and Location: 1100-1200 MW, Holt Hall 306

Course Meeting Days, Times, and Location: MW 1200-1250, Holt Hall 208; M 1400-1550, SIMC 102

Course Catalog Description: Use of aerial photography and digital data for practical application and analysis of local environs. Primary systems are ERDAS ARC GIS, and Arcview. 3.000 TO 4.000 Credit hours 3.000 TO 4.000 Lecture hours

Course Pre/Co Requisites: Prerequisites: GEOG 4650 or GEOG 4660 or their equivalents. Crosslisted GEOG 5610. Laboratory/studio course fee will be assessed.

Course Student Learning Outcomes:

1. Students are able to formulate appropriate objectives and/or hypotheses, and use appropriate geospatial tools and methodologies, to collect, analyze, and interpret data within the context of environmental research.
2. Students are able to retrieve information relevant to geospatial & environmental research from the scientific literature and are able to evaluate the literature critically.
3. Students are able to conduct themselves in a professional manner while communicating geospatial & environmental information in both oral and written formats.

General Education Statement: *This course is not a general education course!*

Course Fees: *Laboratory/studio course fee will be assessed. Check with the Bursar's Office on costs.*

Required Course Materials: Horning, et al. 2012. Remote Sensing for Ecology and Conservation. Recommended Text: Lillesand, T.M, Kiefer, R.W, and J.W. Chipman. 2015. Remote Sensing and Image Interpretation. 7th edition. John Wiley & Sons, Hoboken, New Jersey. 736 pp.

Technology Requirements for Course: You will need to use a computer and associated software to analysis, compile, draft and edit your coursework. You should also have access to a modern up-to-date computer with a high speed internet connection, and a portable external hard-drive to store and back-up all of your necessary data and associated files. You should be able to adequately navigate technology and computers by being able to partition hard-drives, network connections, execute file transfer protocols,

manage databases, extract files with correct path destinations, write scripts using JAVA and Python or similar computer software. So your technology requirements go beyond using, UTC email, Blackboard, and your mobile phone.

Technology Skills Required for Course: This is a graduate level course that goes builds upon your prerequisite course work and the skills that you have mastered those undergraduate courses.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements:

General Expectations (A-E): General expectations: Advanced Applications of Remote Sensing and GIS is a graduate level course (with pre-requisites) and as such students will be expected to perform at a higher level than would be expected in an introductory undergraduate course. Where a student in an introductory undergraduate course would be expected to generally gain knowledge and comprehend its meaning with minimal to moderate application, as an upper-level to graduate student in this class you will be expected to analyze scenarios and real-life case studies with the goal of synthesizing information obtain in this course, other related courses and life experiences to provide cogent evaluation and recommendations that would result in positive, beneficial impact regarding an issue.

Course Objectives: In this class we will be involved with one of the most exciting and fastest growing fields related to geography. Integrated Geospatial Sciences are revolutionizing the decision making capabilities of resource managers and planners by giving a wealth of data at their fingertips. This class is designed to help you: Comprehend the theories behind geographic information systems and remote sensing, including their usefulness; Understand how to use GIS/RS as a planning tool; Gain practical “hands-on” experience in manipulating and analyzing data in a GIS/RS; Master GIS/RS concepts as part of an integrated Geospatial Sciences Framework via a project; During lecture we will talk about general theory behind GIS/RS concepts, discuss readings and assignments, have demonstrations on computer techniques, and troubleshoot problems from assignments. Therefore, you will be asked to participate in and lead discussions.

Reading assignments & Journal Briefs: Not only must you read appropriate text assignments, but literature in trade and scholar journals must be read and used in class discussions, examinations, and special projects and /or reports. Examinations will be primarily essay requiring the student to write lucid arguments and defenses for answers. Rote recall of textbook or journal reading assignments as responses for examination essays may be consider satisfactory but not evident of the higher order learning outcomes expected of students in this course.

Labs, Reports & Assignments: In the laboratory portion of this course, students are expected to self-instruct and in some cases use a team approach in mastering the material and completing assignments. The instructor and laboratory staff are available and will provide guidance as deemed necessary. However, unlike an introductory undergraduate lab where the student is guided mostly by the instructor to specific information or in conducting a lab experiment, as an advanced geospatial science student you are expected to function as a self-directed learner and researcher. Each student will be responsible for being a team leader and mentoring a group of peers during the course of the semester. Lab reports and assignments must be well-written and have a comprehensive analysis provided by each student.

GPS Project & Presentation: Students are expected to produce an advanced geospatial project that addresses a current problem in integrated geospatial sciences. The project should identify the need and state the problem and then provide detailed analysis (within the methods and materials) of the current problem and provide further directions of the proposed research. This course uses truncated collegiate straight grading scale.

Initial GPS Project Guidelines: Evaluation of Topology and Surface Assessment or similar. **This project must be executed using two different GIS software packages, Remote Sensing and Imagery Software, A Mobile Geospatial Technology device for data capture and statistical assessment).**

Milestones: The milestones serve to help you, the student, focus your project. The first milestone is the project proposal. The project proposal should, at a minimum, state the purpose of the project, the desired end state including any deliverables, and consists of detailed methods section that outlines the steps you will perform to achieve the end state. The methods section is the most important part of the proposal, it should serve to help you focus how to apply the knowledge learned in the course (and in previous courses) to the project in addition to identifying any gaps in that knowledge. The second milestone is a one-on-one session with the instructor. At this milestone it is required that you have all data needed to complete the project assembled and pre-processed. This session will help to insure that your project is on track and to identify any gaps in your knowledge base as it related to the project.

GPS Project and Research Grant Proposal Oral Presentations: Oral presentations will be allotted 15 minutes and 3 minutes for questions. Presenters of oral papers should have a complete story to tell. In essence, you are selling your idea to a prospective granting institution. Communicating effectively is the best way to achieve this goal. Your presentations should identify a specific question being addressed by your research, identify specific methods used to collect data to answer the question, specific methods of data analysis, present your possible outcomes and end with a discussion of those possible outcomes. Note: Over the years, I have come to realize that most students are not fully prepared when they give an oral presentation at a “scientific meeting”. Therefore, the only advice I can provide to you is that you must practice, practice and practice. Students should think of an oral presentation as a job interview! You would not present incomplete information at a job interview, and you do not help yourself by doing so in a course.

Research Grant Proposal: While analytical and writing abilities are not innate to everyone, a report will allow you to explore and communicate your ideas regarding Geospatial Sciences. It will also familiarize you with the preparation of a formal report. The idea of a proposal is to get funds needed for research. Competition for contracts is very rigorous and consequently, the report must be very well constructed to have a chance at continued support. You are expected to prepare a report that is appropriate for a local funding agency. Your report must be some subject within the framework of field based geospatial project. Ideally, your report should incorporate all of the aspects listed below. All reports should encompass good hypothesis testing and sound data handling practices. Despite your background, you will be assigned a project to execute carefully. You really need to search the literature carefully to see what has been done and what you can do. Make sure your report comprehensive.

The report should consist of the following:

1. **Cover page:** Give a concise title of the research, name of researcher and proposed length of study. In addition to the above, the cover of your final report should identify and briefly describe three funding agencies that may be appropriate for your project.

2. **Table of contents**: Show the location of each section of the report as well as major subdivisions.
3. **Project Summary**: Maximum of 200-300 words summarizing your work. It is functionally similar to an abstract.
4. **Project Description**: This is the main body of your report and should include:
 - A. Introduction to the problem, background and literature review.
 - B. Objectives of the research and expected significance.
 - C. Materials and methods- This is extremely important! What is your system of study? What experiment(s) do you plan to perform? What hypotheses do you plan on testing (outline those hypotheses!)? Present statistical analyses and sample sizes as appropriate!
 - D. Results
 - E. Applications and Conclusions
5. **Experimental Facilities Description**: Where was this study be done? Be specific about the details of the facility (i.e. Space, equipment, staff, resources, etc.).
6. **Project Time Line**: Give a detailed description of when the specific stages of the project were completed, along with all deliverables. This is extremely important because most studies last from 2-5 years.
7. **Bibliography**: A list of all cited literature, and this better be good! (At least 10 citations, and include a copy of each article that you do in fact cite)
8. **Appendices**: Pre-processed Data, AA, Source Info, Metadata, Ancillary Data, etc.

JOURNAL BRIEFS: Staying abreast of recently published literature is essential for becoming knowledgeable in the rapidly changing field of GIS. Besides you assigned readings, you are expected to peruse through recent books, journals or technical papers related to GIS. At predetermined intervals throughout the semester you will be required to turn in a typed journal brief on a particular aspect of GIS research or application. With each bibliographic reference, the student will submit a typed paragraph summarizing the information contained in the article. In addition, each student must complete a single summary table for their collection of research articles. Note: I will not accept duplicate research articles...so once an article has been used it cannot be submitted again during the semester. The specific details for the paragraph summary are outlined below. Instructions for Journal Briefs You have 5 paper assignments due this semester. You are to find a published journal article (since 1980) from a science journal (no magazine articles allowed) that focus on Landscape/Spatial Ecology using Drones to assessing wildlife and/or habitats. You must read this article, obtain background information on the application, ecosystem and species studied (etc.), evaluate the article, and provide me a copy of the journal article, your electronic excel table, and your paper by the **due date (8/26, 9/9, 9/23, 10/7,10/21)**. Note: Journal Briefs are not a reproduction of the author's abstract!! Finding papers: You cannot use any of the journal articles cited in your GIS textbooks or in their Bibliographies. Additionally, each of your journal articles should preferably be about different species, techniques, ecosystems or problems. The papers must be on the geospatial aspects of Landscape/Spatial Ecology of Amphibians or Reptiles, and should involve some sort of hypothesis testing or problem solving. To find an article you can look through the science and geography journals in the library. However, the best way to search for an article is to use one of the library databases. Please visit the library web page for further information on how to use the databases, and how to request journal articles that are not in our library collection. Because you are interested in a particular assessment tool, you may want to look at the journals dedicated to these

concepts. Also, look in Geo Info Systems, GIS World, Cartographica, Cartography & GIS, Photogrammetric Engineering and Remote Sensing, and ARC user. You might find good papers using Drones in Wildlife Ecology journals, such as, Ecology, and Journal of Wildlife Management, etc. You might find it helpful to browse the contents of journals in addition to or instead of doing big online Abstract search. Many journals now maintain home pages where you can browse the tables of contents of current and recent issues. Some even let you download copies, although most do not unless you have a membership. The UTC library web page has a section devoted to electronic journals with links to many of the journals home pages. Content of your papers: You should address, in prose format, the following questions:

1. What is the question being addressed?
2. What is the functional group being studied?
3. What technique(s) were used?
4. Was the sampling design appropriate and/ or adequate for the question being addressed? Why or why not?
5. Was the statistical analysis appropriate? Explain!
6. Were any useful methods developed that could be adapted to others research? Any new analytical tests or analyzing the data? If so, do the authors provide software for others to use?
7. What were the finding and conclusions? Were these significant? If so, why or why not?
8. What was your favorite part of this study? What was your least favorite part?

Format of your papers: Papers must be typed and laser printed on decent quality paper, paper size = 8.5 x 11, single line spacing, left, right, top, and bottom margins = 1", and printed on one side of the paper only. Papers must be at 1 page and cannot exceed 2 pages. Put your name at the top of the first page, followed by the title of your journal article. Staple your 1-2 pages paper and the journal article together. Do not use report covers or page titles please. Please include a PDF of your article(s). Format of your Summary Table: Tables must be formatted electronically using Microsoft Excel. Your table headings should minimally include those indicated in the sample excel file (please see me) but you should include additional fields.

RS Lecture and RS Laboratory: You have two lesson plans which you are to develop during the semester. Please see me for details on topics, etc.

Course Grading

GRADING: COURSE GRADE WILL BE BASED ON 800 POINTS for ESC 5610

Two written lecture exams @ 100 points each	200 points
Quizzes, TPSs, Assignments	045 points
Two laboratory practical exams @ 100 points each	200 points
Eight laboratory write-ups, exercises or modules @ 10 points each	080 points
Five journal briefs @ 10 points each	050 points
Research Project	050 points
Grant Proposal/Project	100 points
Grant Proposal Oral Presentation	025 points

The University of Tennessee at Chattanooga

Design Your Own RS Lecture

025 points

Design Your Own RS Laboratory

025 points

Exams will not be curved. In other words, the points that you earned reflect your score. Your letter grade will be determined by a straight-collegiate scale at the close of the semester (**ABSOLUTELY NO EXCEPTIONS**).

Grading SCALE – ESC 5610
A= 720 - 800
B= 640 – 719.99
F= 639.99 & BELOW

Course Grading Policy: This course uses a modified collegiate straight grading scale.

Instructor Grading and Feedback Response Time: The grading follows a truncated collegiate straight scale, and feedback is contingent on the length of the assignment. In other words, if you are given weeks to work on an assignment do not expect to get it back the next day. Most assignments are returned within 7-10 business days.

Course and Institutional Policies

Late/Missing Work Policy: You cannot make up assignments in the form of field trips, pop quizzes, projects, participation, or exams. These assignments are due on designated days but see schedule. A missed assignment counts as a ZERO, meaning that you must attend class and adhere to the schedule to receive any credit. TAKE HOME MESSAGE: Come to class, don't miss assignments.

Electronic Device Usage: I would like to discourage distractions during our meeting times. This course cannot be filmed or recorded electronically without the prior and written consent of the instructor. If you plan to use a computer or tablet to take notes, then you must sit in the row along the back wall of the classroom. Use of electronic cigarettes is prohibited. Please silence all mobile communication devices (e.g., cell or smart phones, etc.) and store them in your bag. They should remain stored for the entire class period. These devices should not emit an audible noise during class time. If a pager, cellular telephone or other electronic device emits any audible noise during the class I will deduct 10 points for each incident. In short, any student (or the entire class) will be penalized ten (10) points for each incident involving disruption of the class.

Statement on Disruptive Students in the Classroom: The University will not tolerate disorderly or disruptive conduct which substantially threatens, harms, or interferes with university personnel or orderly university processes and functions. A faculty member may require a student to leave the class room when his/her behavior disrupts the learning environment of the class. A student found responsible for disruptive behavior in the classroom may be administratively withdrawn from the course. I hope to keep you excited and engaged in class so that your interest doesn't wander. But, I must ask that you avoid distractions during our class meetings such as the use of cell phones, texting, instant messaging, pager beeping, or the use of other unapproved electronic devices.

The University of Tennessee at Chattanooga

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: *With the exception of school holidays, attendance is mandatory! You are responsible for the material covered whether you are in attendance or not, including any announcements made during class.*

Course Participation/Contribution: In short, you are expected to attend class and actually speak up and make a contribution to the course in the form of relevant discussion on a regular basis.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

The University of Tennessee at Chattanooga

Course Calendar/Schedule: See Tentative Schedule Below

<u>Wk</u>	<u>Technical Lecture</u>	<u>Lay Readings & HWK</u>	<u>LABORATORY TOPIC</u>
8/19	Remote Sensing of the Environment	Ch.1, 2	Procedures & Logins; Traditional Analogy Aerial Photography: Color, Black and White, and Color Infrared
8/26	Elements of Photographic systems, Electromagnetic Spectrum/ Energy Flow Profile	Appendix 1	ArcGIS Pro Basics https://www.esri.com/training/catalog/5cad02469b1f4010cad9ac46/arcgis-pro-basics/ Or https://learn.arcgis.com/en/projects/get-started-with-arcgis-pro/
<u>9/2</u>	<u>(9/2) HOLIDAY NO CLASSES</u>		Holiday No Classes
	Photointerpretation Principles and Spaceborne Photography	Ch. 3, Appendix 5	
9/9	Multispectral Scanners, Film Filter Combinations, Landsat Orbit and Sensors	Ch. 3.1	The Big 3 Resolutions - https://www.esri.com/content/dam/esrisites/en-us/media/pdf/teach-with-gis/spectral-spatial-temporal.pdf
9/16	Landsat <i>Grant Proposal Topics DUE</i>	Appendix 4	Obtaining information from imagery - https://www.esri.com/content/dam/esrisites/en-us/media/pdf/teach-with-gis/measuring-rondonia-rain.pdf
9/23	Visual Interpretation Techniques, Landsat Thematic Mapper		Classify Land Cover to Measure Shrinking Lakes - https://learn.arcgis.com/en/projects/classify-land-cover-to-measure-shrinking-lakes/
9/30	Landsat Image Analysis Presentations, SPOT		Laboratory Practical Exam (9/30)
	Lecture Midterm Exam (10/2)		
10/7	Continue- Landsat Image Analysis Presentations, SPOT Ultraviolet and Microwave		Calculate Impervious Surfaces from Spectral Imagery - https://learn.arcgis.com/en/projects/calculate-impervious-surfaces-from-spectral-imagery/
<u>10/14</u>	<u>(10/14-15) HOLIDAY- FALL BREAK- NO CLASSES</u>	Ch. 9.3	<u>10/14 – 10/15 HOLIDAY- FALL BREAK- NO CLASSES</u>
	Microwave, Radar and Sonar		
10/21	Microwave, Radar and Sonar		Assess Burn Scars with Satellite Imagery - https://learn.arcgis.com/en/projects/assess-burn-scars-with-satellite-imagery/
10/28	Thermal Sensors; Multistage and Double Sampling, Accuracy Assessments, Meteorological Satellites	Ch. 8, Appendix 6, Ch. 2.2	https://www.esri.com/training/catalog/5ce42f4388c6106da2d53044/image-classification-using-arcgis/ or another advanced exercise from < https://learn.arcgis.com/en/gallery/#?q=remote%20sensing >
11/4	Digital Image Processing; RS of Vegetation	Appendix 2, Ch. 4, 5, 10, 11	Research Project time
11/11	GIS/RS of Marine, Freshwater, Urban or Other	Ch. 6, 7, 11	
11/18	Imagery: Open and Interactive GIS Systems	Appendix 3	
11/25	Conservation Utility of RS	Ch. 12 - 15	<u>Research Projects Due</u>
			<u>THANKSGIVING BREAK 11/26 – 12/1 – NO CLASSES</u>
12/2	Graduate Student Presentations and Proposals		Final Laboratory Practical (12/2)

Final Exam Wednesday, December 4th from 1030-1230 in Holt Hall 208

The University of Tennessee at Chattanooga

Plant Ecology Lecture Fall 2021

BIOL 4540, CRN 43236, online, 4.0 credit hours

Instructor:	Jennifer Boyd
Email & Phone:	jennifer-boyd@utc.edu ; 860-904-8060
Contact & Office Hours:	Students are encouraged to contact me by email as my preferred method of correspondence. I aim to respond to emails within 24 hours on weekdays and within 48 hours on weekends. Face-to-face office hours will be from 10-11:30 am pm on Mondays in my office in Holt 219 and 12-2 pm on Thursday via the Zoom online meeting platform (https://zoom.us/join) accessed with the following meeting ID: 362 955 7870. Other meetings may be scheduled with individual students as needed.
Course Days, Times, and Location:	Plant Ecology (BIOL 4540) is an online lecture course that will be hosted in Canvas. (The corresponding lab course will be delivered face-to-face.) All lecture course content will be delivered <i>asynchronously</i> to allow for flexibility in choosing the days of the week and times that you access material in Canvas. However, you are expected to log into the course several times each week <i>at a minimum</i> to access course content, complete assessments, communicate with me as needed, and receive important announcements made during the term. Due dates for all assessments are provided in this syllabus and on Canvas.

Course Catalog Description:

Plant ecology is the study of relationships of plants with their living and non-living environment, explored from the levels of plant individuals, populations, and communities. Laboratory component includes hands-on activities focused on assessing plant responses to abiotic and biotic environmental conditions and the broader impacts of such research.

Prerequisite:

BIOL 3060 and BIOL 3250 and BIOL 3350 with a minimum grade of C

Corequisite:

BIOL 4540 and BIOL 4540L are corequisite courses that must be taken concurrently.

Course Student Learning Outcomes (CSLOs):

Upon successful completion of this course, students will be able to:

- CSLO 1.** Demonstrate understanding of multiple ways in which plants can interact with their abiotic and biotic environment at various levels of biological organization. *Assessed primarily through quizzes and exams.*
- CSLO 2.** Critically evaluate the relevance and impact of diverse scientific research to building a dynamic body of scientific knowledge of plant ecology. *Assessed primarily through graded material references and incorporating primary literature.*
- CSLO 3.** Formulate and articulate informed thought on specific plant ecology topics and associated contemporary concerns. *Assessed primarily through issue-based writing assignments and discussion board assignments.*
- CSLO 4.** Communicate plant ecological information effectively. *Assessed primarily through individual written work and a group-based presentation.*
- CSLO 5.** Apply knowledge and common methodologies used in plant ecological research and its broader impacts (e.g., phenology networks, citizen science, literature review, data analysis, outreach activities). *Assessed primarily through lab assignments.*

Course Materials:

Strongly Recommended Text – Gurevitch J, Scheiner SM, Fox GA (2006) *The Ecology of Plants*, 2nd Edition. Sinauer Associates, Sunderland, MA

Required Additional Readings – Relevant readings mainly from primary sources (scientific journals) are provided electronically in association with relevant lessons in the online course space in Canvas. At times, lessons may include supplementary videos and online content linked in the course space, which you will be expected to view.

Course Technology Requirements:

Hardware – You must have access to a computer with a reliable broadband Internet connection, a speaker (to listen to lectures and other audio content), and a working webcam and a microphone (to take exams) for this online course.

Software – Course materials and information will be made available in Canvas, and you must have access to and use your UTC email account for all correspondence associated with this course. You also should have access to the [Google Chrome](#) web browser to take exams in this course, to recent versions of Microsoft Word and Excel, and to [Google Docs](#) and [Google Slides](#) to complete various assignments and activities associated with this course. [Proctorio](#) software, which is a free extension for Google Chrome, will be used to proctor exams; this program must

be installed on your computer prior to taking the exams. Information about Accessibility in Canvas can be found here: <https://www.canvaslms.com/accessibility>. Information about Accessibility in Google products can be found here: <https://www.google.com/accessibility/>.

Information about Accessibility in Proctorio can be found here:

<https://proctorio.com/accessibility>. Learn more about the use of Canvas at UTC here:

<https://www.utc.edu/walker-center-teaching-learning/canvas.php>

Technology Skills Required:

You should be able to use Canvas, your MOCSNet email account, Google Chrome, Microsoft Word and Microsoft Excel, Google Docs and Google Slides, Proctorio, and a scholarly citations index (e.g., Web of Science or Google Scholar) for this course.

Technology Support:

If you have problems with your UTC email account, Canvas, or other software or tools used in this course contact the IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu. Software available to UTC students, including access to Microsoft Office products, is listed at <https://www.utc.edu/information-technology/services/software-students.php>. If you have issues with Proctorio, you also are encouraged to contact Proctorio support at 1-877-687-6411.

Accessibility & Accommodation:

If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or a special accommodation in this class or any other class, contact the Disability Resource Center (DRC) at 425-4006. More information can be found at: <https://www.utc.edu/disability-resource-center/index.php>

Student Support Services:

The Student Support Services office at UTC offers students a range of support services, including tutoring, academic coaching, and writing assistance. You are encouraged to utilize these services toward facilitating your success in this course. Information about Student Support Services and a complete list of the services offered can be found at: <https://www.utc.edu/student-support-services/ss-services.php>

Course Organization:

Lecture – The lecture component of this course is structured into three main **Learning Units**, each covering four related lessons. Each **Lecture Unit** module focuses on topics relevant to various subdisciplines of plant ecology as differentiated by levels of biological organization:

Lecture Unit 1 – Plant as Individuals focuses on organismal-level plant ecology. **Lecture Unit 2 – Plant Populations & Species** focuses on population and species dynamics. **Lecture Unit 3 – Communities & Ecosystems** continues from the community level to ecology-level plant ecology. Each **Lecture Unit** will comprise approximately 1 month of the course.

Laboratory – The laboratory component of this course is described in a separate syllabus.

Course Assessments and Requirements:

Exams – Each Lecture Unit will end with an exam consisting of multiple-choice questions, terms to define, and short essay questions to assess your understanding of material specific to that Learning Module. A cumulative final exam of similar style also will be given to assess your understanding of collective course material at the end of the course. Students must *complete* (not just begin) each *regular* exam between 8 AM and 8 PM EST on the due date specific in this Syllabus and the Course Schedule; the Final Exam for this course has been scheduled by UTC for 1-3 PM EST on December 4th. All exams will be administered through Canvas and will require the use of Proctorio, which is an online proctoring system associated with the Google Chrome web browser. You will not be able to take an exam if you do not have Proctorio and Google Chrome installed, a working webcam and microphone associated with your computer, and/or if you do not take the exam during the specified exam time. You will have 1 hour to complete each of the three regular exams in this course and 2 hours to complete the final exam. No notes, electronic devices other than your computer, or other materials can be visible or accessed while you are taking an exam. Proctorio will utilize video and audio recordings of you and your test environment and of all activity on your computer screen to determine suspicious behavior. You may study for exams with other students. However, once you begin taking an exam, you may NOT discuss exam material with anyone else prior to 8 PM EST that day. All violations of these policies will be reported to the UTC Honor Court.

Quizzes – Each Lecture Unit will include four short quizzes consisting of some combination of multiple choice and true/false questions to assess your understanding of material. Each quiz will be specific to a Lesson. Proctorio will NOT be used to take quizzes. You must complete all four quizzes in each Lecture Unit before 8 AM EST on the corresponding exam date for that Learning Module. Once you begin a quiz, you will have 15 minutes to complete it.

Writing Assignments – Each Lecture Unit will include a short (~500 words) writing assignment asking you to apply your knowledge to a defined issue of topical relevance. You will be expected to use both information presented in class and independent research to complete these assignments as instructed. Writing assignments are to be completed as an individual without assistance or input from other students. You must complete written assignments by 8 PM EST on the due dates specified in this syllabus and the course schedule.

Discussion Board Assignments – Each Lecture Unit will include two opportunities to contribute in a meaningful way to course discussion boards as instructed. Discussion board contributions will consist of informed opinion-based answers to questions and feedback to the responses of your peers to these questions as instructed. You must complete Discussion board assignments as an individual without assistance or input from other students. Discussion board contributions must be made by 8 PM EST on the due dates specified in this syllabus and the course schedule.

Course Grading:

Course Grading Policy – Your grade will be based on the points you earn on exams, quizzes, writing assignments, discussion board assignments, and lab assignments, which will comprise the approximate weighted percentages shown. Grades will be assigned using the standard letter scale (90-100% = A, 80-89.9% = B, 70-79.9% = C, 60-69.9% = D, lower than 60% = F) No extra credit will be awarded, and grades will not be adjusted (e.g., curved or rounded up).

3 Regular Exams (40 points each)	~20% of total points
1 Final Exam (80 points)	~15% of total points
12 Quizzes (10 points each)	~20% of total points
3 Writing Assignments (20 points each)	~10% of total points
6 Discussion Board Assignments (10 points each)	~10% of total points
Lab Assessments (150 total points)	~25% of total points

Instructor Feedback & Grading Response Time – I aim to grade all exams, quizzes, and other assessments within one week of the due date and provide feedback when necessary.

Grade Availability – Grades will be made available after I have reviewed and assessed your material submitted for grading. Your grades will be entered in the Grades section of the course space in Canvas.

Course and Institutional Policies:

Course Participation/Contribution – Although this course is being offered online, it is NOT a self-paced course. The lecture component of the course will be delivered *asynchronously*, which means that you have flexibility in choosing the days of the week and times that you access materials in Canvas. However, you are expected to login to the course several times per week *at a minimum* to read your weekly course content and complete assessments as scheduled. You are expected to complete all scheduled activities by their due dates specified in this syllabus and the course schedule. The lab component of the course will be delivered *synchronously* on Tuesdays from 12:20–3:10 PM EST. Lab meetings are mandatory and will be hosted via the ZOOM online meeting platform (<https://zoom.us/join>) with Meeting ID: 891 7193 7892. Lab activities will be team-based, and you are expected to communicate actively with your research team and participate fully in lab activities. Unexcused absences from lab meetings will result in you receiving a 25% deduction on the total points earned by your lab team on associated assignments.

Late/Missing Work – You are strongly encouraged to complete all assessments prior to their due dates to avoid the negative impact of missed assessments on your final grade. **Make-up assessments will be permitted without penalty only for *legitimate* excuses (e.g., those supported by a note from a doctor, dean, athletic director, or academic advisor or due associated with COVID) that prohibit your ability to participate in an online course environment.** If you know ahead of time that you will not be able to take a quiz or exam or

complete an assignment by the time that it is due for a *legitimate* reason, you must let me know ahead of time so that we can arrange an alternative time for you to take it. If you miss a quiz or exam or assignment due date due to a *legitimate* but unexpected reason, then you must let me know as soon as possible so that we can reschedule. If the reason is *legitimate*, you may make up the quiz or exam or assignment without penalty. Unexcused late quizzes and exams will not be accepted; 0 points will be earned for any unexcused quiz or exam not complete by its due date. Unexcused late writing assignments, discussion board assignments, and lab

assignments will result in a deduction of points equal to one-quarter of the total points possible for the assessment for each day of lateness.

University Delays and Closures – If UTC is closed due to the COVID-19 pandemic, inclement weather, or other reasons, this online course will proceed as usual.

UTC Policy on COVID Absences – Students **must complete the [COVID-19 Notification form](#)** if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support. Students will not be penalized for COVID-19 absences or late course assessments due to a COVID-19 related illness unless they are unable to complete course learning outcomes. Faculty will work reasonably with students to identify ways to complete course requirements.

Students must, if they are asymptomatic or if their symptoms do not interfere with their ability to participate in the course, **continue to participate in the online course.**

If COVID-19 related illness results in any missed course work, **students must contact the instructor within 48 hours of recovering to plan make-up work.** Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. But please realize that class will continue, and students may find themselves in the situation where they are unable to complete all work by the end of the semester. In such a case, students should consider a late withdrawal or an incomplete grade. Please contact the Records Office (423-425-4416) to learn more about the late withdrawal process.

If students have COVID-19 disability related risk factors that may affect attendance, students are strongly encouraged to register with the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's [General Student Grievance \(Complaint\) Procedure](#) by filling out the [Student Complaint Form](#) and submitting to the Office of the Dean of Students.

Student Conduct – Students are required to be familiar with and abide by UTC's Academic Integrity Policy, which is stated in the [Student Handbook](#).

Honor Code Pledge – As a UTC student, you are required to abide by its Honor Code: *I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.*

Plagiarism – Written assignments and discussion board entries may be screened with text-matching software that helps to identify plagiarism. To avoid plagiarizing someone else’s work, do not copy directly from any information source, including the Internet. Write in your own words and properly cite your sources. For first offenses, you will fail the assignment. For second offenses, you will fail the course and the offense will be brought to the attention of the UTC Honor Court.

Unauthorized Aid – You must complete quizzes, exams, writing assignments, and discussion board assignments as an individual. You may NOT obtain assistance or utilize input from other students on these assessments. You may prepare/study for exams with other students. However, once you begin taking an exam, you may NOT discuss its content (or lack of content) with other students until after 8 pm on the exam due date. You may not utilize any outside materials when taking exams in this course including those that may be accessed through your computer. Any offenses to these course policies will result in failure from the course and will be brought to the attention of the UTC Honor Court.

Course Learning Evaluations:

Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. I value your feedback and appreciate you taking time to complete these anonymous evaluations.

LECTURE SCHEDULE

Course Introduction

<i>Date</i>	<i>Topic</i>	<i>Materials & Assignments</i>
Aug 16-18	Welcome!	• Welcome Video • Discussion Board Intro – <i>due Aug 18</i> • Read Syllabus • Read ‘Start Here!’ materials

Lecture Unit #1 – Plants as Individuals

<i>Dates</i>	<i>Lesson</i>	<i>Materials & Assignments</i>

Aug 19-26	1.1 Photosynthesis & Pathways	• Lectures (in Canvas) • Chapter 2 (in textbook) • Wand et al. 1999 • Quiz 1 • Writing Assignment 1 – <i>due Sept 2</i>
Aug 26-Sept 2	1.2. Light Adaptations	• Lectures • Chapter 2 • Boyd et al. 2016 • Quiz 2
Sept 3-9	1.3. Water Relations	• Lectures • Chapter 3 • Koch et al. 2004 • Quiz 3 • Discussion Board 1 – <i>due Sept 9</i>
Sept 10-16	1.4. Soil & Belowground Interactions	• Lectures • Chapter 4 • Von Holle et al. 2013 • Van der Heijden et al. 1998 • Quiz 4 • Discussion Board 2 – <i>due Sept 16</i>
Sept 20	Exam 1	<i>Available from 8 AM – 8 PM EST</i>

Learning Unit #2 – Plant Populations & Species

<i>Dates</i>	<i>Lesson</i>	<i>Materials & Assignments</i>
Sept 21-27	2.1. Population Dynamics	• Lectures • Chapter 5 • Thomson & Schwartz 2006 • Quiz 5 • Writing Assignment 2 – <i>due Oct 4</i>
Sept 28-Oct 4	2.2. Evolution & Natural Selection	• Lectures • Chapter 6 • Clausen et al. 1941 • Quiz 6

Oct 5-13	2.3. Growth & Reproduction	• Lectures • Chapter 7 • Biesmeijer et al. 2006 • Quiz 7 • Discussion Board 3 – <i>due Oct 13</i>
Oct 14-20	2.4. Life Histories	• Lectures • Chapter 8 • Grime 1977 • Quiz 8 • Discussion Board 4 – <i>due Oct 20</i>
Oct 22	Exam 2	<i>Available from 8 AM – 8 PM EST</i>

Learning Unit #3 – Plant Communities & Ecosystems

<i>Dates</i>	<i>Lesson</i>	<i>Materials & Assignments</i>
Oct 25-29	3.1. Competition	• Lectures • Chapter 10 • Brown et al. 2002 • Quiz 9 • Writing Assignment 3 – <i>due Nov 5</i>
Nov 1-Nov 5	3.2. Herbivory	• Lectures • Chapter 11 • Benson & Boyd 2014 • Quiz 10
Nov 8-12	3.3. Disturbance & Succession	• Lecture • Chapter 12 • Johnson & Miyanishi 2008 • Quiz 11 • Discussion Board 5 – <i>due Nov 12</i>
Nov 15-19	3.4. Relative Abundance	• Lectures • Chapter 13 • Rabinowitz 1981 • Quiz 12 • Discussion Board 6 – <i>due Nov 19</i>
Nov 23	Exam 3	<i>Available from 8 AM – 8 PM EST</i>

Dec 3

Final
Exam

Available from 1 – 3 PM EST

|

MICROBIAL ECOLOGY – Lecture & Lab

ESC 5030, 4010, BIOL 4530, & ESC 5030L, 4010L, BIOL 4530L -

CRN#s (Lec) 43238, 44238, 44513, (Lab) 44104, 44239, 44515, face to face, 4 credit hours

Instructor: Henry ("Rardy") Spratt; Office - Holt Hall Rm. 351-D

Email and Phone Number: henry-spratt@utc.edu; Office phone # 423-425-4383

Office Hours and Location: Zoom meetings will be set up for Tues 11 AM to 12 PM, and Fri 3 PM to 4 PM (email Zoom links will be sent out the morning of the office hour). In person Office hour meetings will be on Thurs from 11 AM to 12 PM in Holt Hall 351-D. Individual appointments will be made by request for either Zoom or in person meetings.

Course Meeting Days, Times, and Location: Lecture, Tues 3:05 PM to 4:35 PM, Holt Hall Room# 204 Holt Hall; Lab, Thurs 3:05 PM to 6:05 PM, Holt Hall Room #331.

Course Catalog Description: A study of microorganisms in their natural environment with regard to microbial evolution, growth, interactions, dispersal mechanisms, ecological significance, and biotechnology applications. Laboratory fee will be assessed.

Course Pre/Co Requisites: Prerequisites: BIOL 3060, BIOL 3150, BIOL 3250, BIOL 4220, and CHEM 3010, all with minimum grades of C, or department head approval. Corequisite: BIOL 4530L, or ESC 5030L, or ESC 4010L.

Course Student Learning Outcomes:

Course Objectives - Lecture:

- A) To discuss the importance of bacterial metabolism to ecosystem processes.
- B) To describe the overall process of prokaryotic growth in natural communities.
- C) To discuss the evolution of modern prokaryotic communities.
- D) To introduce the types of interactions that may occur within natural ecosystems.
- E) To discuss the importance of elemental cycling to microbial ecology and biogeochemistry.
- F) To discuss examples of elemental cycling in aquatic, soil, sediment habitats.
- G) To relate microbial elemental cycling to global environmental concerns.

Course Objectives - Lab: The primary objective of the laboratory portion of this course is to provide hands on examples of tools used by microbial ecologists to study microbial systems in various habitats. Techniques used to document microbial activities in different habitats will be utilized to help describe the microbial systems under study. Studies conducted in the lab will include hypothesis-driven research projects conducted by small groups. Additional detail regarding the laboratory is available in the portion of the microbiology lab manual available at the UTC Bookstore. If you have taken BIOL 4220 here at UTC since 2019 and you have kept your lab manual from that course, there is no need to purchase a new version of the manual.

Student Learning Outcomes – Graduate Students: In this upper-level undergraduate/graduate-level course, graduate students are expected to self-instruct and in some cases use a team approach in mastering the material and completing assignments. Graduate students will take a leadership role in group exercises, both in and out of class. Graduate students must also read and synthesize scholarly journal articles and lead class discussions relating to the articles. The instructor will provide guidance as deemed necessary. Graduate students are expected to function as self-directed learners, synthesizing information from this course and other courses and life experiences, and engage in substantial critical analysis with the goal of providing innovative perspectives on the field of microbial ecology. As for exams, graduate students are expected to demonstrate a strong understanding of the lecture objectives covered on exams. Additionally, graduate students will be required to complete one additional question (not required of undergraduate students) on each exam designed to emphasize understanding and application of key concepts covered. Lastly, graduate students will also be required to write a detailed proposal based on one of the lab projects, or an article presented in the lecture. This proposal will require detailed introduction, literature review, objective, methodology, expected outcomes, budget, budget justification, and reference sections. This proposed work should be completely feasible using resources available in UTC. Additional information on this proposal will be provided prior to mid-term.

Student Learning Outcomes – All Students:

Lecture - Much of the lecture will be used to introduce new topics. Discussions of any topics at the time they are introduced are welcomed. Students will demonstrate that they understand the above course objectives by exhibiting satisfactory performance on examinations.

Laboratory - The laboratory section of this course will include the completion of complex exercises that may require some time outside of scheduled lab time. Actual times in the lab working on projects will be determined by group project needs. The class will be subdivided into small groups to conduct studies of microbial ecology. Note that these groups will be assigned based (hopefully) on having at least one graduate student per group to serve as that group's leader. Topics for study in the laboratory will be discussed during the first lab meeting. One characteristic of the topics of study is that they be brief enough to be accomplished in the time frame of the semester. The specifics of the lab exercises are detailed in the microbial ecology exercises in the lab manual for this course. Group projects will be designed to allow for three distinct exercises based on "canned" procedures. A final group project, which will be hypothesis driven, will be conducted as the culminating project of the laboratory. This final project will be based on techniques learned in one or more of the "canned" exercises conducted earlier in the semester. Three, brief laboratory reports (five typed, double-spaced pages) will be due during the semester (see below for actual due dates) describing the exercises conducted. A final lab report (10 to 12 pages) describing the hypothesis-based group project conducted (written as a scientific report – see writing guide to be handed out later) will be turned in during the final lab period at the end of the semester.

Required Course Materials: [Click here to enter text..](#)

Lecture Text Book: Madsen, E. L. 2016. Environmental microbiology: From genomes to biogeochemistry. Second Edition. John Wiley & Sons/Blackwell, Hoboken, NJ. 592 pg. ISBN 978-1-118-43963-0

Primary Literature: Periodically, articles on topics covered in lecture (or of greater interest to microbial ecologists) will be posted on the Canvas course website. These articles will provide the basis for class discussions of the particular topic. If graduate students are enrolled, each graduate student will be given the responsibility of giving one or two 15-minute summary reports of these articles (based on the number of graduate students enrolled) to the class (the schedule of who and when will be determined by the second week of class).

Laboratory - Manual: Spratt, H.G. 2019. Laboratory microbiology for biology majors. 2nd Ed. Kendall Hunt Publ. Dubuque, IA. ISBN: 9781524987930. Available at the UTC bookstore.

Technology Requirements for Course: No specific devices or skills are required for this course regarding technology other than having computer access to the course's Canvas web page.

Technology Skills Required for Course: The ability to use Microsoft Word and Excel will be important.

COVID-19 Absence Policy: COVID Absence Statement – Fall 2021 Revised

COVID Absences (face-to-face class) Students must complete the COVID-19 Notification form if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support.

Students who are instructed by university administration to stay home due to their responses are not to come to campus or attend face-to-face classes. Students who are cleared to be on campus and attend class are required to attend face-to-face class sessions. Students will not be penalized for COVID-19 related absences or late course assessments due to a COVID-19 related concerns unless they are unable to complete course learning outcomes. Faculty will work reasonably with students to identify ways to complete course requirements.

Students must, if they are asymptomatic or if their symptoms do not interfere with their ability to participate in the course, continue to participate in the course using the online assets and tools that the instructor may make available through UTCLearn including: Canvas and Zoom meetings.

If COVID-19 related illness results in any missed course work, students must contact the instructor within 48 hours of recovering to plan make-up work. Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time.

But please realize that class will continue, and students may find themselves in the situation where they are unable to complete all work by the end of the semester. In such a case, students should consider a late withdrawal or an incomplete grade. Begin by talking with your instructor if you think that one of these options would be helpful. Please contact the Records Office (423-425-4416) to learn more about the late withdrawal process.

If students have COVID-19 disability related risk factors that may affect attendance, students are strongly encouraged to register with the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's General Student Grievance (Complaint) Procedure by filling out the Student Complaint Form and submitting to the Office of the Dean of Students.

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, [submit a request](https://new.utc.edu/information-technology/learning-from-home) (<https://new.utc.edu/information-technology/learning-from-home>) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the [Disability Resource Center](https://www.utc.edu/disability-resource-center/index.php) (<https://www.utc.edu/disability-resource-center/index.php>) at 423-425-4006 or email DRC@utc.edu.

Course Assessments and Requirements: Quizzes and Exams will be scheduled for regular lecture periods. Students will be given 30 to 35 minutes to take quizzes. For exams, students will be given the equivalent of 75 minutes.

Course Grading Course

Grading Policy:

LECTURE	(total pts)	LABORATORY	(total pts)	GRAND TOTAL
3 Exams	300	Lab Reports (1 – 3)	300	
Final Exam	150	Final Lab Report	150	
Inst. Derived Part.	25	Inst. Derived Part.	25	
TOTAL	475	TOTAL	475	950
		GRAND TOTAL = 50% Lecture + 50% Laboratory		
		Note: Grad Students will have a 100 point proposal due at the time of the final exam, increasing their total		

The University of Tennessee at Chattanooga

		points available for the course to 1050. Details on this proposal will be provided in a handout at mid term.

FINAL COURSE GRADE (Any adjustments will be announced)

Undergraduate Students (950 pts)

A = 950-855 pts.

B = 854-760 pts.

C = 759-665 pts.

D = 664-570 pts.

F < 570 pts.

Graduate Students (1050 pts)*

A = 1050-945 pts.

B = 944-840 pts.

C = 839-735 pts.

D = 734-630 pts.

F < 630 pts.

*) Included for grad students = 100 pt. proposal

Grading Details: All exams will be emailed to students by the end of the day on Monday of the week that the exam is noted on the schedule. These exams will be considered to be of an “open book” nature. All questions will be of an essay nature, and will require both information presented in lectures and possibly some searching to find scientific articles that will help support your arguments in your answers. Students will be expected to answer the questions independently. References must be cited for all answers. The completed exams will be due the Friday of the week slated for the exam, by 5PM. Lab reports will be due at the lab meeting time indicated on the schedule.

Response Time: Graded quizzes and exams will be returned within one week of the date on which they are taken.

Course and Institutional Policies

Late/Missing Work Policy: (Note: due to the CoVid-19 pandemic exceptions for late work will be considered if the student can make a valid case to the instructor – usually in the form of a letter from the Dean of Students Office.)

The penalty for any work turned in past the due date will be minus 5% per school day the work is late. Make-up exams will only be given in exceptional cases, or when official University business is involved. Such make-up exams for official university functions will only be allowed if the following conditions are met:

- Notification of the instructor by the student about being absence from class must occur before the absence
- A request must be made in writing (on paper or electronically)
- The request should include the event/conference and the name of the faculty advisor/sponsor (when possible the faculty sponsor should probably contact instructors on behalf of students who will be absent for educational/scholarship reasons)
- For lab reports, unless there are exceptional circumstances approved by Dr. Spratt, the late work penalty (see above) will apply.

Student Conduct Policy: UTC's Student Code of Conduct and Honor Code (Academic Integrity Policy) can be found on the [Student Conduct Policy page](https://www.utc.edu/student-conduct/codes.php) (<https://www.utc.edu/student-conduct/codes.php>).

Honor Code Pledge: As a student at the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to ensure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity

Course Attendance Policy: Students in any senior-level or graduate-level course are expected to understand the need to take part in course activities. Due to the CoVid-19 pandemic it is possible we will need to have occasional Zoom meetings or discussions. Students will be expected to take part in these Zoom meetings. Excessive absences from these meeting will be cause for reductions in student "Instructor Derived Participation" scores.

Course Participation/Contribution: See above.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

UTC Bookstore: The UTC Bookstore will price match Amazon and Barnes and Noble (<https://www.barnesandnoble.com/>) prices of the exact textbook - same edition, ISBN, new to new format, used to used format, and used rental to used rental format, with the same rental term. For more information, go to the [Bookstore Price Match Program](#) (<https://bnc.pgtb.me/MMt77F>), visit the bookstore, email sm430@bncollege.com or call 423-425-2184.

COVID Absences

Students **must complete the [COVID-19 Notification form](#)** if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support.

If COVID-19 related illness or quarantine results in any missed classes or course work, **[students must contact the instructor within 48 hours of completing the COVID-19](#)**

Notification form to plan make-up classes and course work. Where possible, faculty will work with students to identify ways to complete course requirements but are not required to change or offer additional modalities. Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. Please realize that class will continue, and students may find themselves in the situation where they are unable to complete work in a timely manner. In such a case, students may consider requesting an [Exception to the Withdrawal Deadline](#) or an incomplete grade. Please contact the Office of the University Registrar (423-425-4416) to learn more about the late withdrawal process. Some departments may have department bylaws or student handbook requirements that specify a limit to the number of classes or amount of work that can be missed. In these cases the department requirements take precedence.

If students have COVID-19 disability-related risk factors that may indicate a need for additional academic accommodations, students are strongly encouraged to register with and/or contact the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's [General Student Grievance \(Complaint\) Procedure](#) by filling out the [Student Complaint Form](#) and submitting to the Office of the Dean of Students.

Biology, Geology & Environmental

Science COVID-19 Related Safety

Protocols

- 1. Vaccines:** Vaccination is strongly encouraged for all faculty, staff and students.
- 2. Capacities:** Teaching labs are at full capacities. All classrooms are at full capacities. All course modalities are taught as stated on the course schedule.
- 3. Face Masks:** All faculty, staff and students are required to wear face masks, at all times, in all UTC instructional spaces. Masks should cover both the mouth and nose. Instructional spaces in BGE include the following, but are not limited to:
 - [Teaching Labs](#)
 - [Prep Labs:](#) Intro Biology Prep Lab, ESC Prep Lab, Microbiology Prep Lab, Geology Prep Labs, etc.
 - [Research Labs and Museum Spaces:](#) When students are present, all personnel in the lab/museum space are required to wear masks.
 - [Student Study Rooms \(4\)](#)

The University of Tennessee at Chattanooga

- Graduate Teaching Assistant Office
- Offices (In-Person Office Hours): Faculty and staff can require students to wear masks in your offices.
- All faculty, staff and students should default to wearing masks when students are present in indoor BGE spaces.

Mask use by anyone, anywhere on campus, regardless of vaccination status, is encouraged.

4. Disposable Nitrile Gloves: Access to disposable nitrile gloves should always be available in research spaces and teaching labs in case students and faculty want to wear them, regardless of lab activity.

5. Seating Charts: It is recommended that seating charts be kept for classrooms and teaching labs to aid in contact tracing by UTC.

6. Cleaning work areas and equipment in Research Spaces and Teaching Labs: In accordance with appropriate lab safety protocols, teaching lab workspaces and equipment should be cleaned after every lab meeting. Research spaces should be cleaned before finishing for the day.

- Microscopes: Microscopes should be disinfected before and after use. In each teaching lab, there is a designated spray bottle to use for microscopes. This solution is a combination of alcohol, vinegar and water. For research spaces, please request a spray bottle from Cheryl if needed.
 - o Students should NOT touch the glass of the eyepieces.
 - o Spray some of the microscope disinfectant on KimWipes.
 - o Use the KimWipes to wipe off the microscope – everywhere that was touched and especially between the eyepieces where students breathe onto.
 - o DO NOT wipe the glass of the oculars with the disinfectant if at all possible. The alcohol could dissolve any adhesives, etc. in the eyepieces.
 - o If instructors need to help students with their microscopes, make sure to disinfect the microscope before and after use.
- Run out of Disinfectant Spray? Bring the empty spray bottles to either Wendy or Cheryl. We will exchange the spray bottles and get the empty ones refilled.
 - o This applies for both the general disinfectant spray and the microscope cleaner.

7. Card-Swipe/After-Hour Access to Teaching Labs for Students: Students enrolled in courses will not be given card-swipe access to any teaching labs. Students can only be in the lab outside of their regular lab time, if an instructor is present at all times. This is to ensure students are adhering to COVID safety protocols.

If you would like assistance in proctoring labs after-hours, inquire with Dr. Potts and Kelly Locke about the options that are available.

8. Card-Swipe/After-Hour Access to Teaching Labs for course TA's. Card-swipe and after-hour access will be given to lab TAs that are helping with the course. Instructors are responsible

The University of Tennessee at Chattanooga

for making sure their TA's abide by the safety guidelines for the course and Department, including the protocols outlined here.

9. No approval forms are required for students working in research spaces.

10. It is the faculty/instructor's responsibility to make sure the research space and teaching lab they are using is stocked with paper towels, disinfectant spray, microscope disinfectant spray, soap, hand sanitizer, etc.

The following items can be found in the Holt 3rd Floor Office Suite:

- Paper towels
- Nitrile Gloves
- KimWipes
- Soap & Soap Refill
- Hand Sanitizer & Refill

The following items should be given to either Wendy or Cheryl to refill:

- Disinfectant Spray Bottles
- Microscope Disinfectant Spray Bottles
- Disposable Face Masks

11. Each teaching lab has been replenished with disposable masks (in Ziplock bag) that can be used in case a student forgot their mask, etc. These should be placed where anyone teaching in the lab can have access to it. If you need more disposable masks, ask Wendy or Cheryl.

12. Anyone deliberately violating safety rules may be asked to leave the BGE academic space.

Course Calendar/Schedule: TENTATIVE SCHEDULES:

LECTURE

DATE	DAY	SUBJECT	READING
8/17	TU	Class Introduction, Review of Prokaryotic Biology	Madsen Chpt #1
8/24	TU	Hist. of Environ. Micro., Formation of the Biosphere	Madsen Chpt #2
8/31	TU	Biosphere Formation & Microbial Evolution	“
9/7	TU	EXAM #1, “	“
9/14	TU	Microbial Interactions – Abiotic & Biotic	Madsen Chpt #3,5
9/21	TU	Organic Matter Biodegradation	Madsen Chpt #3,7

The University of Tennessee at Chattanooga

9/28	TU	“	Madsen Chpt #3,7
10/5	TU	Elemental Cycles – Global Perspective	Madsen Chpt #7
10/12	TU	FALL VACATION	Handout
10/19	TU	EXAM #2 , Elemental Cycling – Aquatic Environments	Madsen #3,7
10/26	TU	Elemental Cycling – Soils	Madsen #3,7
11/2	TU	Elemental Cycling – Aquatic Sediments	Madsen #3,7
11/9	TU	Elemental Cycling – Extreme Environments	Handout
11/16	TU	EXAM #3 , Elemental Cycling – Atmospheric Components	Handout
11/23	TU	The Case for Terraforming Mars	Handout
11/30	TU	Reading Day	
12/7	TU	FINAL EXAM DUE (5:30 PM)	

LABORATORY

DATE	DAY	SUBJECT	READING
8/19	TH	Introduction, Lab Safety, Development of Group Plans	Lab Manual, pgs. ix to x, 135-138
8/26	TH	Methodology Demonstrations, initiation of 1 st Group Project	Handout
9/2	TH	1 st Group Project – Group Work	Lab Manual, Exercise #15
9/9	TH	1 st Group Project – Group Work	“
9/16	TH	2 nd Group Project set up, Discussion of 1 st Lab Report	“, Exercise #16
9/23	TH	1st LAB REPORT DUE , 2 nd Group Project – Group Work	Lab Manual, Exercise #16
9/30	TH	2 nd Group Project – Group Work	“
10/7	TH	3 rd Group Project set up, Discussion of 2 nd Lab Report	“, Exercise #17
10/14	TH	2nd, LAB REPORT DUE , 3 rd Group Project – Group Work	Lab Manual, Exercise #17
10/21	TH	3 rd Group Project – Group Work, Planning for Final Project	“
10/28	TH	Final project set up, Discussion of 3 rd Lab Report	“
11/4	TH	3rd LAB REPORT DUE , Final Project – Group Work	Lab Manual & Handouts
11/11	TH	Final Project – Group Work	“
11/18	TH	Final Project – Group Work, Discussion of Final Report	“
11/25	TH	THANKSGIVING HOLIDAY	

The University of Tennessee at Chattanooga

11/30	TU	Reading Day	
12/7	TU	FINAL LAB REPORT DUE (5:30 PM)	

Course Title

Limnology and Reservoir Ecology

Fall 2021

ESC 5080, CRN 41055, Face-to-Face, 4 credit hours;

(Laboratory: ESC 5080L, CRN 41056, Face-to-Face, 0 credit hours)

Instructor: Dr. Mark Schorr

Email and Phone Number: Mark-Schorr@utc.edu; 423-425-4149

Office Hours and Location: In-person: Tue & Thu 11-11:50 am in Holt 217 or 232D

Course Meeting Days, Times, and Location: Lecture -- MWF 10:00-10:50 am, Holt 208; Laboratory – Fri 2:00-4:50 pm, Holt 123 or field sites (directions will be provided)

Course Catalog Description: Chemical, physical, and biological processes in lake and reservoir systems (nutrient budgets and cycling, hydrodynamics, phytoplankton/ zooplankton/benthic dynamics, and physical similarities and differences in lakes and reservoirs). Lecture 3 hours, laboratory 3 hours. May be registered as BIOL 5080. Credit not allowed in both BIOL 5080 and ESC 5080. Laboratory/studio course fee will be assessed.

Course Pre/Co-Requisites: Corequisite: ESC 5080L

Course Student Learning Outcomes: Students will be able to (1) demonstrate in-depth knowledge of the physical, chemical, and biological characteristics of inland water systems; (2) demonstrate in-depth knowledge of the ecological structure and function of freshwater lakes, streams, and reservoirs; (3) demonstrate and apply knowledge of limnological equipment and techniques used for measuring physicochemical conditions and sampling biological populations in freshwater ecosystems; and (4) conduct research or other scholarly work in limnology.

Course Fees: Laboratory/studio fee will be assessed.

Required Course Materials: Required Book – Cole GA, Weihe PE (2016) Handbook of Limnology, 5th edition. Waveland Press., Inc. Long Grove, IL. ISBN 978-1-4786-2307-6

Technology Requirements for Course: You should have access to a computer with a reliable internet connection for this course. Test your computer setup and browser for compatibility with UTC Learn at <http://www.utc.edu/learn/getting-help/system-requirements.php>. Course materials and information will be made available throughout the semester in UTC Learn. You also should have access to and use your UTC email account for all correspondence associated with this course.

Technology Skills Required for Course: You should be able to use Microsoft Word, Microsoft Excel, UTC Learn and MOCSNet email, and the *Web of Science* literature database.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Assessments and Requirements: A graduate student will be graded based on his/her performance on lecture/laboratory exams, laboratory/field notebook, and an individual project (research or pedagogical). Graduate student exams (ESC 5080/5080L) will be more rigorous than undergraduate exams; for example, lecture exams will often have additional calculations and essay questions; lab exams/assignments will contain more complex analyses/interpretations. The student's course grade will be computed with the lecture average, laboratory average, and individual project score accounting for 50 %, 40 %, and 10%, respectively. The course average is based on three lecture exams (50%), two lab exams (20%), an individual field notebook (20%), and an individual project (10%).

Course Grading

Course Grading Policy: Grading scale: A = 90-100 %; B = 80-89 %; C = 70-79 %; D = 60-69 %; F = 0-59 %.

Instructor Grading and Feedback Response Time: I will try my best to grade all exams, quizzes, and assignments within one week of the due date and provide feedback when necessary.

Course and Institutional Policies

Late/Missing Work Policy: Make-up exams and quizzes and late assignments will be permitted only for *legitimate* absences (i.e., those supported by a note from your doctor, dean, athletic director, or academic advisor). If you know ahead of time that you will miss an exam or a quiz, you must let me know before your absence so that we can arrange an alternative time for you to take the make-up test. If you are not in class on the date that an assignment is due, you remain responsible for submitting that assignment to me on paper by that date.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: :Each student is expected to attend every lecture and lab and maintain an environment conducive to learning. This means being respectful to fellow classmates, the instructor, and any visitors who may be present.

Course Participation/Contribution: The course contains several learning objectives that are critical to building a foundation of knowledge and skill set in Limnology. For this reason, several methods will be employed, including (but not limited to): lecture, group discussions, and post-class work. To be successful in this course, I recommend that you engage in all methods. Your participation will be factored into your grade.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Course Calendar/Schedule: : Tentative weekly lecture schedule for the Limnology course. Read all textbook chapters, lecture notes/handouts, and posted notes. Some sections of chapters will be omitted. Schedule is subject to change; in this event, you will be made aware of changes.

Lecture Schedule

Learning Unit I

1. Week of August 16 (MWF)
Course Overview and Chapter 1: Introduction
2. Week of August 23 (MWF)
Chapter 2: Survey of Limnological Biodiversity
3. Week of August 30 (MWF)
Chapter 3: The Limnetic Communities
4. Week of September 6 (WF)
Chapter 4: Ecosystems, Energy, and Production
Chapter 5: Lake Origins
5. Week of September 13 (MWF)
Chapter 5 (Continue)
EXAM 1 (Chapters 1 – 5)

Learning Unit II

6. Week of September 20 (MWF)
Chapter 6: Shapes and Sizes of Lakes
Chapter 7: Wetlands
7. Week of September 27 (MWF)
Chapter 8: Streams: The Lotic Ecosystem
8. Week of October 4 (MWF)
Chapter 9: Light and the Aquatic Ecosystem
9. Week of October 11 (WF)
Chapter 10: Density, Layering, and Lake Mixing
10. Week of October 18 (MWF)
EXAM 2 (Chapters 6 – 10)

Learning Unit III

11. Week of October 25 (MWF)
Chapter 11: Heat Energy and Water Movements
Chapter 12: Oxygen and Other Dissolved Gases
12. Week of November 1 (MWF)
Chapter 13: Carbon Dioxide, Alkalinity, pH: The CO₂ System
13. Week of November 8 (MWF)
Chapter 14: The Major Ions in Inland Waters
14. Week of November 15 (MWF)
Chapter 15: Redox, Metals, Nutrients, and Organic Substances
15. Week of November 22 (M)
Chapter 15 (Continue)
16. Week of November 29 (M)
Review for Exam 3

FINAL EXAM (Exam 3: Chapters 11 – 15)

December 3 (Friday): 8-10 am

The University of Tennessee at Chattanooga

Tentative weekly laboratory schedule for the Limnology course. Read all board notes, handouts, and posted materials for the laboratory. The laboratory schedule is subject to change; in this event, you will be made aware of changes.	
Week / Date / Location	Laboratory/Field Work, Assignment, Exam
Laboratory Learning Unit I	
Week 1 / Aug. 20 / Holt 123 lab	<u>Lab</u> : 1) Overview of laboratory; 2) Ecology of lakes, streams, reservoirs; 3) Watersheds; 4) Geology, physiographic provinces; 5) Major river drainages in TN; 6) Reservoirs on Tennessee River. Read lab/posted notes.
Week 2 / Aug 27 / Holt 123 lab	<u>Lab</u> : 1) Physicochemical water quality – temperature, dissolved oxygen, pH, conductivity, turbidity; 2) Aquatic microbiota - study prepared slides/specimens of algae/protozoans, microinvertebrates; 3) Identify selected taxon groups. Read lab/posted notes.
Week 3 / Sept 3 / Holt 123 lab	<u>Lab</u> : 1) Aquatic macrofauna -- study preserved specimens of macroinvertebrates, fishes, amphibians; 2) Identify selected taxon groups; Read lab/posted notes.
Week 4 / Sept 10 / Field work -- Reservoir on Tennessee River	<u>Field Work</u> : 1) Water quality profiles – measure physicochemical conditions (temperature, dissolved oxygen, pH, conductivity, turbidity) at different depths in a reservoir (from surface to bottom); 2) Record field data and notes; 3) Discuss/interpret data; 4) Sketch map of field site; 5) Prepare graphic data summaries. Read lab/posted notes.
Week 5 / Sept. 17 / Field work – Cumberland Plateau streams	<u>Field Work</u> : 1) Sample water quality, habitat, and macrofauna in Cumberland Plateau streams (mining-impacted and control sites); 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 6 / Sept. 24 / Field work – Cumberland Plateau streams	<u>Field Work</u> : 1) Sample water quality, habitat, and macrofauna in Cumberland Plateau streams (mining-impacted and control sites); 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 7 / Oct. 1 (Fri.) / Holt 123	Lab Exam I

The University of Tennessee at Chattanooga

Laboratory Learning Unit II	
Week 8 / Oct. 8 / Field work – Ridge and Valley streams	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in Ridge and Valley streams; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 9 / Oct. 15 / Field work – Ridge and Valley streams	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in Ridge and Valley streams; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 10 / Oct. 22 / Field work – Reservoir on Tennessee River	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in a reservoir; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 11 / Oct. 29 / Field work – Reservoir on Tennessee River	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in a reservoir; 2) Record field data/notes; 3) Discuss/ interpret data; 4) Prepare graphic/tabular data summaries. Read lab/posted notes.
Week 12 / Nov 5 / Field work – Ridge and Valley streams	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in urban and non-urban streams in Ridge and Valley; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 13 / Nov. 12 / Field work – Ridge and Valley streams	<u>Field Work:</u> 1) Sample water quality, habitat, and macrofauna in urban and non-urban streams in Ridge and Valley; 2) Record field data/notes; 3) Sketch map of field site; 4) Prepare tabular data summaries; 5) Provide written interpretation of data. Read lab/posted notes.
Week 14 / Nov 19 (Fri.) / Holt 123	Lab Exam II; Field Notebook (compilation of student's data sheets, map sketches of all study sites; field records/notes, graphic/tabular data summaries) due.

COVID Absence Statement – Fall 2021 Revised

COVID Absences (face-to-face & blended hybrid version – 3rd person)

Students **must complete the** [COVID-19 Notification form](#) if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support.

Students who are instructed by university administration to stay home due to their responses are not to come to campus or attend face-to-face classes. Students who are cleared to be on campus and attend class are required to attend face-to-face class sessions. Students will not be penalized for COVID-19 related absences or late course assessments due to a COVID-19 related concerns unless they are unable to complete course learning outcomes. Faculty will work reasonably with students to identify ways to complete course requirements.

Students must, if they are asymptomatic or if their symptoms do not interfere with their ability to participate in the course, **continue to participate in the course using the online assets and tools that the instructor may make available through UTC Learn (Canvas) including:**

- Lecture/lab notes and related materials (posted in Canvas);
- Lecture/lab assignments and field data (posted in Canvas);
- Examples of completed assignments (posted in Canvas);
- Online assistance in the course (email, zoom).

If COVID-19 related illness results in any missed course work (face-to-face or online), **students must contact the instructor within 48 hours of recovering to plan make-up work.** Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. But please realize that class will continue, and students may find themselves in the situation where they are unable to complete all work by the end of the semester. In such a case, students should consider a late withdrawal or an incomplete grade. Please contact the Records Office (423-425-4416) to learn more about the late withdrawal process.

If students have COVID-19 disability related risk factors that may affect attendance, students are strongly encouraged to register with the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's [General Student Grievance \(Complaint\) Procedure](#) by filling out the [Student Complaint Form](#) and submitting to the Office of the Dean of Students.

BIOREMEDIATION

Fall 2022

BGES, BIOL 4430, CRN# 45267, ESC 4430, CRN# 45260, ESC 5040, CRN# 45321, Face to Face, 4 crt hrs

Instructor: Henry ("Rardy") Spratt; Office - Holt Hall Rm. 351-D

Email and Phone Number: henry-spratt@utc.edu; Office phone # 423-425-4383

Office Hours and Location: Zoom meetings will be set up for Wed 3 PM to 4 PM (email Zoom links will be sent out the morning of the office hour). In person Office hour meetings will be on Tues from 2 PM to 3 PM and Fri from 2 PM to 3 PM in Holt Hall 351-D. Individual appointments will be made by request for either Zoom or in person meetings. If any changes in this office hour schedule occur announcements will be made both in class and online.

Course Meeting Days, Times, and Location: Lecture = Tu 10:50 AM to 12:05 PM; Lec/Lab = Th 10:50 AM to 12:05 PM, Holt Hall Rm. 203. Lab = Th 1:40 PM to 4:30 PM, Holt Hall Rm. 331.

Course Catalog Description: A study of the potential use of biological systems in the remediation of areas contaminated with toxic pollutants. Lecture 3 hours, laboratory 3 hours.

Course Pre/Co Requisites: BIOL 3060 and BIOL 3250 and BIOL 3350 with minimum grades of C; and BIOL 4220; and CHEM 3010; or department head approval. Corequisites: either BIOL 4430L, ESC 4430L, or ESC 5040L, or department head approval. Laboratory/studio course fee will be assessed.

Course Student Learning Outcomes:

Course Objectives - Lecture:

- A) To discuss the nature of problems that might be candidates for bioremediation.
- B) To introduce the history of bioremediation.
- C) To introduce the biology of bioremediation.
- D) To consider enzymes that are important to bioremediation.
- E) To discuss the bioremediation of toxic wastes in aquatic ecosystems.
- F) To discuss the bioremediation of toxic wastes in aquatic ecosystems.
- G) To discuss the future of bioremediation and how this might link to human sustainability.

Course Objectives - Lab:

The primary objective of the laboratory portion of this class is to provide students the opportunity to develop experience with systems used to biologically remove contaminants from soil or aquatic

systems. Through the use of hands-on examples of tools used in bioremediation to study microbial remediation of various toxins in different habitats, students should be able to appreciate potential applications of this field of science. Studies conducted in the lab will be hypothesis-driven research projects conducted by small groups.

GRADUATE STUDENTS:

In this upper level undergraduate/graduate level course, graduate students are expected to self-instruct and in some cases use a team approach in mastering the material and completing assignments. Graduate students will take a leadership role in group exercises. Graduate students must also read and synthesize scholarly journal articles and lead class discussions in the lecture related to the articles. The instructor will provide guidance as deemed necessary. Graduate students are expected to function as self-directed learners, synthesizing information from this course and other courses and life experiences, and engage in substantial critical analysis with the goal of providing innovative perspectives on the field of bioremediation. As for exams, graduate students are expected to demonstrate a strong understanding of the lecture objectives covered on exams. Additionally, graduate students will be required to complete one additional question (not required of undergraduate students) on each exam designed to emphasize understanding and application of key concepts covered. Lastly, graduate students will also be required to write a detailed proposal based on one of the lab projects, or an article presented in the lecture. This proposal will require detailed introduction, literature review, objective, methodology, expected outcomes, budget, budget justification, and reference sections. This proposed work should be completely feasible using resources available at UTC. Additional information on this proposal will be provided prior to mid-term.

ALL STUDENTS:

Lecture - Much of the lecture will be used to introduce new topics. Discussions of any topics at the time they are introduced are welcomed. Students will demonstrate that they understand the above course objectives by exhibiting satisfactory performance on examinations and quizzes. Note that this semester we will have one meeting period on Tuesdays, and two meeting periods on Thursdays. The Tuesday meeting period will be devoted to the lecture. On Thursday, the earlier meeting period will be used both for lecture (to finish any unfinished items from the Tuesday lecture) and as a question/answer session for the labs. Thursday afternoon periods will be devoted to lab work necessary to conduct the assigned exercises.

Laboratory - The laboratory section of this course will include the completion of complex exercises that may require some time outside of scheduled lab period on Thursday afternoons. Actual times in the lab working on projects will be determined by group project needs. The class will be subdivided into small groups to conduct studies of bioremediation. Depending on enrollment in the course, these groups will be assigned based on having at least one graduate student per group to serve as that group's leader. Topics for study in the laboratory will be discussed during the first lab meeting. One characteristic of the topics of study is that they be brief enough to be accomplished in the time frame of the semester. The specifics of the lab exercises for are detailed in the lab manual assigned for this course (see Course Materials below for details). Group projects will be designed to allow for three distinct exercises based on "canned" procedures. Note that due to the fact that the liquid scintillation counter in the Biology Department's Radioactive Materials Lab (Holt Hall Rm. 301) has malfunctioned and cannot be

The University of Tennessee at Chattanooga

repaired will limit our ability to conduct the mineralization of herbicides lab exercise. A work around exercise will be established during the first week meeting of the lab. A final group project, which will be hypothesis driven, will be conducted as the culminating project of the laboratory. This final project will be based on techniques learned in one or more of the “canned” exercises conducted earlier in the semester. Three, brief laboratory reports (three to five typed, double-spaced pages) will be due during the semester (see below for due dates) describing the exercises conducted. A final lab report (10 to 12 pages) describing the hypothesis-based group project conducted (written as a scientific report – more information on this will be presented later) will be turned in with the final exam at the end of the semester.

Course Fees: A laboratory fee of \$50 will be assessed for the lab section of Bioremediation.

Required Course Materials:

LECTURE: Spratt, H. G., Jr. 2022. Bioremediation: Cleaning toxic waste with a little help from nature. Kendall Hunt Publ. Dubuque, IA. 164 pg. ISBN 978-8-7657-0772-2.

LAB MANUAL: Spratt, H.G. 2019. Laboratory microbiology for biology majors. 2nd Ed. Kendall Hunt Publ. Dubuque, IA. ISBN: 978-1-5249-8793-0.

Supplemental/Optional Course Materials: Periodically, articles on topics covered in lecture (or of greater interest to Bioremediation experts) will be posted on the UTC Learn Canvas course website. These articles will provide the basis for class discussions of the particular topic. Each graduate student (the schedule of who and when will be determined by the second week of class and will be based on the number of graduate students taking the class) will be given the responsibility of giving one or two 15-minute summary reports of these articles to the class.

Technology Requirements for Course: No specific devices or skills are required for this course regarding technology other than having computer access to the course’s UTC Learn web page. If you have technology needs to access your courses and/or complete course requirements in Canvas, [submit a request](https://new.utc.edu/information-technology/learning-from-home) (<https://new.utc.edu/information-technology/learning-from-home>) with Information Technology. If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Technology Skills Required for Course: The ability to use Microsoft Word and Excel will be important.

COVID-19 Policy, Student Accommodations, and Other University Policies: Please see the “Campus Syllabus - Fall 2022”, which is also posted in the BIOL 4720 Syllabus site on Canvas for details related to CoVid-19 and other University-wide policies. [Click here to enter text.](#)[Click here to enter text.](#)

Course Grading [Click here to enter text.](#)

Grading:

The University of Tennessee at Chattanooga

LECTURE	(total pts)	LABORATORY	(total pts)	GRAND TOTAL
3 Exams	300	Lab Reports (1 – 3)	300	
Final Exam	150	Final Lab Report	150	
Inst. Derived Part.	25	Inst. Derived Part.	25	
TOTAL	475	TOTAL	475	950
		GRAND TOTAL = 50% Lecture + 50% Laboratory		

FINAL COURSE GRADE (Any adjustments will be announced)

Undergraduate Students (950 pts)

A = 950-855 pts.

B = 854-760 pts.

C = 759-665 pts.

D = 664-570 pts.

F < 570 pts.

Graduate Students (1050 pts)*

A = 1050-945 pts.

B = 944-840 pts.

C = 839-735 pts.

D = 734-630 pts.

F < 630 pts.

*) Included for grad students = 100 pt. proposal

Course Grading Policy: All exams will be emailed to students by the end of the Monday of the week that the exam is scheduled. All questions will be of an essay nature. Students will be expected to answer the questions independently, citing references for all answers. The completed exams will be due the Friday of the week slated for the exam, by 5PM. Lab reports will be due at the lab meeting time indicated on the schedule.

Instructor Grading and Feedback Response Time: Graded exams will be returned the first meeting of the lecture on the week following the due date for the exams. Graded lab reports will be returned at the next meeting of the lab section the week following submission of the reports.

Course Policies

Late/Missing Work Policy: [Click here to enter text.](#)

Late Work & Make-up Policy – The penalty for any work turned in past the due date will be minus 5% per school day the work is late. Make-up exams will only be given in exceptional cases, or when official University business is involved. Such make-up exams for official university functions will only be allowed if the following conditions are met:

- Notification of the instructor by the student about being absent from class must occur before the absence
- A request must be made in writing (on paper or electronically)
- The request should include the event/conference and the name of the faculty advisor/sponsor (when possible the faculty sponsor should probably contact instructors on behalf of students who will be absent for educational/scholarship reasons)
- For lab reports, unless there are exceptional circumstances approved by Dr. Spratt, the late work penalty (see above) will apply.

The University of Tennessee at Chattanooga

Course Attendance Policy: Students in any senior level or graduate level course are expected to understand the need to take part in course activities. So, taking part lectures and lab sessions, and any Zoom meetings we might have will be expected of all students. Excessive absences from these meeting will be cause for reductions in student “Instructor Derived Participation” scores.

Course Participation/Contribution: See above.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve learning experiences at UTC. Toward the end of the semester, you will be emailed links to course evaluations and you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

Course Calendar/Schedule: TENTATIVE SCHEDULE:

LECTURE – FA 2022

ot	DAY	SUBJECT	READING
8/23	TU	Class Introduction, Scope of Bioremediation	Chapt #1
8/30	TU	Natural Toxins, Historical Attempts at Bioremediation – Human Wastes	“ Chapt #2
9/6	TU	Modern Sewage Treatment, The Biology of Bioremediation	Chapt #2, #3
9/13	TU	EXAM #1 , The Biology of Bioremediation	Chapt #3
9/20	TU	Enzymes Involved in Bioremediation	Chapt #4
9/27	TU	Enzymes, Mineralization of Organic Matter, Options for Inorganics	Chapt #4
10/4	TU	Bioremediation of Toxic Organic Matter in Aquatic Ecosystems	Chapt #5
10/11	TU	Bioremediation OM & Inorganic Compounds in Aquatic Ecosystems	Chapt #5, #6
10/18	TU	FALL BREAK	-----
10/25	TU	EXAM #2 , Bioremediation of Inorganic Compounds in Aquatic Ecosystems	Chapt #6
11/1	TU	Bioremediation of Toxic Chemicals in Soils	Chapt #7
11/8	TU	Bioremediation of Toxic Chemicals in Soils	Chapt #7
11/15	TU	EXAM #3 , Future of Bioremediation	Chapt #8
11/22	TU	Future of Bioremediation & Human Sustainability, Review	Chapt #8
12/13	TU	FINAL EXAM DUE (5 PM)	-----

LABORATORY – FA 2022 (Thursday Lab Work Day)

The University of Tennessee at Chattanooga

DATE	DAY	SUBJECT	READING
8/25	TH	Introduction, Lab Safety	Spratt Lab Manual (p. 135-140)
9/1	TH	Initiation of 1 st Group Projects – Degradation of Waste Oil	Spratt Lab Manual (Ex. 20)
9/8	TH	Group Work – Degradation of Waste Oil	“
9/15	TH	“ – Degradation of Waste Oil	“
9/22	TH	FIRST LAB REPORT DUE , Initiation of 2 nd Group Project	Spratt Lab Manual (Ex. 18)
9/29	TH	Group Work – Microbial Dye Degradation	“
10/6	TH	“ – Microbial Dye Degradation	“
10/13	TH	SECOND LAB REPORT DUE , Initiation of 3 rd Group Project	Spratt Lab Manual (Ex. 20)
10/20	TH	Group Work – Degradation of Waste Oil – Enrichment Cultures	“
10/27	TH	“ – Degradation of Waste Oil – Enrichment Cultures	“
11/3	TH	THIRD LAB REPORT DUE , Initiation of Final Group Project	Spratt Lab Manual (Ex. 18 - 20)
11/10	TH	Group Work	“
11/17	TH	“	“
11/22	TH	Discussions on Final lab report	“
12/13	TU	FINAL LAB REPORT DUE WITH FINAL EXAM (5 PM)	

Geographic Information

Systems Spring 2022

Biology, Geology, and Environmental Science, ESC 5660/5660L, 24128/24129, Face-to-Face Lecture & Laboratory, 3 credit hours

Instructor: Thomas P. Wilson, Ph.D., GISP, UC Foundation Professor

Email and Phone Number: Thomas-wilson@utc.edu, 423-425-4713(Office) or 423-425-4341(BGE Main Office, Holt Hall 215)

Office Hours and Location: 1100-1150 MW, Holt Hall 306A

Course Meeting Days, Times, and Location: MW 1200-1250, Holt Hall 125; M 1400-1550, SIMC 102

Course Catalog Description: Introduction to fundamental principles of geographic information systems (GIS). Applications, data structures and basic functions of GIS. GIS computer programs are used to demonstrate basic GIS functions. Lecture 2 hours, laboratory 2 hours.

Course Pre/Co Requisites: Prerequisite: Department Head approval. Corequisite: ESC 5660L.

Course Student Learning Outcomes: 1. Students are able to formulate appropriate objectives and/or hypotheses, and use appropriate geospatial tools and methodologies, to collect, analyze, and interpret data within the context of environmental research. 2. Students are able to retrieve information relevant to geospatial & environmental research from the scientific literature and are able to evaluate the literature critically. 3. Students are able to conduct themselves in a professional manner while communicating geospatial & environmental information in both oral and written formats.

Course Fees: *Laboratory/studio course fee will be assessed. Check with the Bursar's Office on costs.*

Required Course Materials: Access to a computer and the internet.

Technology Requirements for Course: You will need to use a computer and associated software to analysis, compile, draft and edit your coursework. You should also have access to a modern up-to-date computer with a high-speed internet connection, and a portable external hard drive to store and back-up all of your necessary data and associated files. You should be willing to adequately navigate technology and computers by being understand the process involved in partitioning hard drives, networking connections, executing file transfer protocols, managing databases, extracting files with correct path destinations, scripting using JAVA and Python (or similar computer software). So, your technology requirements in this course do go beyond using UTC email, Blackboard, and your mobile phone.

Technology Skills Required for Course: This is a 5000 level science majors course and does build upon your prerequisite course work and the skills that you have mastered in those underclassman courses.

Technology Support: If you have problems with your UTC email account or with UTC Learn, contact IT

Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

COVID-19 Absence Policy: COVID Absences Students must complete the COVID-19 Notification form if they are positive for COVID-19; symptomatic for COVID-19; exposed (close contact) to a known case of COVID-19 / someone positive for COVID-19; or potentially exposed to a known case of COVID-19 / someone positive for COVID-19. Documentation will be provided to the instructor by the Office of Student Outreach & Support.

If COVID-19 related illness or quarantine results in any missed classes or course work, students must contact the instructor within 48 hours of completing the COVID-19 Notification form to plan make-up classes and course work. Where possible, faculty will work with students to identify ways to complete course requirements but are not required to change or offer additional modalities. Makeup work must be completed according to the plan devised by the instructor in coordination with the student. It remains the student's responsibility to complete any missed work such as assignments, tests, quizzes, labs, or projects outside of scheduled class time. Please realize that class will continue, and students may find themselves in the situation where they are unable to complete work in a timely manner. In such a case, students may consider requesting an Exception to the Withdrawal Deadline or an incomplete grade. Please contact the Office of the University Registrar (423-425-4416) to learn more about the late withdrawal process. Some departments may have department bylaws or student handbook requirements that specify a limit to the number of classes or amount of work that can be missed. In these cases, the department requirements take precedence.

If students have COVID-19 disability-related risk factors that may indicate a need for additional academic accommodations, students are strongly encouraged to register with and/or contact the Disability Resource Center (423-425-4006) in order to receive necessary accommodations.

If students believe the instructor has not made reasonable and appropriate accommodations for absences, or makeup assignments, projects, labs, or exams due to COVID-19, students have the right to appeal according to UTC's [General Student Grievance \(Complaint\) Procedure](#) by filling out the [Student Complaint Form](#) and submitting to the Office of the Dean of Students.

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Student Technology: If you have technology needs to access your courses and/or complete course requirements in Canvas, [submit a request](#) (<https://new.utc.edu/information-technology/learning-from-home>) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the [Disability Resource Center](#) (<https://www.utc.edu/disability-resource-center/index.php>) at 423-425-4006 or email DRC@utc.edu.

Course Assessments and Requirements:

General Expectations (A-E): **General expectations:** Advanced Applications of Remote Sensing and GIS is an upper-level to graduate level course and as such students will be expected to perform at a higher

level than would be expected in an introductory undergraduate course. Where a student in an introductory undergraduate course would be expected to generally gain knowledge and comprehend its meaning with minimal to moderate application, as an upper-level student in this class you will be expected to analyze scenarios and real-life case studies with the goal of synthesizing information obtain in this course, other related courses and life experiences to provide cogent evaluation and recommendations that would result in positive, beneficial impact regarding an issue.

Course Objectives: In this class we will be involved with one of the most exciting and fastest growing fields related to geography. Integrated Geospatial Sciences are revolutionizing the decision-making capabilities of resource managers and planners by giving a wealth of data at their fingertips. This class is designed to help you: Comprehend the theories behind geographic information systems and remote sensing, including their usefulness; Understand how to use GIS as a planning tool; Gain practical “hands-on” experience in manipulating and analyzing data in a GIS; Master GIS concepts as part of an integrated Geospatial Sciences Framework; During lecture we will talk about general theory behind GIS concepts, discuss readings and assignments, have demonstrations on computer techniques, and troubleshoot problems from assignments. Therefore, you will be asked to participate in and lead discussions.

Reading assignments & Journal Briefs: Not only must you read appropriate text assignments, but literature in trade and scholar journals must be read and used in class discussions, examinations, and special projects and /or reports. Examinations will be primarily essay requiring the student to write lucid arguments and defenses for answers. Rote recall of textbook or journal reading assignments as responses for examination essays may be consider satisfactory but not evident of the higher order learning outcomes expected of students in this course. **Design Your Own Geospatial Study** – This semester, you will design your own geospatial study. Your proposal must integrate the geospatial sciences (i.e., GIS and Remote Sensing) to demonstrate your knowledge of the core areas of environmental science (i.e., including ecology, survey methodology, environmental resources, environmental law and policy, and environmental ethics) as they exemplify the interdisciplinary nature of the field. In short, you must follow the scientific method and be cautious of data/knowledge gaps, sample size, procedures/methods and bias/inconsistencies. Please clearly state your objectives, outline your methods and materials, and provide a short description of your projected outcomes, timeline and budget. You are required to make your project feasible and be geospatially and environmentally relevant. You will provide me with a typed document not to exceed 500 words about your geospatial study. In addition, to the 500 word essay, you must also include a flow chart that outlines your thought process on how you will carry out this proposed study and you must have 10 references that tie GIS & Remote Sensing to the 5 core areas of Environmental Science (Due March 7th).

ESRI GIS Modules, Labs, Reports & Assignments: In the laboratory portion of this course, students are expected to self-instruct and in some cases use a team approach in mastering the material and completing assignments. The instructor and laboratory staff are available and will provide guidance as deemed necessary. However, unlike an introductory undergraduate lab where the student is guided mostly by the instructor to specific information or in conducting a lab experiment, as an advanced geospatial science student you are expected to function as a self-directed learner and researcher. Each student will be responsible for being a team leader and mentoring a group of peers during the semester. Lab reports and assignments must be well-written and have a comprehensive analysis provided by each student.

Course Grading

GRADING: COURSE WILL BE BASED ON 700 POINTS for ESC 5660.

Two written lecture exams @ 100 points each	200 points
Comprehensive laboratory practical exam @ 100 points	100 points
Ten laboratory exercises/modules @ 10 points each	100 points*
Four journal briefs @ 25 points each	100 points
GIS Grant Proposal (see me for details)	100 points
GIS Grant Proposal Presentation (see me for details)	50 points
Design a GIS Lecture in Powerpoint	25 points
Design a GIS Laboratory in ArcGIS	25 points
(*) Must include at least two modules from each transcript sessions	

Exams will not be curved. In other words the points that you earned reflect your score. Your letter grade will be determined by a straight-collegiate scale at the close of the semester (**ABSOLUTELY NO EXCEPTIONS**).

Graduate Grading SCALE – ESC 5660
A= 630 - 700
B= 560 – 629.999
<i>F= 559.99 and Below</i>

Course Grading Policy: This course uses a collegiate straight scale.

JOURNAL BRIEFS: Staying abreast of recently published literature is essential for becoming knowledgeable in the rapidly changing field of GIS. Besides you assigned readings, you are expected to peruse through recent books, journals or technical papers related to GIS. At predetermined intervals throughout the semester, you will be required to turn in a typed journal brief on a particular aspect of GIS research or application. With each bibliographic reference, the student will submit a typed paragraph summarizing the information contained in the article. In addition, each student must complete a single summary table for their collection of research articles. Note: I will not accept duplicate research articles...so once an article has been used it cannot be submitted again during the semester. The specific details for the paragraph summary are outlined below. Instructions for Journal Briefs You have 5 paper assignments due this semester. You are to find a published journal article (since 1980) from a science journal (no magazine articles allowed) that focus on Landscape/Spatial Ecology using Drones to assessing wildlife and/or habitats. You must read this article, obtain background information on the application, ecosystem and species studied (etc.), evaluate the article, and provide me a copy of the journal article, your electronic excel table, and your paper by the **due date (1/24, 1/31, 2/14, 2/28)**. Note: Journal Briefs are not a reproduction of the author's abstract!! Finding papers: You cannot use any of the journal articles cited in your chosen GIS textbooks or in their Bibliographies. Additionally, each of your journal articles should preferably be about different issues, species, techniques, ecosystems, or problems, etc. The papers must be on the geospatial aspects of Landscapes/Spatial Ecology/Urban Planning/Human

The University of Tennessee at Chattanooga

Health/Transportation/Business and should involve some sort of hypothesis testing or problem solving. To find an article you can look through the science and geography journals in the library. However, the best way to search for an article is to use one of the library databases. Please visit the library web page for further information on how to use the databases, and how to request journal articles that are not in our library collection. Because you are interested in a particular assessment tool, you may want to look at the journals dedicated to these concepts. Also, look in Geo Info Systems, GIS World, Cartographica, Cartography & GIS, Photogrammetric Engineering and Remote Sensing, and ARC user. You might find good papers using Drones in Wildlife Ecology journals, such as, Ecology, and Journal of Wildlife Management, etc. You might find it helpful to browse the contents of journals in addition to or instead of doing big online Abstract search. Many journals now maintain home pages where you can browse the tables of contents of current and recent issues. Some even let you download copies, although most do not unless you have a membership. The UTC library web page has a section devoted to electronic journals with links to many of the journals home pages. Content of your papers: You should address, in prose format, the following questions:

1. What is the question being addressed?
2. What is the functional group being studied?
3. What technique(s) were used?
4. Was the sampling design appropriate and/ or adequate for the question being addressed? Why or why not?
5. Was the statistical analysis appropriate? Explain!
6. Were any useful methods developed that could be adapted to others research? Any new analytical tests or analyzing the data? If so, do the authors provide software for others to use?
7. What were the finding and conclusions? Were these significant? If so, why or why not?
8. What was your favorite part of this study? What was your least favorite part?

Format of your papers: Papers must be typed and laser printed on decent quality paper, paper size = 8.5 x 11, single line spacing, left, right, top, and bottom margins = 1", and printed on one side of the paper only. Papers must be at 1 page and cannot exceed 2 pages. Put your name at the top of the first page, followed by the title of your journal article. Staple your 1-2 page paper and the journal article together. Do not use report covers or page titles please. Please include a PDF of your article(s). Format of your Summary Table: Tables must be formatted electronically using Microsoft Excel. Your table headings should minimally include those indicated in the sample excel file (please see me) but you should include additional fields.

Instructor Grading and Feedback Response Time: The grading follows a truncated collegiate straight scale, and feedback is contingent on the length of the assignment. In other words, if you are given weeks to work on an assignment do not expect to get it back the next day. Most assignments are returned within 7-10 **business days**.

Course and Institutional Policies

Late/Missing Work Policy: You cannot make up assignments in the form of field trips, pop quizzes, projects, participation, or exams. These assignments are due on designated days but see

schedule. A missed assignment counts as a ZERO, meaning that you must attend class and adhere to the schedule to receive any credit. TAKE HOME MESSAGE: Come to class, don't miss assignments.

Electronic Device Usage: I would like to discourage distractions during our meeting times. This course cannot be filmed or recorded electronically without the prior and written consent of the instructor. If you plan to use a computer or tablet to take notes, then you must sit in the row along the back wall of the classroom. Use of electronic cigarettes is prohibited. Please silence all mobile communication devices (e.g., cell or smart phones, etc.) and store them in your bag. They should remain stored for the entire class period. These devices should not emit an audible noise during class time. If a pager, cellular telephone or other electronic device emits any audible noise during the class I will deduct 10 points for each incident. In short, any student (or the entire class) will be penalized ten (10) points for each incident involving disruption of the class.

Statement on Disruptive Students in the Classroom: The University will not tolerate disorderly or disruptive conduct which substantially threatens, harms, or interferes with university personnel or orderly university processes and functions. A faculty member may require a student to leave the class room when his/her behavior disrupts the learning environment of the class. A student found responsible for disruptive behavior in the classroom may be administratively withdrawn from the course. I hope to keep you excited and engaged in class so that your interest doesn't wander. But I must ask that you avoid distractions during our class meetings such as the use of cell phones, texting, instant messaging, pager beeping, or the use of other unapproved electronic devices.

Student Conduct Policy: UTC's Academic Integrity Policy is stated in the [Student Handbook](#).

Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy: *With the exception of school holidays, attendance is mandatory! You are responsible for the material covered whether you are in attendance or not, including any announcements made during class.*

Course Participation/Contribution: In short, you are expected to attend class and actually speak up and make a contribution to the course in the form of relevant discussion on a regular basis.

Course Learning Evaluation: Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

The University of Tennessee at Chattanooga

Course Calendar/Schedule: See Tentative Lecture & Laboratory Schedules Below

Week	Dates	Lecture Topic
1 & 2	1/10 & 18	Introduction, Logistics & Course Outline. GIS Data and Maps 1/17 Holiday- No Classes
3 & 4	1/24 & 31	Managing GIS Data
5 & 6	2/7 & 14	Coordinate Systems
7 & 8	2/21 & 28	Mapping GIS Data
9, 10, & 11	3/7 & 21	2/26 Midterm Exam Presenting GIS Data, Attribute Data, Basic Editing
	3/14 - 20	SPRING BREAK-NO CLASSES
12 & 13	3/28 & 4/4	Geospatial Data Quality and Analysis- Queries, Joins, Overlays & Geoprocessing Raster Analysis, Functions & Capabilities
14	4/11	Editing & Topology Geodatabases & Metadata
15	4/18	Continued from previous
16	4/25	Graduate Presentations

Final Exam Wednesday, April 27, 2022, from 1030-1230 in Holt Hall 125

The University of Tennessee at Chattanooga

Week	Dates	Laboratory Module or Topic
1	1/10	<u>Beginning GIS- Set 1</u> ArcGIS Pro Tutorial (30 Minutes) – 3 Goals: A geographic information system (GIS) is a way to display and analyze data using maps. In this lesson, you'll learn the basics of ArcGIS Pro, a desktop GIS application. https://www.esri.com/training/catalog/57660c6ebb54adb30c945412/get-started-with-arcgis-pro/ and Lesson Path Below Getting Started with ArcGIS Pro (for ArcMap users only; 5.5 hours) - 4 Goals: Learn the essential concepts that you need to jumpstart your productivity with ArcGIS Pro. This course introduces the ribbon-style interface, project-based organization, key capabilities, and ArcGIS Pro terminology. https://www.esri.com/training/catalog/57630435851d31e02a43f007/getting-started-with-arcgis-pro/ or ArcGIS Fundamentals (7.5 hours)- 3 Goals: ArcGIS combines the science of geography with powerful GIS technology to help you make smarter decisions. Discover how to use maps to explore data in new ways and gain deeper understanding. Learn how to share these insights and collaborate with others through web maps and apps, all built with ArcGIS. https://www.esri.com/training/catalog/618ac4474a893555070a7101/arcgis-fundamentals/
2	1/17	<u>MLK Holiday NO CLASSES</u>
3	1/24	<u>Continue with your training...Getting Started with GIS (see above) with 5 exercises.</u>
4	<u>1/31*</u>	<u>All Modules and Exercises Due 1/31*</u>
5	2/7	<u>Beginning GIS- Set 2</u>
6	2/14	Getting Started with Data Management (1.25 hours) with 2 goals. High-quality GIS analysis requires high-quality GIS data. But what makes GIS data unique? Explore how GIS data is structured, stored, and accessed in this entry-level course. https://www.esri.com/training/catalog/5c9a7395190cf23eac62a998/getting-started-with-data-management/ and Getting Started with Mapping and Visualization (1.25 hours) with 2 goals. In this course, you will explore 2D and 3D information products that you can create using ArcGIS. You will learn how to identify and choose the best information product for your audience and needs. https://www.esri.com/training/catalog/5c9a7354190cf23eac62a92f/getting-started-with-mapping-and-visualization/ and Getting Started with Spatial Analysis (1.25 hours) with 2 goals. Spatial analysis helps you to understand your world. Explore how the six categories of spatial analysis can help you answer geographic questions. Navigate these questions using the spatial analysis workflow and learn how to apply it to your own projects. https://www.esri.com/training/catalog/5bca58f8f77b99238f845e1c/getting-started-with-spatial-analysis/
7	<u>2/21*</u>	<u>Above Modules/Exercises are Due 2/21*</u>
8	2/28	<u>Beginning GIS- Set 3</u>
9	<u>3/7*</u>	Editing Basics in ArcGIS Pro (2 hours) with 2 goals. As a GIS professional, you want to be confident that your data is up to date and accurate. ArcGIS Pro provides editing tools that allow you to update existing features or create new features. Using editing functionality in ArcGIS Pro, you can change the geometry of features or the informational attributes. This course will teach you editing basics and how to use workflows. https://www.esri.com/training/catalog/5a9f11d1c5c7c34872fcc218/editing-basics-in-arcgis-pro/ Getting Started with the Geodatabase (3.5 hours) with 4 goals. The geodatabase is the native data storage format for ArcGIS. Learn about geodatabase components and functionality as well as steps to create and add data to a file geodatabase. This course prepares you for courses that focus on advanced geodatabase components. https://www.esri.com/training/catalog/57630436851d31e02a43f19e/getting-started-with-the-geodatabase/ <u>Above Modules/Exercises are Due 3/7*</u>
<u>10</u>	<u>3/14</u>	<u>SPRING BREAK-NO CLASSES</u>

The University of Tennessee at Chattanooga

11	3/21	Intermediate level GIS Modules/Exercises (Due 4/11*): - Building Geoprocessing Models using ArcGIS Pro: https://www.esri.com/training/catalog/57630433851d31e02a43eebc/building-geoprocessing-models-using-arcgis-pro/ - Basics of Geographic Coordinate Systems ArcGIS: https://www.esri.com/training/catalog/57630435851d31e02a43efe7/basics-of-geographic-coordinate-systems/ Advanced level GIS Modules/Exercises (Due 4/18*): 3D Visualization and Analytics Fundamentals: https://www.esri.com/training/catalog/60d1f986b588b75ae084bc59/3d-visualization-and-analytics-fundamentals/ or - Crime Analysis Solution: Cell Phone Analysis: https://www.esri.com/training/catalog/5e8ce8d81fe054449dca1c90/crime-analysis-solution%3A-cell-phone-analysis/ - Basics of Python (ArcGIS): https://www.esri.com/training/catalog/57630436851d31e02a43f13c/python-for-everyone/ - Work Flows using Python: https://www.esri.com/training/catalog/5763042c851d31e02a43ed84/python-scripting-for-geoprocessing-workflows/
12	3/28	
13	4/4	
14 & 15	<u>4/11*</u> & <u>4/18*</u>	
16	4/25	<u>Comprehensive Laboratory Practical (Module 1 through Advanced)</u>
(*) Indicates when ESRI modules and transcript are due. Transcript must be ESRI valid and include all proceeding modules and associated scores. For example, on 1/31 Modules 1-5 due, on 2/21 Modules 6- 10 are due, on 3/7 Modules 11-13 are due, on 4/11 two intermediate modules are due, and on 4/18 two advanced modules are due.		

For access to current ArcPro references please see the following website-

[Esri Documentation | Up-to-date documentation for ArcGIS and more | ArcGIS](#)

For access to older ArcGIS references please see the following website- [Archive—](#)

[Links to archived documentation for ArcGIS 10.2 and earlier](#)

For access to an excellent online reference for ArcGIS 10.X please see the following website-

<http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html>

The University of Tennessee at Chattanooga

CASE STUDIES IN ENVIRONMENTAL PROBLEMS

Spring 2023

Department of Biology, Geology, and Environmental Science
ESC 5180, CRN No. 25048, Face-to-Face Course, 3 credit hours

Instructor: John C. Tucker

Email and Phone: John-Tucker@utc.edu; 423-425-4341

Office Hours and Location: Tuesday 3:00-3:50, Wednesday 10:30-11:20, Thursday 3:00-3:50, and by advance appointment, 232K Holt Hall

Course Meeting Days, Time, and Location: T,Th 10:50a.m. - 12:05p.m., Room 229, Holt Hall

Course Catalog Description

In depth study of the application of environmental law and policy to specific environmental problems using the case study method. Course will focus on four factors in each case study: 1) characterize the environment, 2) identify human modification to the environment, 3) examine law and policy responses to modification of the environment, and 4) critique the responses. Examples of potential case studies include South Chattanooga, Tellico Dam, Pigeon River, Florida Everglades, New Jersey Pinelands, Pacific Northwest Forests, and the Brazilian Pantanal.

Course Pre/Co Requisites: None

Course Student Learning Outcomes (SLOs)

After completing this course students will be able to:

1. Demonstrate knowledge of social, economic, and environmental impacts of human activities on natural systems.
2. Demonstrate knowledge of how society responds to degraded natural systems through law and policy.
3. Demonstrate knowledge of scientific, social, economic, policy, and law tools to protect and restore natural systems.
4. Apply law and policy concepts from case studies to resolve real-world and hypothetical scenarios.
5. Research, develop, and present an environmental case study to upper-level undergraduate environmental science students that involves scientific, social, economic, policy, and law issues.

6. Create and administer an interactive capstone exercise that engages upper-level undergraduate environmental science students in critical analysis of scientific, social, economic, policy, and law issues toward resolving an environmental situation.

Required Course Materials

The instructor will post materials on the class Canvas site. The instructor may also provide in class handouts.

Technology Requirements for Course: Computer, CANVAS, internet, email, and possibly Zoom.

Technology/Digital Literacy Skills Required for Course: Ability to use and communicate effectively using the technology listed above (computer, word processing, CANVAS, internet, email, and Zoom).

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Course Assessments and Requirements

The course will examine case history studies of problems in environmental management. Students will explore the role of science, society, law and policy in management and regulation of natural resources and the environment. For each case study we will characterize the environment, identify human modifications to the environment, examine law and policy responses to modification of the environment, and critique the responses. The course requires substantial in-class participation and internet research.

Students must attend class regularly, be prepared to discuss assigned readings and other matters in class, and participate in in-class exercises in order to do well in this course. There will be three examinations. Exam questions may be multiple choice, fill in the blank, short answer, and essay. There will be homework assignments and in-class exercises.

All homework answers and the take home final exam must be typed and turned in online through CANVAS. Assessments include

- **Homework Assignments:** Homework assignments are intended to engage you in the course content and build your critical thinking skills. Homework assignments will be announced in class and on CANVAS at least one week prior to the due date. All homework answers must be typed and turned in online through CANVAS.
 - o **Plagiarism - If plagiarism is detected, you will receive a zero for the assignment. If detected a 2nd time, you will fail the course.** To avoid plagiarizing, write using your own words, properly cite your sources, and never copy and paste from the internet or from the work of others.
- **Exams:** There are two exams during the semester. Exam questions may be multiple choice, fill in the blank, short answer, and essay. There is no final exam.
- **In-class Exercises and Class Participation:** There will be several in-class exercises throughout the semester. These will be announced ahead of time. There are no in-class exercise makeups. Class participation includes your attendance and contribution to in-class discussions.
- **Case Study 7:** Graduate students will develop and present to the class a case study concerning a real-world environmental situation. The topic must be approved by Professor Tucker. You

should provide background reading materials to the undergraduate students.

- **Capstone Assignment:** Graduate students will develop and oversee a major in-class exercise near the end of the semester. The capstone exercise may, but is not required to, relate to one or more of the case studies covered in class. You should provide materials and roles for the exercise.
- **Reflection Assignment:** Your essay must be typed and turned in through Canvas.

Your final grade in the class is based on the following components and weights:

2 Exams (20% each)	40%
Homework Assignments	10%
Exercises & Class Participation	10%
Case Study 7	20%
Capstone Assignment	15%
Reflection Assignment	5%
Total	100%

Course Grading

Course Grading Policy: Grades are based upon the three exam scores, homework assignments, in-class quizzes and exercises, and participation in the in-class capstone assignment.

A 90 - 100 points, B 80-89 points, C 70-79 points, D 60-69 points, F 0-59 points

Instructor Grading and Feedback Response Time: Exams will be graded and returned within two weeks of being administered. I will try my best to grade quizzes and homework within 1-1.5 weeks of the due date.

Course and Institutional Policies

Missed/Makeup Exams:

There will be NO EARLY EXAMS OR MAKE UP EXAMS, except under extenuating circumstances as determined by the professor and **ONLY** if you **are granted permission from the professor prior to the exam**. Otherwise, you will earn a zero for missed work.

Late or Missed Assignments:

A zero will be recorded for missed homework assignments and included in final course grade calculation. Late assignments are not allowed without approval of the instructor. There are no exercise makeups.

Student Conduct Policies: Students must comply with UTC's [Honor Code](#) and [Code of Conduct](#).

Honor Code Pledge: As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus- wide climate of honesty and integrity.

Honor Code Violations: Violation of the honor Code will result in an automatic zero on the assignment or exam, an F in the class, and referral to UTC Honor Court.

Course Attendance Policy: You are required to attend face-to-face class meetings and participate in class discussions during class meetings, including the in-class capstone assignment.

Cell Phones & Other Electronic Equipment: Turn off your cell phone or other electronic equipment before you enter class. Sending or receiving text messages or calls is distracting and you will be asked to leave class if you engage in this activity. You may use a laptop to take notes.

Course Participation/Contribution: In the classroom, students are expected to arrive on time to every class and stay until dismissal, ask and answer questions, and keep phones on silent and out of sight. Participation in in-class activities will count toward your final grade. Out of the classroom, students are expected to regularly check the Canvas Announcements and MOCSNet email, read relevant textbook pages, complete all homework assignments, and study a minimum of 6 hours per week. See course assessments and requirements section of this syllabus.

Student Accommodations: If you have accessibility and accommodation requests, contact the [Disability Resource Center](#) at 423-425-4006 or email DRC@utc.edu.

UTC Campus Syllabus: Students must review and comply with all provisions of the UTC Campus Syllabus. The UTC Campus Syllabus is posted in the CANVAS site for this course.

Course Calendar/Schedule:

CASE STUDIES IN ENVIRONMENTAL PROBLEMS COURSE OUTLINE

This outline is subject to change and it is the responsibility of the student to keep informed of changes, new materials, missed content.

Introduction

Course Overview

Tools for environmental
protection Policy
Development Approaches

U.S. Institutions and
Authority Sources of Law

Water Pollution and Management

Case Study 1: Intrastate Natural System - The Everglades

Case Study 2: International Natural System - Pantanal and Hidrovia

Case Study 3: Interstate Natural System - Apalachicola/Flint/Chatahoochee System

Biodiversity Conservation

Case Study 4: Commercial Fish and Shrimp Harvests and the Issue of By-Catch in the
Southeast Case Study 5: Cherokee National Forest

Natural System Conservation

Case Study 6: Riparian Habitat Protection- The Wekiva/Econlockhatchee/Tomoka
Rivers Case Study 7: TBA – Developed and presented by Graduate Students

Capstone Exercise

Wk	Day	Date	Topic
1	T	1/10	Introduction & Background
	Th	1/12	Background
2	T	1/17	<u>Case Study 1</u> : Intrastate Natural System – The Kissimmee/Lake Okeechobee/Everglades (KLOE) System
	Th	1/19	KLOE
3	T	1/24	KLOE
	Th	1/26	KLOE
4	T	1/31	KLOE
	Th	2/2	KLOE
5	T	2/7	<u>Case Study 2</u> : International Natural System - Pantanal and Hidrovia
	Th	2/9	Pantanal
6	T	2/14	Pantanal
	Th	2/16	<u>Case Study 3</u> : Interstate Natural System - Apalachicola/Flint/Chatahoochee System
7	T	2/21	ACF
	Th	2/23	ACF
8	T	2/28	EXAM 1
	Th	3/2	<u>Case Study 4</u> : Commercial Fish and Shrimp Harvests and the Issue of By-Catch in the Southeast
9	T	3/7	Coastal Fisheries

	Th	3/9	Coastal Fisheries
10	T	3/14	HOLIDAY
	Th	3/16	HOLIDAY
11	T	3/21	Case Study 5: Cherokee National Forest and Ruth's Golden Astor
	Th	3/23	Ruth's Golden Astor
12	T	3/28	EXAM 2
	Th	3/30	Case Study 6: Riparian Habitat Protection- The Wekiva/Econlockhatchee/Tomoka Rivers Wekiva River
13	T	4/4	Riparian Habitat
	Th	4/6	Riparian Habitat
14	T	4/11	Riparian Habitat
	Th	4/13	Case Study 7: TBA – Developed & Presented by Graduate Students
15	T	4/18	TBA – Developed & Presented by Graduate Students
	Th	4/20	Capstone Exercise – Developed and Led by Graduate Students
		TBA	Reflection Assignment

Developed and administered by graduate students.

CASE STUDIES IN ENVIRONMENTAL PROBLEMS

ESC 5180, T,Th 10:50a.m. - 12:05p.m.

Room 229, Holt Hall

DRAFT SCHEDULE (readings will be posted in Canvas)

This schedule may be adjust

Appendix 4-A

University of Tennessee at Chattanooga Faculty Handbook

Preface

FACULTY HANDBOOK

The administration and faculty of the University of Tennessee at Chattanooga ("UTC") share responsibility for effectively conducting the academic affairs of UTC. Institutional success depends upon the mutual respect and thoughtfulness of the faculty and the UTC administration. Both the faculty and the UTC administration are employed by The University of Tennessee (the "University") and have specific responsibilities that can be successfully discharged only with the support and counsel of the other. UTC faculty members are professionals whose services have been obtained by the University through its administrators on behalf of UTC and for the sake of UTC's students.

The Faculty Handbook is intended to be a general summary of university governance, policies, guidelines, services, and resources. UTC maintains a copy of the current Faculty Handbook on the [Faculty Senate website](#). The Faculty Handbook, along with [UT Policy HR0580 - Code of Conduct](#), should be read carefully by all members of the faculty.

Collegiate and departmental bylaws do not supersede and may not conflict with the contents of this Faculty Handbook. In the event of any conflict or inconsistency between Board policy and this Faculty Handbook, Board policy will take precedence.

Current versions of the Board and UT System policies are available on the [UT System policy website](#).

UTC campus policies and procedures are available on the [UTC policy website](#).

Additional information about UTC accreditation, memberships, history, facts, and statistics may be found on the UTC website [here](#).

Chapter 1

University Organization and Governance

1.1. THE UNIVERSITY OF TENNESSEE SYSTEM

The University of Tennessee is the state's land-grant, higher education institution and flagship public university. It is comprised of campuses at Knoxville, Chattanooga, and Martin; the Health Science Center at Memphis; the Space Institute at Tullahoma; and the statewide Institute of Agriculture and Institute for Public Service.

The University of Tennessee System has a presence in each of Tennessee's 95 counties. Through the combined force of its education, research, and outreach, the University serves students, business and industry, schools, governments, organizations, and citizens throughout the state. The mission statement of The University of Tennessee System can be found [here](#).

1.2. THE UNIVERSITY OF TENNESSEE AT CHATTANOOGA

Since its founding as Chattanooga University in 1886, The University of Tennessee at Chattanooga ("UTC") has developed an institutional excellence which rests on an unusual blend of the private and public traditions of American education.

For 83 years the university was a private school. Three years after its founding, the university was consolidated with another church-affiliated school, East Tennessee Wesleyan University at Athens, under the name of Grant University. In 1907, the university adopted the name University of Chattanooga.

In 1969, the University of Chattanooga and a junior college, Chattanooga City College, merged with The University of Tennessee to form The University of Tennessee at Chattanooga campus.

UTC is a driving force for achieving excellence by actively engaging students, faculty and staff; embracing diversity and inclusion; inspiring positive change; and enriching and sustaining our community. The mission statement of UTC can be found [here](#).

1.3. UNIVERSITY ORGANIZATION AND GOVERNANCE

1.3.1. UT Board of Trustees (link: [Board of Trustees website](#))

The governing body of The University of Tennessee is the Board of Trustees (the "Board"). The Board exercises general control and oversight of The University of Tennessee System and its institutions, delegating to the President the executive management and administrative authority necessary and appropriate for the efficient administration of the system or to carry out the mission of the system; and delegating to each Chancellor the executive management and administrative authority necessary and appropriate for the efficient administration of each institution and its programs, subject to the general supervision of the President.

The Board reserves to itself, among other matters, the authority to approve the scope of educational opportunities to be offered by the University, provided that the planning and development of curricula shall be the function of the faculties; policies and procedures governing the granting and removal of tenure for faculty members; granting tenure to eligible members of the faculty upon the positive recommendation of the President; and general admission, progression, retention, and graduation requirements.

The Board, through its Academic Affairs and Student Success Committee, oversees matters related to the University's educational mission of teaching, research, and service; and considers the needs and interests of the faculty, administrative staff, and students in creating and sustaining the University's academic environment, including in the creation, evaluation, continuation, and termination of academic programs.

For a more complete description of the organization, duties, and powers of the Board, please consult the Charter of The University of Tennessee and the [Board Bylaws](#).

1.3.2. UT System Administration

The UT System Administration, headed by the President, enunciates the general mission of The University of Tennessee System, and coordinates comprehensive, long- range plans, growth, and development of the campuses and system operating divisions. For more information regarding the organization, duties, and functions of the UT System Administration, please consult the [Office of President website](#).

1.3.3. UTC Campus Administration

The Chancellor of the UTC campus (the "Chancellor") has been delegated authority to administer the campus, subject to the supervision of the President and to system-wide administrative policies, and to coordinate campus relations with the officers of the UT System Administration. For the UTC campus, the Chancellor exercises primary authority in control and allocation of all fiscal resources; establishment of the administrative organization; approval of personnel appointments; administration of academic programs and policies; administration of student affairs and services; administration and control of the intercollegiate athletics program; and administration of all campus plans and facilities. As a member of the President's staff, the Chancellor also participates regularly in matters concerning the state-wide University of Tennessee System. The Chancellor serves at the pleasure of the President.

For more information regarding the organization, duties, and functions of the Office of the Chancellor and the UTC campus administration, please consult the [Office of the Chancellor website](#) and [Article IV, Section 5\(c\) of the Board Bylaws](#).

1.3.4. UTC Academic Administration

1. Provost and Vice Chancellor for Academic Affairs

The Provost and Vice Chancellor for Academic Affairs (the "Provost") is the chief academic officer of UTC. The Provost reports directly to the Chancellor and is responsible for the supervision of all academic affairs at UTC, including ensuring that UTC's academic programs

and faculty are of the highest quality. The Provost's responsibilities include, but are not limited to, working collaboratively with the deans for the oversight of the colleges and similar major academic units; supervising and evaluating the performance of the deans and Academic Affairs administrators and staff; managing the Academic Affairs budget and fiscal affairs; directing the development and implementation of UTC's academic plans and policies; working in a collaborative fashion with UTC administrators, the deans, and faculty to advance UTC's academic programs; and reviewing recommendations for appointment, salary, retention, tenure, and/or promotion of faculty and making recommendations to the Chancellor regarding the same.

The Provost serves at the pleasure of the Chancellor. Information about the UTC Academic Affairs administrative structure can be found at the [UTC Academic Affairs webpage](#).

2. Academic Deans

Academic units at UTC are varied and diverse both in their role and scope and in their model of organization. Each college or major unit (hereafter referred to as "college") is administered by a dean, who is the chief officer responsible for the success of its programs.

Deans serve as the academic leaders of their colleges, representatives of their colleges to the rest of the UTC community, representatives of the UTC executive leadership to their colleges, managers of the resources of their colleges, and representatives of their colleges and UTC to external bodies. A dean's responsibilities include, but are not limited to, coordinating the development of and implementing the college's goals in alignment with UTC's goals and strategic plan; developing a college budget through conversation with department heads and faculty within the college; managing the fiscal affairs of the college; evaluating the performance of department heads and staff within the college; reviewing recommendations for appointment, salary, retention, tenure, and/or promotion of faculty within the college, and making recommendations regarding the same to the Provost; and assessing the performance of academic programs within the college and recommending to the Provost reductions in or the elimination of current programs and the addition of new programs within the college.

The deans serve at the pleasure of the Provost and the Chancellor. An evaluation of the performance of the deans is conducted annually by the Provost.

3. Academic Department Heads

The term "department head" includes administrators with other titles, such as director, who perform the duties of a unit administrator, where the basic administrative units are typically departments, but not always (e.g., schools). In discipline-specific colleges not organized into schools or departments, the dean may serve as both dean and department head.

The department head is the first level of administration and is assigned the special duty of administering the academic department. The department head is appointed by the dean in consultation with the faculty within the unit that the department head will administer.

The department head's responsibilities include, but are not limited to, assuming responsibility for the quality, effectiveness, and progress of the academic programs and activities within the department; implementing University, college, and departmental policies and procedures affecting the department, with due regard for the prerogatives and responsibilities of the

faculty; recommending to the dean, after appropriate faculty counsel and consistent with University policies and procedures, appointment, re-appointment, salary adjustments, tenure, dismissal, and other personnel actions relating to members of the faculty and staff within the department; providing, through conversation with the departmental faculty, an annual budget for the department and submitting the annual budget to the dean; coordinating the recruitment of new faculty members within the department, consistent with University policies and procedures; promoting the career development and performing annual performance appraisal reports of faculty and staff within the department; and in consultation with the departmental faculty, assessing departmental academic programs for performance and productivity and recommending to the dean the continuation, reduction, or elimination of programs and the addition of new programs within the department.

In addition, the department head's responsibility entails care of the apparatus necessary for support of the academic programs through employment and supervision of clerical and support personnel, management of departmental physical facilities, planning for space and equipment needs, and monitoring of all expenditures from the departmental budget.

The department head's many tasks relating to these duties may be delegated to other members of the department or to specific clerical or support personnel. In almost all departments, a number of standing faculty committees are responsible for collection of data and the formulation of policy recommendations concerning specific matters. In such instances, the departmental faculty reviews recommendations made by committees. The active participation of departmental faculty in the planning, execution and review of its curriculum is vital to the well-being of the department.

The administrative appointment of department heads, like all other administrative offices, does not carry tenure. The department head serves at the pleasure of the dean, Provost, and Chancellor. The dean conducts an annual evaluation of the department head.

1.4. UTC FACULTY ROLE IN SHARED GOVERNANCE

Faculty members are representatives of a profession whose services have been obtained by the University through its administrative officers on behalf of UTC and for the sake of UTC's students. The privileges and responsibilities of the faculty in the governance of UTC are important and varied. The most direct responsibility of the faculty in the governance of UTC is to plan and develop the curriculum of UTC's academic programs. The Board, through its Academic Affairs and Student Success Committee, shall consider the needs and interests of the faculty (as well as the administrative staff and students) in creating and sustaining UTC's academic environment, including the creation, evaluation, continuation, and termination of academic programs. A less direct, but no less important, role of the faculty is to advise UTC's administration about administrative matters that are intrinsically related to the well-being of UTC. These advisory matters include the:

- appointment, dismissal, evaluation, and reappointment of faculty, including probationary faculty
- promotion of faculty and the awarding of tenure
- evaluation of faculty performance
- grievances of faculty
- search for and hiring of the UTC Chancellor, Provost, deans, and department heads

The opinion of the faculty in these areas is invaluable. Its advice cannot be lightly given or peripherally

received. Institutional success depends upon the mutual respect and sensitivity of the faculty and the administration. The basic principle of the relationship is that the faculty and the administration are colleagues in shared governance. The Board is the governing body for all campuses within the University of Tennessee System and has delegated respectively to the faculty and administration separate specific sets of responsibilities that can be successfully discharged only with the support and counsel of the other. It is the right and responsibility of faculty members to work collaboratively with administrators, professional support staff, and students in deliberations and decisions on university actions, policies, and positions on the matters listed above. The basic fundamentals of successful shared governance include:

- transparency and accessibility of information and responses of others
- adequate time to reflect on information and the responses of others
- opportunity to communicate collaboratively across all campus bodies
- consistency in the process of shared governance
- clear accountability for responsibilities at all levels
- consistent and clear communication among all levels of governance

1.4.1. The Full Faculty

The full faculty is composed of all full-time tenured, tenure track and non-tenure track faculty.

The full faculty reviews, considers and votes on issues of major importance. Issues of major importance are determined by the Faculty Senate President, in consultation with the Faculty Secretary, the Senate Executive Committee, the Parliamentarian, and, whenever possible, the body of the Faculty Senate.

1.4.2. Faculty Senate

The faculty role in campus-wide governance is through its representative body, the Faculty Senate, and responsibility for much of the business conducted on behalf of the faculty is delegated to the Faculty Senate. The Faculty Senate is composed of elected faculty representatives as well as administrators with *ex officio* status. The Faculty Senate is authorized to recommend to the Chancellor for approval, policies and regulations related to the overall general requirements for admission, readmission, retention, graduation, and honors for the academic programs of UTC; and UTC's educational standards and degree requirements, including planning, development, and recommendation of academic programs and their curricula. The Faculty Senate is also

authorized to consider, advise, and recommend to the administration policies about a wide range of issues affecting the general welfare of the faculty.

Neither the full faculty nor the Faculty Senate have management or administrative functions either in themselves or through their committees, since such functions are expressly reserved for the President (as delegated by the Board) and through the President to the Chancellor. Nevertheless, the advice and recommendation of the full faculty and the Faculty Senate about all of the matters listed in the previous paragraph are considered carefully and seriously by all administrators.

Specific information about the organization, duties, and powers of the Faculty Senate can be found in the [Faculty Senate Bylaws](#).

1.4.3. Faculty Role in Appointment of UTC Administrators

The Bylaws of the Board of Trustees provide that in a search to fill a vacancy in the UTC Chancellor position, the President's advisory committee shall include faculty, staff, students,

alumni, and representatives of the external constituencies of the campus to assist in identifying and screening candidates. In addition, the UTC faculty and the Faculty Senate render advice to the UTC administration about the appointment of the Provost, deans, and department heads. In addition, the faculty of each academic unit plays an important role in the evaluation of deans and department heads assigned to it and in the search of new persons to fill such positions as they become vacant. When these leadership positions become vacant, faculty members are invited and expected to serve on search committees, to interview prospective candidates and to submit evaluations of those candidates. This participation in the ongoing renewal of the leadership is one of the most important ways in which faculty judgment informs the administration of the University.

1.4.4. Faculty Role on Administrative Committees

Administrative committees play an important role in the governance of UTC. These committees, composed of students, faculty, staff and, in some cases, members of the community, are appointed yearly by the Chancellor and other administrators to assist in the development of institutional policy, procedure and practice. Faculty members are given an opportunity to indicate their preference of administrative committees on which they wish to serve.

Chapter 2

Faculty Rights and Responsibilities

2.1. ACADEMIC FREEDOM

The principal mission of the University is the discovery and dissemination of truth through teaching, research and service. The Board of Trustees for The University of Tennessee ("Board") recognizes that freedom of inquiry and expression is indispensable for this purpose and believes that it and the administration and faculty should cooperate to that end. In the University's program of teaching, research and service, it is essential that the Board, administration and faculty cooperate voluntarily, each contributing freely, according to his or her qualifications, in a mutually beneficial exchange of information and ideas.

2.1.1. Academic Freedom and Responsibility of the Faculty Member

The Board's policy governing academic freedom and responsibilities ([UT Policy BT0006](#)) states the following about academic freedom and the responsibility of faculty members:

A healthy tradition of academic freedom and tenure is essential to the proper functioning of a University. At the same time, membership in a society of scholars enjoins upon a faculty member certain obligations to colleagues, to the University, and to the State that guarantees academic freedom.

1. The primary responsibility of a faculty member is to use the freedom of his or her office in an honest, courageous, and persistent effort to search out and communicate the truth that lies in the area of his or her competence.
2. A faculty member is entitled to full freedom in research and in publication of the results, subject to the adequate performance of his or her other academic duties, but research for pecuniary gain either within or beyond the scope of his or her employment must be based upon an understanding with the University administration, according to the University's policies (e.g., Compensated Outside Services, Conflict of Interest).
3. A faculty member should maintain a high level of personal integrity and professional competence, as demonstrated in teaching, research, and service. Academic freedom does not exempt a faculty member from an evaluation by colleagues and administration of his or her qualifications for continued membership in their society.
4. Although faculty are free in the classroom to discuss subjects within areas of their competence, faculty shall be cautious in expressing personal views in the classroom and shall be careful not to introduce controversial matters that have no relationship to the subject taught, and especially matters in which they have no special competence or training and in which, therefore, the faculty's views cannot claim the authority accorded statements they make about subjects within areas of their competence; provided, that no faculty will face adverse employment action for classroom speech, unless it is unreasonably germane to the subject matter of the class as broadly construed, and comprises a substantial portion of classroom instruction.

5. A faculty member should recognize that the right of academic freedom is enjoyed by all members of the academic community. He or she should be prepared at all times to support actively the right of the individual to freedom of research and communication as defined herein.
6. In addition to the normal responsibilities of a citizen of the State and nation, including the duty to uphold their Constitutions and obey their laws, a faculty member also should conduct himself or herself professionally with colleagues. He or she should strive to maintain the mutual respect and confidence of his or her colleagues. He or she should endeavor to understand the customs, traditions, and usages of the academic community.
7. When, as a citizen, a faculty member speaks outside the classroom or writes for publication, he or she should be free, as a citizen, to express his or her opinions. Each faculty member should conduct himself or herself professionally, should be accurate, should exercise appropriate restraint, should show respect for the opinions of others, and should make clear that he or she speaks for himself or herself and not for the University.
8. This policy is intended to be consistent with [UT Policy BT0010 - Policy Affirming Principles of Free Speech for Students and Faculty](#), and shall be interpreted accordingly.

2.1.2. Academic Freedom and Responsibility of the University Administration

The Board's policy governing academic freedom and responsibilities ([UT Policy BT0006](#)) states the following about academic freedom and the responsibility of the University administration:

1. The University is committed to recruiting, appointing, retaining and promoting faculty members by processes which are thorough, thoughtful, equitable, and in which the professional judgments of faculty members are of major importance.
2. Administrative officers should actively foster within the University a climate favorable to freedom of teaching and research. In its pursuit of excellence, the University should reward its outstanding faculty members.
3. The administration is responsible for enforcing all Board and campus policies applicable to faculty members. It is the duty of the administration—beginning with department heads, deans, and chief academic officers—to remove from the faculty any faculty member who has been found, through proper procedures, seriously derelict in his or her responsibilities as a member of the academic community.

2.2. TENURE

Tenure is defined in board policy and protects academic freedom. This status is awarded to a junior tenure-track faculty member after serving a successful probationary period that is typically six years, to a senior faculty member with previously demonstrated academic excellence who maintains excellence for a shorter probationary period, to a senior faculty member of outstanding academic excellence who was tenured at the institution from which recruited, or to a senior faculty member who is assuming a senior administrative position at the time of appointment and was tenured at the institution from which recruited. Additional information about tenure is found in [Chapter 3](#) of this Handbook.

2.3. FREEDOM AS A CITIZEN

When faculty members communicate as citizens on matters of public concern, they operate independently of UTC. In this situation, faculty members have rights common to all citizens, including the rights to

organize associations, join associations, participate in public meetings, run for and serve in government offices subject to applicable state and federal laws and university personnel policies, demonstrate, picket, and voice their opinions. When exercising their rights as citizens, faculty members must also respect UTC by not claiming to represent the positions or views of UTC and by using institutional resources.

2.4. EQUITY AND DIVERSITY

2.4.1. Equal Employment Opportunity

1. Policy and Position Statements

The University is committed to the principle that decisions concerning employment, admission, and performance should be based on an individual's qualifications and performance and not on characteristics unrelated to job performance or academic requirements. It is the policy of the University under [UT Policy HR0220 - Equal Employment Opportunity](#) not to discriminate against any employee or applicant for employment on the basis of race, color, religion, sex, marital status, parental status, sexual orientation, gender identity, national origin, disability, age, genetic information, veteran status, or any other characteristic protected by federal or state law. The University policy also prohibits harassment based on such characteristics. This policy extends to recruitment, employment, promotion, demotion, transfer, layoff, termination, compensation, training, benefits, and all other terms and conditions of employment.

This policy shall not be construed to: (1) confer eligibility for employment benefits for which an employee is not otherwise eligible under state law, policy, or practice as the same may be modified by federal law; (2) infringe upon the free exchange of ideas essential to the academic environment; (3) limit freedom of religious association; (4) establish a duty to engage in affirmative action measures for characteristics not subject to affirmative action under state or federal law; (5) require the compliance of external government agencies in which non-discrimination does not include certain personal characteristics (e.g., ROTC); or (6) create any cause of action not currently provided under state or federal law.

For further information, see the following:

- [UTC Notice of Non-Discrimination and Statement of Equal Employment Opportunity](#)
- The UTC Office of Equity and Inclusion (OEI). The [OEI website](#) includes information regarding the following:
 - o Discrimination complaint procedures;
 - o The affirmative action checklist for conducting searches; and
 - o UTC sexual harassment and discrimination guidelines.

2. Complaints

Complaints that a University employee has violated a University policy prohibiting discrimination, including but not limited to [UT Policy HR0220 - Equal Employment Opportunity](#) and [UT Policy HR0280 - Sexual Harassment & Other Discriminatory Conduct](#), should be directed to the OEI. Complaints will be investigated and resolved in accordance with the [Discrimination Complaint Procedure](#).

2.4.2. Sex Discrimination

UTC is a recipient of federal financial assistance, and in accordance with the provisions of Title IX of the Education Amendments of 1972, 20 U.S.C. § 1681 *et seq.* ("Title IX"), all of its education programs and activities are subject to the prohibition against sex discrimination, including sexual harassment, sexual assault, and sexual exploitation. UTC's [Nondiscrimination Statement](#) prohibits sex discrimination in any UTC education program or activity, including employment and admissions. Title IX applies to all UTC students, employees, applicants for admission or employment, volunteers and campus visitors.

1. Sexual Harassment & Other Discriminatory Harassment

The University is committed to an environment that recognizes the worth and dignity of every person while striving to foster tolerance, sensitivity, and mutual respect. The University therefore prohibits employees from engaging in acts of harassment on the basis of sex, which includes harassment based on gender, pregnancy, sexual orientation, and gender identity, as required by state or federal law. [UT Policy HR0280 - Sexual Harassment & Other Discriminatory Conduct](#) prohibits employees from engaging in sexual or other discriminatory harassment, regardless of whether such conduct is directed at another employee, a student, a vendor, or a visitor to campus.

2. Policy on Sexual Harassment, Sexual Assault, Dating and Domestic Violence, and Stalking

UTC is committed to creating and maintaining a learning, living, and working environment free from sexual harassment, sexual assault, dating and domestic violence, stalking, and retaliation, as defined and prohibited under the [Policy on Sexual Harassment, Sexual Assault, Dating and Domestic Violence, and Stalking](#) ("Title IX Policy"). The Title IX Policy protects and applies to the conduct of UTC students, employees, volunteers, contractors, and third parties participating in a UTC program or activity.

(1) Complaints

Complaints of prohibited conduct under the Title IX Policy should be directed to the OEI or the Title IX Coordinator. Complaints will be investigated and resolved in accordance with the Title IX Policy.

(2) Mandatory Reporter Obligations

All UTC faculty members are mandatory reporters under the Title IX Policy when: (1) the complainant is a student; (2) the faculty member is the immediate supervisor of either the complainant or the respondent; or (3) the faculty member has the authority to redress the prohibited conduct. As mandatory reporters, faculty members are obligated to report information they receive concerning conduct prohibited under the Title IX Policy to the Title IX Coordinator in accordance with the mandatory reporter procedures set forth in the policy. A mandatory reporter's failure to fulfill his or her obligations may result in discipline. For more information regarding the requirements and guidelines for mandatory reporters,

please see the [Title IX Policy](#).

3. Prohibited Relationships with Students

An amorous or sexual relationship between a faculty member and a student greatly increases the potential for a faculty member's abuse of power because of the inherently unequal status of the persons involved in the relationship. Even in cases where such a relationship begins with the mutual consent of the participating persons, it can result in exploitation of the student or the creation of a hostile learning or work environment for the student. Accordingly, amorous or sexual relationships between faculty members and students under the circumstances provided under Section [2.4.2.3.\(1\)](#) below are expressly prohibited. Amorous or sexual relationships between faculty members and students not otherwise prohibited are strongly discouraged.

(1) Prohibited Conduct

The following conduct is prohibited:

- (a) A faculty member shall not have an amorous or sexual relationship (consensual or otherwise) with a student who is not the faculty member's spouse and who is simultaneously enrolled in a course taught by the faculty member or whose academic or work performance is subject to the supervision or evaluation of the faculty member.
- (b) A faculty member shall not have an amorous or sexual relationship (consensual or otherwise) with a student who is not the faculty member's spouse and to whom the faculty member, as part of the faculty member's job-related responsibilities, provides academic advising, mentoring, or tutoring.
- (c) Retaliation is prohibited against any person who reports conduct prohibited under this Section [2.4.2.3.\(1\)](#). Retaliation is also prohibited against any person who participates in an OEI investigation of a report of prohibited conduct under this section.

(2) Reporting Violations

Reports of possible violations of Section [2.4.2.3.\(1\)](#) above should be reported to the OEI for review and investigation. Certain conduct described in this section may also trigger a mandatory reporting obligation under the Title IX Policy: (1) if the involved student is a minor; (2) if the conduct appears to violate the Title IX Policy; or (3) if reporting is otherwise required by law or University policy. In the case of uncertainty about the reporting obligation, OEI officials may be consulted without providing personally identifiable information in order to clarify the reporting obligation, or to get more information about how the OEI might handle a possible violation of this section.

4. Prohibited Discrimination Against Pregnant Students

Discrimination against any student, or exclusion of any student from participation in any part of a UTC educational program or activity, on the basis of a student's pregnancy is prohibited, as provided under state or federal law. UTC educational programs and activities include, but are not limited to, classes, extracurricular activities, internships, fellowships, clinics, and labs. When necessary to ensure a pregnant student's access to an educational program or activity,

UTC will provide reasonable adjustments to the program or activity for the student, in accordance with the [Policy on Educational Accommodations for Pregnant Students](#).

2.4.3. Discipline and Appeal Rights

A faculty member who is found to have violated a University policy prohibiting discrimination or other provision of this [Section 2.4](#), including but not limited to [UT Policy HR0220 - Equal Employment Opportunity](#), [UT Policy HR0280 - Sexual Harassment & Other Discriminatory Conduct](#), and the [Title IX Policy](#), may be subject to discipline up to and including termination. Any disciplinary action taken against a faculty member for violation of the University's anti-discrimination policies or other provision of this [Section 2.4](#), and any appeal of such disciplinary action, must be in accordance with [Section 5.4.2](#). (tenured faculty) or [Section 5.4.3](#). (non-tenured faculty).

2.5. SEXIST LANGUAGE

It is the practice at UTC to avoid the use of sexist words and terms in all official correspondence and publications. Every reasonable attempt should be made to comply with this policy and to assist in making UTC a model for real as well as perceived equal treatment in organizational communications. The following serves as a guideline for all written materials:

Avoid sexist words and terms. Do not avoid them, however, at the expense of correct grammar. Almost all sexist language problems—especially "he" or "she" constructions—can be eliminated by careful writing or rewriting.

2.6. DRUG-FREE CAMPUS AND WORKPLACE

It is the policy of the University to maintain a safe and healthful environment for its students and employees. Therefore, University policy prohibits the unlawful use, manufacture, possession, distribution, or dispensing of drugs ("controlled substances" as defined in the Controlled Substances Act, 21 U.S.C. 812) and alcohol on University property or during University activities. For more information, please see [UT Policy HR0720 - Drug Free Campus and Workplace](#).

2.7. PERSONNEL FILES AND RELEASE OF INFORMATION

The University maintains official personnel files on every University employee and has adopted [UT Policy HR0130 - Personnel Files and Release of Information](#) to assure that accurate and complete personnel data are maintained, that individual employees are afforded an opportunity to see that their records reflect such standards, and that the release of information from personnel files is adequately monitored.

Under the Tennessee Public Records Act, personnel records of all University employees are public records which may be inspected and copied by citizens of Tennessee during regular business hours. Public records include "all documents, papers, letters, maps, books, photographs, microfilms, electronic data processing files and output, films, sound recordings, or other materials regardless of physical form or characteristics made or received pursuant to law or ordinance or in connection with the transaction of official business by any governmental agency" (Tenn. Code Ann. § 10-7-503(a)(1)(A)). This law is addressed by [UT Policy HR0130](#), which includes a list of information to be redacted (when possible) before record release and a list of documents to be stored permanently. At UTC, these documents are found in Human Resources,

Academic Affairs, and college and departmental personnel files.

2.8. ETHICAL CONDUCT OF FACULTY

Faculty members should be familiar with and must comply with University policies governing the ethical conduct of faculty, including the policies set forth under [Chapter 7](#) of this Handbook.

2.9. GENERAL STATEMENT OF STUDENT-RELATED AND PROFESSIONAL RESPONSIBILITIES OF FACULTY

Faculty members carry a wide range of specific responsibilities—to students, to professional colleagues, and to UTC. The statement of responsibilities below represents UTC's view of those specific responsibilities of its faculty members:

2.9.1. Responsibilities to Students

Faculty members have the responsibility to deal seriously and conscientiously with the instructional assignment, including careful planning of courses, preparation of class meetings, regularity in meeting scheduled classes, clear communication to students of course requirements through presentation of course syllabi (further description of appropriate syllabus material appears in the appendices), and fair and impartial grading according to standards established by the institution.

Faculty members should recognize that students deserve respect as individuals and have certain rights that must be protected. This encompasses an active interest in individual academic and personal problems of students, the giving of mature professional advice, courteous treatment of students in class, and keeping in confidence personal information about students that may come to the attention of faculty members in their role as counselors, subject to university, system, and state policies for reporting.

Faculty members should recognize that faculty members serve as models and exercise a great influence in shaping young minds. This being true, faculty members must try to set a high standard in:

- Academic and scholarly excellence
- Personal integrity
- Professional ethics

Faculty members should recognize that in their influential classroom roles, they are morally bound not to take advantage of their positions by repeatedly introducing into classes discussions of subject matter outside the scope of the course and not within their field of professional competence.¹

2.9.2. Professional Responsibilities

Faculty members have the following general professional responsibilities:

1. Special responsibility to keep up to date with developing knowledge in their academic disciplines through familiarity with recent publications and journals and participation in local or national professional societies and meetings where appropriate.

2. Responsibility to seek ways of improving their effectiveness as teachers, exploring new ways of presenting academic subject matter, motivating students, and improving methods of evaluating student performance.
3. Responsibility to advance knowledge in their respective academic disciplines through individual research, creative writing and analysis, and presenting papers at colloquiums or professional meetings.
4. Responsibility to assist faculty colleagues in academic department and college activities including:
 - (1) Contributing to curriculum studies at both the departmental and college levels
 - (2) Participating in department, college and University faculty meetings for the better operation and strengthening of the educational program of the institution
 - (3) Carrying a fair share of the burden of special faculty committee assignments, including participation in such bodies as curriculum committees and honors program committees, as well as sharing in joint faculty responsibilities such as registration, counseling, and academic proctoring
 - (4) Responsibility to exercise an active role in protecting and enhancing the academic and professional standing of the faculty by:
 - Assisting with recruitment of competent new faculty members
 - Giving appropriate recommendations regarding promotion or tenure appointments for faculty colleagues
 - Recommending the removal of colleagues who, after fair hearing, have been proved to warrant removal for adequate cause
 - (5) Responsibility to demonstrate respect for the right of others in the UTC community to hold

¹ Statement adapted from Asa Knowles' *1970 Handbook of College and University Administration*. Used with permission of the publisher, McGraw-Hill.

divergent opinions, including other faculty members, students and administrators.²

2.10. FACULTY RESPONSIBILITIES RELATED TO TEACHING AND ADVISING

A university's worth is determined in large measure by the quality of its teachers. The styles of good teaching vary almost as much as the many disciplines in a complex university. The size and academic level of the class, the personality of the teacher, the goals of the students, the kind of subject matter under investigation, the expectations of a profession or of the public—all affect the definition of what constitutes good teaching. UTC acknowledges and supports this variety. It supports as well the seriousness of the UTC faculty's commitment to good teaching and recognizes the students' legitimate expectations in this important aspect of UTC's mission.

Good advising (as assigned) is an important aspect of many faculty roles. Indeed, good teaching, scholarly research and academic advising are mutually supporting aspects of faculty excellence. The serious UTC student is learning how to learn and also how to relate the several parts of the college experience (the

classes, lectures, readings, discussions, labs and extra-classroom endeavors) to some emerging sense of a whole. Good advising is a crucial aspect of this search for unity and integrity in the many parts. To be good academic advisors, faculty must be knowledgeable about the curriculum and the students. All students are required to see their advisor at least once a semester to discuss the many choices and goals that need to be considered. Every student should know some faculty member well enough to ask for an informed, personal letter of reference or recommendation when the time comes for graduation. The faculty member has, in turn, much to learn from the advisee and from the careful inspection of curriculum that advising requires. A good advisor is better informed about the issues that face the faculty when it votes on curriculum and on admission and graduation requirements.

Course loads should be consistent with UTC and departmental policies. Advising students, as assigned, is considered to be an integral part of the teaching obligation, and instructors are expected to give assistance freely to students in their classes. In addition, faculty members are expected to provide competent counsel to students assigned for overall course planning.

All members of the faculty are expected to attend commencement exercises in support of student success and accomplishments and in accordance with college and departmental bylaws.

2.11. FACULTY RESPONSIBILITIES RELATED TO CLASS ADMINISTRATION AND STUDENT INTERACTIONS

The following statements cover important aspects of UTC's expectations for faculty members' administration of their classes, including their relationships with students in the classroom and related interactions, as well as its general philosophy governing the rights and responsibilities of students in the classroom and related interactions with faculty members.³

2.11.1. Student Standards of Conduct

The [UTC Student Handbook - Student Rights & Responsibilities](#), published annually, contains statements concerning standards of conduct which students are expected to maintain and disciplinary procedures which may be used when unacceptable student behavior occurs. Faculty members are expected to encourage acceptable conduct on the part of students. In specific cases of student misconduct, faculty should consult with the Division of Student Development or the Division of Academic Affairs for guidance on how to appropriately address the misconduct.

2.11.2. Faculty Office Hours

² Statement adapted from Asa Knowles' *1970 Handbook of College and University Administration*. Used with permission of the publisher, McGraw-Hill.

³ For more information regarding student rights and responsibilities, please see [UTC Student Handbook - Student Rights & Responsibilities](#).

Faculty members are expected to maintain office hours so that they may be available to students and other members of the UTC community at stated places and times. Office hours should be clearly posted in a manner that is accessible to students.

2.11.3. Textbooks and Course Materials

Unless departmental approval is given, an instructor may not require students to purchase the instructor's own textbook for the courses the instructor teaches. Each department is responsible for adopting and enforcing appropriate guidelines concerning textbook choices within the department. Additionally, any duplication and distribution of instructional materials must comply with [UT Policy FI0155 - Duplication and Distribution of Instructional Materials](#) and federal copyright statutes.

2.11.4. Meeting Scheduled Classes

Faculty members should meet their classes as scheduled; in the event faculty members are unable to meet class, it is their responsibility to notify the department head and arrange for a qualified replacement to conduct the class. Individual faculty members may not dismiss their classes without official authorization from their department head. Any decision to dismiss all university classes must be made by the Chancellor, or if absent, by an individual designated by the Chancellor.

2.11.5. Freedom of Expression

Free and pertinent discussion is welcome at UTC. Students should feel free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion. Students are responsible, however, for learning the content of any course of study for which they are enrolled.

2.11.6. Academic Evaluation

Faculty are expected to evaluate student performance honestly and professionally, based solely on academic considerations and not on opinions or conduct in matters unrelated to academic standards. Students are responsible for meeting the academic standards and requirements of each course in which they are enrolled. In order to make clear to students the basis for academic evaluation, faculty members normally should satisfy the following general guidelines: a) provide written course objectives, criteria and methods of student evaluation to the students near the beginning of each course; b) provide a written make-up examination policy near the beginning of each course; c) return graded exercises to the student promptly; d) provide a mid-term grade in writing to students by the middle of the semester or term at the latest; e) make themselves reasonably available to students for conferences and make reasonable efforts to assist students who are having difficulty in their courses. However, the burden of taking advantage of such opportunities falls on the student. A student alleging unfair evaluation may appeal pursuant to the applicable grade appeal procedure referenced under [Section 2.11.16.](#) below.

2.11.7. Academic Integrity

UTC expects that all academic work will provide an honest reflection of the knowledge and abilities of both students and faculty. Cheating, plagiarism, fabrication of data, providing unauthorized help and other acts of academic dishonesty are abhorrent to the purposes for which the UTC exists.

1. UTC Honor Code

The Honor Code is designed to foster a campus-wide climate of honesty and integrity in order to insure that students derive the maximum benefit from their work at UTC. All students are

subject to the rules and regulations of the UTC Honor Code upon registration at UTC. Faculty members have a general responsibility to make students aware that the Honor Code governs all of their academic work at UTC. Faculty members should stress that, although the Honor Code applies only to student work, the principles which it embodies, especially the principle of giving proper credit for another's ideas, are binding upon all members of the academic community. The Honor Code places responsibility for maintaining academic honesty on the student, but faculty are free to supervise examinations and other graded work in whatever way deemed appropriate.

The rules and regulations governing the UTC Honor Code and the procedures and disciplinary measures for addressing violations of the Honor Code are provided under the Tennessee Rules and Regulations for the UTC Honor System ([Tenn. Comp. R & Regs. § 1720-02-01-.01 et seq.](#)) and can also be found in the [UTC Honor Code Handbook](#).

(1) Reporting Honor Code Violations

Either through their own observation, reports from students, or other means, faculty members may confront suspected violations of the Honor Code. The faculty member must make a preliminary judgment about the seriousness of the incident and judge whether it is a possible violation of the Honor Code. If the incident appears to be a violation of the Honor Code, the faculty member must then decide whether the seriousness of the incident and the evidence are sufficient to justify a formal report to the Office of Student Conduct. Formal reports of suspected Honor Code violations should be submitted to the Office of Student Conduct.

Faculty members are strongly encouraged to report suspected violations of the Honor Code to the Office of Student Conduct. The Office of Student Conduct (or designee) is empowered, through the Honor Code Process, to impose penalties more severe than those which an individual faculty member can impose. Only through the process of reporting suspected violations will it be possible to identify and deal with students whose academic work is habitually dishonest. If a faculty member chooses not to formally report an Honor Code violation to the Office of Student Conduct, the faculty member is not permitted to penalize the students involved without the students' knowledge and consent.

(2) Resolution of Honor Code Violations

A student accused of an Honor Code violation is guaranteed the right to a hearing to contest the accusation before either: (1) an Honor Code Officer, (2) the Honor Code Board⁴ or (2) an Administrative Judge in accordance with the Uniform Administrative Procedures Act ("APA") (Tenn. Code Ann. §§ 4-5-101 *et seq.*)⁵ The faculty member who reports the Honor Code violation ("faculty member reporter") and other faculty members who are necessary witnesses will be requested to appear at the hearing. If appearing and called upon to testify at the hearing, the faculty member reporter should present a clear and impartial account of the incident in question and present to the decision-maker (i.e., Honor Code Officer, Honor Code Board, or APA Administrative Judge) any relevant evidence, especially written evidence, at the faculty member's disposal.

Where a faculty member reporter who is willing to appear at an Honor Code Officer or Honor Code Board hearing but has provided adequate prior notice of a reasonable excuse for not being able to appear at the hearing, the Honor Code Officer or Honor Code Board

⁴ The rules and procedures governing Honor Code Officer and Honor Code Board hearing proceedings are provided under the Tennessee Rules and Regulations for the UTC Honor Code ([Tenn. Comp. R & Regs. § 1720-02-01-.01 et seq.](#)), and can also be found in the [UTC Honor Code Handbook](#).

⁵ The rules and procedures governing APA hearing proceedings are provided under the Tennessee Rules and Regulations for APA Hearings ([Tenn. Comp. R. & Regs. § 1720-01-05-.01 et seq.](#)).

has the discretion to hold the hearing in the faculty member reporter's absence if it reasonably concludes that a delay in holding the hearing may result in undue harm to the accused student.

2. Employee Academic Misconduct

UTC's [Policy on Employee Academic Misconduct Involving Students](#) prohibits all UTC faculty and staff employees from engaging in academic misconduct in student academic matters. Prohibited academic misconduct under the policy includes academic fraud relating to a student (e.g., falsifying a student's transcript); authorizing, enabling or assisting violations of the Honor Code by a student; and providing impermissible academic assistance to a student.

2.11.8. Students with Disabilities

Under certain circumstances, UTC is obligated, under the Americans with Disabilities Act (ADA) of 1990 and Section 504 of the Rehabilitation Act of 1973, to make reasonable accommodations to provide qualified students with disabilities the opportunity for full participation in academic programs and activities. Reasonable accommodation may include increasing physical accessibility, modifying teaching/testing practices, acquiring equipment/devices, course substitution,⁶ and/or providing qualified readers or interpreters. Faculty who have students with disabilities in their classes are expected to be sensitive to the special needs of those persons. The [UTC Disability Resource Center](#) should be contacted for information regarding possible reasonable accommodations for students with disabilities.

2.11.9. Make-Up Examination Policy

Students are responsible for meeting all course requirements, including graded exercises which are administered in class. Along with other course requirements, policies covering make-ups for graded exercises normally are announced at the beginning of the course. In the event of an impasse between the instructor and the student over the questions of make-up, the student may appeal to the department head, director or program coordinator.

2.11.10. Final Exams

Final examinations are to be given at the scheduled time during final exam week. If an emergency should arise, or if there are scheduling difficulties, the faculty member should consult with his or her dean.

2.11.11. Attendance Policy and Excuses

At the beginning of the semester, faculty members should state to their classes their policy on

absences. It is the student's responsibility to inform the instructor when documented illness, family emergency, participation in a University activity, or other reasonable excuse prevents attendance.

When absences are occasioned by University projects, students should check with their instructors, informing them of the possibility of the event and the classes to be missed. If the instructor wishes written confirmation of the organized trip before granting an excuse, a list of the student's classes along with the instructors' names and dates of the trip should be submitted to the office of the appropriate dean. All excuse requests must be submitted at least three days before the event. This list should be signed by the faculty advisor of the organization, who certifies as to the accuracy of the information. The dean returns the approved list to the faculty advisor, who issues copies to the students.

⁶ For more information regarding granting substitution of a course as a reasonable accommodation for a student with a disability, please see the [UTC Course Substitution Policy](#).

Upon receipt of appropriate documentation, the instructor should accommodate the missed coursework and communicate with the student how the make-up work should be accomplished. Specific information on make-up exams and missed work should be clearly stated in course syllabi.

2.11.12. [Academic Disputes](#)

Complaints or grievances will arise occasionally in the faculty-student relationship and should be clarified at the earliest possible time and at the level closest to the locus of the complaint. Students who have such complaints are urged to address them directly to the faculty member in an appropriate setting. It is understood that some issues may need to be addressed to the nearest administrator, generally the department or program unit head. Every effort should be made to resolve such matters informally by conversation. A matter unresolved on the departmental level may be brought to the appropriate dean and, after that, the Provost.

2.11.13. [Grade Change Policy](#)

Changing of a semester grade, once it has been reported to the records office by the instructor, may be made only in cases of computational error, for removal of an incomplete, or in cases of academic dishonesty after the conclusion of the student conduct process. Students are not permitted to re-do work or do additional work (e.g., re-write a paper) after the end of the semester in order to receive a change of grade.

2.11.14. [Course and/or Instructor Evaluation](#)

Course and/or instructor evaluation by students is required by UTC. Such evaluations form one constituent of the overall evaluation of the faculty which includes, in addition, a self-evaluation, an evaluation by the department head, and an evaluation by the dean or other administrator.

2.11.15. [Retention of Student Papers](#)

A faculty member who chooses not to return papers to the student should keep graded exams and papers for a minimum of the next regular semester following the completion of a term, until the time period for filing a grade appeal has expired. In the event the faculty member goes on leave, papers should be kept until one semester after the faculty member's return from leave.

2.11.16. Student Grade Appeals

It is the prerogative and responsibility of members of the faculty to determine the final grade for each student according to criteria clearly defined and explained in the course syllabus.

If a student feels that his or her rights and interests have been seriously jeopardized by way of unfair, arbitrary or malicious exercise of faculty grading prerogatives, and desire to appeal the final grade, the student may file a grade appeal pursuant to the applicable grade appeals procedures linked below.

1. Undergraduate Students

The grade appeal process for undergraduate students is set forth in the [UTC Student Handbook - Academics](#).

2. Graduate Students

The grade appeal process for graduate students is set forth in the [Catalog of Academic Policies for Graduate Students - Grade Appeal Section](#).

Chapter 3

Tenure-Track and Tenured Faculty

The Board of Trustees' *Policies Governing Academic Freedom, Responsibility, and Tenure* ([UT Policy BT0006](#)), originally adopted in 1998, and all subsequent amendments, govern faculty rights and responsibilities. The following sections are intended as a general summary of the parts of the Board's policy relevant to tenure and tenure-track faculty and of UTC's related policies and procedures established in accordance with Board policy. Academic freedom is addressed in [Chapter 2](#) of this Handbook. In the event of any conflict or inconsistency between Board policy and this Handbook, Board policy will control.

3.1. SELECTION OF NEW FACULTY FOR TENURE-TRACK APPOINTMENTS

Except as otherwise provided in this chapter, all academic departments will follow departmental and college bylaws for conducting the search for and the hiring of new faculty for tenure-track faculty appointments. In general, selection of new tenure-track faculty follows the following process.

3.1.1. Authorization to Search

The dean or other appropriate administrator must obtain authorization from the Provost to begin a search for a tenure-track faculty position. Factors considered by the Provost in determining whether to authorize a search for a tenure-track position include demonstrated need of the academic department's academic program and availability of funds for the position. The tenure-track position may be a new position or an existing position that is or is expected to be vacant. The authorization by the Provost of a search for a new or existing tenure-track position does not

necessarily mean that an appointment will be made to the position.

3.1.2. Commitment to Diversity

UTC is fully committed to diversity in recruitment at all levels. Efforts must be made by the academic department to advertise position vacancies in an effort to obtain a diverse pool of qualified applicants. For each search, the Director of the Office of Equity and Inclusion ("OEI") will be contacted to advise the academic department as to appropriate search procedures that should be followed.⁷ Prior to an appointment being offered for a position, the Director of the OEI must certify that appropriate search procedures have been followed in the search for the position.

3.1.3. Search Process

A thorough search and careful selection should precede any departmental recommendation of appointment to the dean. The department head should consult with the departmental faculty members to develop a plan for the search process. Under normal circumstances, the departmental faculty members or a faculty member search committee should identify the needs of the program, the characteristics needed in a new faculty member, and a timeline of the procedures to be followed in conducting the search and screening candidates. The department head and the departmental faculty members should approve the plan. The departmental faculty members should have the opportunity to help determine the kind of person needed, the search procedure to be followed, the basic pool of candidates, the persons to be selected for interview, and to provide an assessment of candidates interviewed. At each of these stages, final responsibility for the departmental recommendation rests with the department head.

⁷ The OEI search procedures can be found [here](#).

3.1.4. Certification of English Language Competency

No individual shall be appointed to a teaching position or recommended for tenure in such a position unless the department head, in consultation with the departmental faculty members, certifies in writing to the Provost that the individual can communicate effectively with students in the English language. Individuals who teach courses that are conducted primarily in a foreign language are exempt.⁸ The certification form is available on the UTC Academic Affairs website [here](#).

3.1.5. Recommendation to Appoint

A departmental recommendation of appointment for a tenure-track position shall be made by the department head to the dean. If the dean agrees with the departmental recommendation, the department head and dean shall forward the recommendation to the Provost. Each recommendation should be accompanied by a full set of the candidate's credentials and any required forms or certifications. Following a departmental decision to recommend an appointment of a candidate to a position, there may be informal discussions concerning rank, salary and other terms of employment between the department head or dean and the candidate. Such discussions serve merely to shape and influence the recommendations of the department head or dean and do not constitute a binding commitment by UTC.

3.1.6. Official Notification of Appointment

Official notification of appointment is made by letter from the Provost. The letter of appointment must specify:

1. the rank at which the faculty member is being appointed;
2. the faculty member's initial salary and related financial conditions;
3. the faculty member's probationary status, indicating that he or she will be advised annually on his/her reappointment status and progress toward tenure and promotion;
4. the length of the faculty member's probationary period (i.e. the academic year during which a tenure decision must be reached); and
5. the faculty member's general duties and expectations.

Only the letter of appointment from the Provost to the candidate regarding the terms and conditions of the appointment is binding on UTC. Any other representations concerning the terms and conditions of the appointment, whether oral or written, are not authorized by UTC and not binding on UTC.

The new faculty member's written acceptance of the letter of appointment, together with execution of normal UTC employment forms, completes the initial appointment to employment between UTC and the faculty member.

3.2. TENURED AND TENURE-TRACK APPOINTMENTS

Except as otherwise permitted in this chapter and agreed upon between UTC and a faculty member, all tenure and tenure-track appointments will be for either one academic year or for twelve months.⁹

⁸ See [UT System Policy Concerning English Language Competency of UT Instructional Staff](#).

⁹ See [Section 3.2.2](#), below regarding the Classifications of Tenure-Track and Tenured Appointments.

Academic departments shall provide their faculty members with the resources necessary to perform assigned duties, including office space, office and pedagogical supplies, support services, and equipment.

Academic departments should have consistent criteria for assigning teaching duties to all faculty members and should consider the views of non-tenure-track faculty members when preparing teaching schedules and other professional assignments.

Employment of relatives of a faculty member is permitted, subject to the restrictions set forth under [UT Policy HR0115 - Employment of Relatives](#).

3.2.1. Criteria for Appointment to Faculty Rank

Criteria for appointment to faculty ranks reflect the rigorous preparation necessary for University teaching and research, the various service activities expected of the faculty members of a major university, and the diversity of missions performed by academic departments. For all faculty ranks, concerned and effective advising and counseling, where appropriate, is normally understood to be part of the task of teaching.

UTC has established the following general criteria that faculty members are expected to meet for the appropriate rank. Each academic department must establish its own metrics and standards for evaluating such criteria for faculty rank appointments within the department, and the department's specific metrics and standards shall be published in the department's bylaws. In regard to evaluation of librarians, "librarian" should be substituted for the word "teacher."

1. An Assistant Professor is expected to:

1. have a doctorate degree or other terminal degree in his or her discipline or present equivalent training and experience;
2. show potential or have demonstrated ability as a teacher;
3. show potential or have demonstrated evidence of research, scholarship, or creative activity;
4. have demonstrated willingness to participate effectively in professional activities other than teaching and research; and
5. have demonstrated ability to relate appropriately to students and professional colleagues.

2. An Associate Professor is expected to:

1. have a doctorate degree or other terminal degree in his or her discipline or present equivalent training and experience;
2. have achieved a reputation as an accomplished teacher;
3. have achieved a good record in research, scholarly, or creative activities;
4. have an established record of effective participation in professional activities other than teaching and research;

5. have demonstrated ability to relate appropriately to students and professional colleagues; and
 6. have demonstrated excellence in at least one of the three areas of responsibility (i.e., teaching, service, and research) required for full-time faculty status.
- 3. A Professor is expected to:**
1. have a doctorate degree or other terminal degree in his or her discipline or present equivalent training and experience;
 2. have achieved and maintained a reputation as an accomplished teacher;
 3. have achieved and maintained a significant record in research, scholarly or creative activities;
 4. have achieved and maintained a significant record of effective participation in professional activities other than teaching and research;
 5. have demonstrated an ongoing ability to relate appropriately to students and professional colleagues; and
 6. have demonstrated excellence in at least two of the three areas of responsibility (i.e., teaching, service, and research) required for full-time faculty status.

4. "All But Dissertation" Appointees

A faculty member who has not completed the terminal degree in his or her discipline (e.g., Ph.D.) but who otherwise meets all of the other criteria for the rank of Assistant Professor may be initially appointed to a tenure-track full-time academic year appointment at the rank of Assistant Professor and noted as "All But Dissertation" or "ABD," subject to the following conditions:

- If appointed in August, the faculty member will be required to complete his or her terminal degree on or before July 31 after completing his or her first full academic year (i.e., Fall and Spring semesters) in order to retain the rank of Assistant Professor; or
- If appointed in January, the faculty member will be required to complete his or her terminal degree on or before July 31 after completing half of his or her first academic year (i.e., the Spring semester) in order to retain the rank of Assistant Professor; or
- Such conditions as are imposed by the Provost at the time of the faculty member's initial appointment and set forth in the initial appointment letter.

The faculty member's failure to complete his or her terminal degree within the applicable time period set forth in this section constitutes adequate cause for terminating the faculty member's employment. The tenure probationary period for a faculty member initially appointed under such circumstances is treated in an identical manner as the tenure probationary period for a faculty member initially appointed at the rank of Assistant Professor who already has his or her terminal degree at the time of the appointment.

3.2.2. Classifications of Tenure-Track and Tenured Appointments

Tenure-track and tenured appointments consist of regular full-time academic year appointments and regular full-time twelve-month appointments.

1. Regular Full-Time Academic Year (Nine-Month) Appointment:

Regular full-time academic year appointments involve full-time service during the nine-month academic year (Fall and Spring semesters). One-half of the faculty member's annual salary is earned for service for the Fall semester and one-half of the faculty member's annual salary is earned for service for the Spring semester. Regular full-time academic year appointments typically commence in August at the beginning of the Fall semester. The faculty member's annual salary for the nine-month appointment is prorated and paid over twelve (12) months, as earned, in monthly installments from August to July.

In some cases, regular full-time academic year appointments may begin in January at the beginning of the Spring semester. In such cases, the faculty member may be compensated in one of two ways for the Spring semester of the initial appointment, as agreed upon between the department head and the faculty member:

- The faculty member's salary earned for service for the Spring semester (i.e., one-half of the faculty member's total annual salary) is prorated and paid, as earned, over six (6) months from February to July; or
- The faculty member's salary earned for service for the Spring semester (i.e., one-half of the faculty member's total annual salary) may be prorated and paid, as earned, over seven (7) months from January to July.

2. Regular Full-Time Twelve-Month Appointment

Regular full-time twelve-month appointments involve full-time service for twelve months out of a year commencing on July 1 and ending the following June 30. The faculty member's total annual salary is paid, as earned, in twelve (12) monthly installments from July to June. Faculty members under regular full-time twelve-month appointments are entitled to vacation and sick leave accruals in accordance with [UT Policy HR0305 - Annual Leave \(Vacation\)](#) and [UT Policy HR0380 - Sick Leave](#).

3.3. PROBATIONARY PERIOD

A tenure-track faculty member must serve a probationary period at UTC prior to being considered for tenure.

3.3.1. Length of Probationary Period

Except as otherwise provided in [UT Policy BT0006](#), the probationary period of a tenure-track faculty member shall be six years. The faculty member will apply for tenure during the sixth year, and if tenure is not granted, the faculty member will be permitted to serve a seventh year as a terminal year. If a faculty member begins employment after July 1 and before January 1, the

remaining term of the faculty member's initial appointment will count as the first year of the probationary period, so that what is treated as the first year of a faculty member's probationary period will not be shorter than six months.

For tenure-track full-time academic year appointments that begin in January, the faculty member's probationary period begins on August 1 of the year in which the original appointment is made. For example, the tenure probationary period for an original appointment made in January 2020 would begin in August 2020 and the faculty member's first reappointment review would be performed in the 2020-2021 academic year.

The provision of a probationary period and any statement in an appointment letter or otherwise regarding the probationary period and the year of mandatory tenure consideration does not guarantee retention of the faculty member for the full probationary period.

3.3.2. Applying for Early Tenure

A tenure-track faculty member may request an early consideration for tenure before the sixth year of his or her probationary period ("early tenure") subject to the following limitations:

- A faculty member may apply for early tenure during years 2, 3, and 4 of the probationary period; however, if tenure is not granted, the faculty member must wait for one complete annual tenure cycle before reapplying; and
- A faculty member may apply for early tenure in year 5 of the probationary period. If tenure is not granted, he or she may reapply in the final year of the probationary period.

A faculty member should seek early tenure only after consultation with his or her departmental RTP Committee, department head and/or dean, which should include a thorough conversation about the faculty member's record.

3.3.3. Extension of Probationary Period

For good cause that is either related to procedural error or results from a significant disruption of University operations that has impeded the faculty member's opportunity to conduct required research or other scholarly activity, teaching, and/or service, UTC and a tenure-track faculty member may agree in writing to extend a six-year probationary period for a maximum of two additional years (not including any extension granted due to the coronavirus crisis as authorized by the UT Board of Trustees' March 27, 2020 action). The proposed extension must be approved in advance by the Provost, the Chancellor, and the UT System Vice President for Academic Affairs.¹⁰

3.3.4. Suspension of Probationary Period

The Provost shall decide whether the probationary period will be suspended when the following circumstances occur:

1. the faculty member accepts a part-time faculty position;
2. the faculty member accepts an administrative position; or
3. the faculty member is granted a leave of absence or modified duties assignment.

The Provost shall give the faculty member written notice of the decision concerning suspension of the probationary period.¹¹

3.4. FACULTY EVALUATION AND DEVELOPMENT

UTC utilizes the Faculty Evaluation and Development by Objectives (EDO) process for its annual evaluations of its faculty members. The EDO process is an annual performance- oriented system that is based on identifying objectives, establishing a realistic program for obtaining the objectives, and evaluating and rewarding performance in achieving the objectives. The scope of the EDO process is broad in that the format of the review process is consistent for all members of the faculty, is evidentiary- based, and represents common goals of all faculty members. The EDO process also recognizes unique

¹⁰ See Section III.E.2. of [UT Policy BT0006](#).

¹¹ See Section III.E.3. of [UT Policy BT0006](#).

disciplinary characteristics and expectations of the faculty members working within their academic discipline.

The evaluation of a faculty member's performance is an essential component of the EDO process. The performance evaluation provides a formative and summative assessment of the faculty member's performance so that the faculty member can maintain or improve subsequent performance; serves as a basis for promotion, tenure, salary, and other decisions; and provides accountability with regard to the quality of teaching, research and service to those concerned with the institution. Essential to the annual evaluation process and progress toward promotion and/or tenure is the linking of the expectations for annual performance to the long-term efforts toward promotion and/or tenure. Departmental bylaws should clearly describe the association of the annual EDO process with faculty progression toward promotion and/or tenure.

3.4.1. Areas of Evaluation

The evaluation of the performance of the faculty member focuses on the following three (3) areas of professional responsibility:

- teaching and advising;¹²
- research, scholarship, and creative activities; and
- professional service to the University, profession, and community.

Among these obligations, teaching and advising (as appropriate) are of highest importance at UTC. It is recognized, however, that research, and scholarly and creative achievement contribute significantly to good teaching and to the advancement of knowledge. It follows, then, that faculty members will be expected to be actively involved in research, scholarship or creative activity as well. The fundamental purpose of the institution is to serve the people of the community, state, and region, and it is expected that faculty members will contribute to the mission of UTC.

While the individual faculty member is expected to participate in each of the three areas, annual achievement will vary in accordance with the objectives established in conference with the department head. Lesser participation in one area should be counterbalanced by greater

participation in others.

The mechanics for the EDO as they apply to tenure-track and tenured faculty members do not differ. However, the EDO process for tenure-track faculty members can and does have bearing on reappointment and tenure decisions. In turn, the EDO process for tenured faculty members can and does have bearing on promotion decisions, and is linked directly to the Enhanced Post-Tenure Performance Review (EPPR) process.¹³ It is the responsibility of the department head to ensure that the EDO process takes into account the distinction between tenure-track and tenured faculty members as follows:

- Tenure-Track Faculty Members: The EDO process should focus on faculty development and mentorship, and should help to determine whether the faculty member is making adequate progress towards receiving tenure.
- Tenured Faculty Members: The EDO process should focus on innovation and long-term goal setting and should ensure that the faculty member continues to meet the expectations of a tenured member of the faculty at such rank as determined by departmental by-laws.

¹² The scope of a faculty member's responsibility regarding "advising" is determined by departmental bylaws.

¹³ See Section III.I.3. and Appendix E of [UT Policy BT0006](#) for more information regarding the EPPR process.

3.4.2. EDO Process Calendar

The schedule of timelines for the annual the EDO review process is available on the UTC Academic Affairs website [here](#). Each tenured and tenure-track faculty member must be evaluated annually in accordance with Board policies.

3.4.3. Evaluation and Development by Objectives

An effective EDO process is one in which a faculty member's objectives are clear and in which discussion occurs on an ongoing basis between the faculty member and the department head regarding the faculty member's performance and progress toward achieving the faculty member's objectives.

1. EDO Objectives

Within the context of the institutional goals and long-range plans of UTC, individual faculty members propose objectives in writing on the [Individual Objectives Sheet Form](#), which they submit to their department heads for review, discussion, and approval. Since the objectives of the faculty are fundamental components of the EDO process, it is important that they be carefully prepared. It is the responsibility of the faculty member to clearly articulate in writing specific objectives and to demonstrate how the objectives relate to his or her professional development and responsibilities. It is the responsibility of the department head to provide an unambiguous review of the merit and quality of the faculty member's objectives within the context of the disciplinary standards for the profession and the expectations of the faculty member specified in the faculty member's letter of appointment. The following guidelines should be consulted during the stage of the EDO process for formulating the faculty member's objectives:

- The objectives must reflect the department, college, and University missions.
- The objectives should contribute to the faculty member's development as an effective faculty member.
- The objectives should be realistic and they should identify needed resources. Although a good objective will be challenging, it should also be attainable within the capabilities and resources of the faculty member and the University. Objectives should reflect the resources available to the faculty member.
- Objectives should specify an action to be taken or a task to be accomplished. At the time of evaluation, it should be clear whether or not a particular objective has been achieved.
- Objectives should be described in such a way that their completion may be objectively evaluated in a manner keeping with disciplinary standards. Not all objectives can or even should be quantified; but for those objectives that so lend themselves, the objectives should be stated in a manner so that the result is specific and subject to quantitative measures. When an objective aims for a qualitative result, understanding should be reached between the faculty member and the department head beforehand as to how and by what standards the outcome is to be judged.
- Once formulated, objectives should be set forth in writing in a completed Individual Objectives Sheet for the faculty member.

2. Review and Modifications of EDO Objectives

The faculty member and the department head will review the faculty member's objectives at the time of the faculty member's EDO review. If, after a faculty member's objectives have been established, the faculty member proposes to change his or her objectives before the next EDO review is conducted, the faculty member must immediately consult with and obtain the approval of his or her department head regarding the proposed changes.

3.4.4. Performance Ratings

Each tenured and tenure-track faculty member must be evaluated annually in accordance with Board policy. Performance ratings for annual reviews shall be as follows, and college and department bylaws must clarify the means and metric for each department head to employ in conducting these reviews:

3. Exceeds Expectations for Rank—eligible for significant merit pay or performance-based salary adjustment that is consistent with campus, college, and department fiscal situations;
4. Meets Expectations for Rank—eligible for minimum merit pay or performance-based salary adjustment that is consistent with campus, college, and department fiscal situations;
5. Needs Improvement for Rank—not eligible for merit pay or performance-based salary adjustment and, if tenured, required to implement an Annual Review Improvement Plan (see [Section 3.4.6.3.\(1\)](#) below).¹⁴ If tenure-track, required to implement an Annual Review Improvement Plan unless the faculty member receives a notice of non-renewal of his or her reappointment as provided under [Section 3.7.4.](#) below; and
6. Unsatisfactory for Rank—not eligible for any salary adjustment, and, if tenured, requires an Enhanced

Post-Tenure Performance Review (see [Section 3.4.6.4.\(1\)](#) below).¹⁵ If tenure-track, required to implement an Annual Review Improvement Plan unless the faculty member receives a notice of non-renewal of his or her reappointment as provided under [Section 3.7.4.](#) below.

3.4.5. Performance Standards

Each college and academic department will establish the standards for evaluating performance of their faculty members in each of the three areas of professional responsibility: teaching, research, and service. The performance standards will be utilized in determining the assignment of performance ratings to faculty members for their annual reviews.

College and departmental performance standards must be approved by the dean and the Provost and should be kept on file in the office of the dean of the college. The performance standards must be included in the college and departmental bylaws. Any proposed changes in college or departmental performance standards must be approved by the dean and Provost. It is the role of the dean to encourage reasonably comparable levels of standards for the differing units within each college or school. It is the role of the Provost to encourage reasonably comparable standards for the differing colleges and schools at UTC.

Performance evaluations must be based on the published performance standards as stated in college and departmental bylaws. In applying the performance standards, the department head is charged with fairly and equitably identifying qualitative differences in performance of the academic department's faculty members.

¹⁴ See Section III.I.1. of [UT Policy BT0006](#).

¹⁵ See Section III.I.3. of [UT Policy BT0006](#).

3.4.6. Determination of Performance Ratings and Process

In the three areas of responsibility (teaching, research, and service), the department head will evaluate the faculty member's routine responsibilities established by the academic department, those defined by Board policy,¹⁶ and those identified in the faculty member's Individual Objectives Sheet for the period being evaluated. During the course of the year, a faculty member may undertake teaching, research, or professional service activities in addition to those listed in the faculty member's Individual Objectives Sheet and report such activities for consideration in the EDO evaluation process. The department head shall not utilize quotas or forced distributions of ratings in the determination of annual performance ratings of faculty members within the academic department.

For the faculty member's performance evaluation, the department head will report on the [Individual Evaluation Form](#): (1) brief narrative evaluations of the faculty member's performance in each of the three areas of responsibility; and (2) a recommended composite rating of the faculty member's overall performance.

The department head will provide the completed Individual Evaluation Form to the faculty member. The faculty member must sign the completed Individual Evaluation Form to indicate that the faculty member has read and understood the department head's evaluation. The faculty member's signature does not indicate agreement with the department head's evaluation. Subject to the provisions under [Sections 3.4.6.1.-3.4.6.4.](#) below, the department head will send a copy of the

faculty member's evaluation and other EDO documentation to the dean, and the dean will send to the Provost for review and approval/disapproval copies of the evaluations of all faculty members within the dean's college or a list of the names of the faculty members and their corresponding performance ratings.

1. Rating of Meets Expectations for Rank

If a faculty member disagrees with the department head's recommendation of a "Meets Expectations for Rank" rating, the faculty member must, within seven (7) days of signing the Individual Evaluation Form, submit a written response to the department head setting forth the basis for the disagreement. The department head's evaluation and the faculty member's written response will be forwarded to the dean along with the faculty member's EDO documentation, all of which will become a part of the faculty member's official EDO record. The dean will review the matter and forward to the Provost a written recommendation and a copy of the faculty member's EDO documentation. The Provost will review the matter and provide written notice of his or her decision to the faculty member, department head, and dean.

2. Recommendation for Exceeds Expectations for Rank

In cases where the department head recommends an annual performance rating of "Exceeds Expectations for Rank," the department head will forward the recommendation to the dean by attaching the Exceeds Expectations for Rank Recommendation Form to the faculty member's Individual Evaluation Form. If the dean agrees with the department head's recommendation, the dean will forward his or her recommendation for "Exceeds Expectations for Rank" to the Provost and provide a copy of the recommendation to the department head. The Provost will make his or her recommendation to the Chancellor for final award.

3. Rating of Needs Improvement for Rank

If a faculty member disagrees with the department head's recommendation of a "Needs

¹⁶ See UT Policy BT0006.

Improvement for Rank" rating, the faculty member must, within seven (7) days of signing the Individual Evaluation Form, submit a written response to the department head setting forth the basis for the disagreement. Within three (3) days of receipt of the faculty member's response, the department head must provide to the departmental Reappointment, Tenure, and Promotion Committee (RTP Committee)¹⁷ written notice of the basis and rationale for the faculty member's rating and a copy of the faculty member's written response. Within seven (7) days of receipt of the department's head notice, the departmental RTP Committee will provide a written evaluation of the faculty member's record and a performance rating recommendation. The departmental RTP Committee shall include in its evaluation the number of votes for and against the recommended performance rating.

The department head's evaluation, the faculty member's written response, and the departmental RTP Committee's recommendation will be forwarded by the department head to the dean along with the faculty member's EDO documentation, all of which will become a part of the faculty member's official EDO record. The dean will review the matter and forward to the Provost a written recommendation and a copy of the faculty member's EDO documentation. The Provost

will review the matter and provide written notice of his or her decision to the faculty member, departmental RTP Committee members, department head, and dean.

(1) Annual Review Improvement Plan

Except as otherwise provided in this [Section 3.4.6.3.\(1\)](#) or in [Section 3.4.6.4.\(1\)](#) below, within thirty (30) calendar days of the Provost's decision to approve a "Needs Improvement for Rank" rating for a faculty member, the faculty member must collaborate with the department head on an Annual Review Improvement Plan to be reviewed by the department head and recommended by him or her to the dean for review and approval/denial. The next year's annual review must include a progress report that clearly describes improvements in any area(s) for which improvement was required. The Annual Review Improvement Plan process is inapplicable if the faculty member's performance rating has triggered Enhanced Post-Tenure Performance Review.¹⁸ An Annual Review Improvement Plan is not required for a tenure-track faculty member with an overall performance rating of "Needs Improvement for Rank" who receives a notice of non-renewal of his or her appointment for the following year.

4. Rating of Unsatisfactory for Rank

If a faculty member disagrees with the department head's recommendation of an "Unsatisfactory for Rank" rating, the faculty member must, within seven (7) days of signing the [Individual Evaluation Form](#), submit a written response to the department head setting forth the basis for the disagreement. Within three (3) days of receipt of the faculty member's response, the department head must provide to the departmental RTP Committee written notice of the basis and rationale for the faculty member's rating and a copy of the faculty member's written response. Within seven (7) days of receipt of the department's head notice, the departmental RTP Committee will provide a written evaluation of the faculty member's record and a performance rating recommendation. The departmental RTP Committee shall include in its evaluation the number of votes for and against the recommended performance rating.

The department head's evaluation, the faculty member's written response, and the

¹⁷ See [Section 3.5.](#) below for information regarding departmental RTP Committees.

¹⁸ See Section III.I.1. of [UT Policy BT0006](#).

departmental RTP Committee's recommendation will be forwarded by the department head to the dean along with the faculty member's EDO documentation, all of which will become a part of the faculty member's official EDO record. The dean will review the matter and forward to the Provost a written recommendation and a copy of the faculty member's EDO documentation. The Provost will review the matter and provide written notice of his or her decision to the faculty member, departmental RTP Committee members, department head, and dean.

(1) Enhanced Post-Tenure Performance Review

A tenured faculty member who receives an annual performance rating of "Unsatisfactory for Rank" will be subject to an Enhanced Post-Tenure Performance Review (EPPR). An EPPR is an expanded and in-depth performance review conducted by a committee of

tenured peers and administered by the Provost.

An EPPR must be initiated when the Provost determines that a faculty member has:

- Requested an EPPR, after at least four annual performance review cycles since the last enhanced review (such as a previous EPPR or a review in connection with tenure or promotion);
- Received one overall annual performance rating of "Unsatisfactory for Rank"; or
- Received two overall annual performance ratings of "Needs Improvement for Rank" during any four consecutive annual performance review cycles.¹⁹

The procedures for conducting an EPPR are detailed in Appendix E of [UT Policy BT0006](#).

(2) Annual Review Improvement Plan

Except as otherwise provided in this [Section 3.4.6.4.\(2\)](#), within thirty (30) calendar days of the Provost's decision to approve an "Unsatisfactory for Rank" rating for a tenure-track faculty member, the tenure-track faculty member must collaborate with the department head on an Annual Review Improvement Plan to be reviewed by the department head and recommended by him or her to the dean for review and approval/denial. The next year's annual review must include a progress report that clearly describes improvements in any area(s) for which improvement was required. However, an Annual Review Improvement Plan is not required for a tenure-track faculty member with an overall performance rating of "Unsatisfactory for Rank" who receives a notice of non-renewal of his or her appointment for the following year.

3.4.7. Appeal of Annual Performance Rating

The Provost's decision regarding a faculty member's annual performance rating may be appealed pursuant to the appeal procedure under [Section 5.3](#) of this Handbook, except that the decision of the Chancellor on appeal shall be final and not appealable to the President. An Enhanced Post-Tenure Review or the implementation of an Annual Review Improvement Plan will not be stayed pending the appeal of an annual performance rating.

3.4.8. Periodic Post-Tenure Performance Review (PPPR)

The academic freedom afforded to faculty by a grant of tenure is essential to the University's principal mission of discovery and dissemination of truth through teaching, research, and service.

¹⁹ See Section III.I.3. of [UT Policy BT0006](#).

The Board has recognized and affirmed the importance of tenure in [UT Policy BT0006](#). The Board has also recognized its fiduciary responsibility to students, parents, and all citizens of Tennessee to ensure that faculty members effectively serve the needs of students and the University throughout their careers. To balance its dedication to academic freedom with its responsibilities, UTC, with the approval of the President and the Board, has established the procedures under this [Section 3.4.8](#) under which every tenured faculty member shall receive a comprehensive performance review no less often than every six years.

1. Post-Tenure Review Period

Except as otherwise provided in the procedures under this [Section 3.4.8](#), each tenured faculty member must undergo some form of comprehensive performance review ("post-tenure review" or "PTR") no less often than every six years. The PTR shall not substitute for the EDO process in the year a faculty member is scheduled for PTR.

The dean of each college shall develop, and submit to the Provost for approval, an initial plan for staggering post-tenure reviews to avoid excessive administrative burden at any given time. The initial staggering plan may be revised with the approval of the Provost if later developments require changes in order to avoid excessive administrative burden. The post-tenure review period begins at the granting of tenure, and, except as otherwise provided by the staggering plan, a faculty member's PTR will occur no less often than every six years thereafter unless one of the following circumstances results in a different timetable:

1. Suspension of PTR Period: A faculty member's PTR period is suspended during any year in which the faculty member is granted a leave of absence or a modified duties assignment.
2. Restarting of PTR Period Due to Alternative Comprehensive Review: A comprehensive review of a faculty member's performance restarts the faculty member's PTR period under the following circumstances:
 - (a) If a tenured faculty member undergoes a successful promotion review or a promotion is in progress during the year scheduled for the faculty member's PTR, the promotion review fulfills the PTR requirement and the PTR period is modified to require a PTR six years after the promotion review. An unsuccessful promotion review does not count as an Alternative Comprehensive Review.
 - (b) If a tenured faculty member undergoes an Enhanced Post-Tenure Performance Review (EPPR) (generally triggered by annual performance review rating(s)) and is either rated as meeting expectations or successfully completes the terms of the EPPR improvement plan, the EPPR process fulfills the PTR requirement and the PTR cycle is modified to begin with the date of the EPPR committee's report.
3. Start of the PTR Period Upon Conclusion of an Administrative Appointment: Full-time administrators and faculty members with a majority administrative appointment (more than 50%) are not subject to PTR; faculty members holding a less than majority administrative appointment (50% or less) are subject to PTR regarding their faculty duties based on expectations consistent with their faculty duty allocation. When a full-time or majority-time administrator leaves his or her administrative position to assume a tenured faculty position, the faculty member's initial PTR shall occur within six years after leaving the administrative post.
4. Commitment to Retire: When a faculty member submits a letter of resignation with a termination date within the academic year during which a post-tenure review would have taken place, and provided the letter of resignation is accepted by the Provost, the post-

tenure review shall be deemed unnecessary.

5. Good Cause: A faculty member's scheduled PTR may be otherwise deferred or modified only for good cause approved by the Provost.

2. Annual Schedule for Post-Tenure Reviews

All post-tenure reviews will be conducted and completed during the Fall semester according to the following schedule:

- The Provost shall notify all faculty members subject to post-tenure review in a given academic year no later than April 1 of the preceding academic year.
- The dean of the faculty member's college shall appoint all PTR Committees as set forth in [Section 3.4.8.3.](#) below no later than May 1 of the preceding academic year.
- Each PTR Committee shall convene and elect a chair and shall be provided with the materials required by [Section 3.4.8.3.](#) below no later than September 1.
- When external review is required as part of the post-tenure review by the PTR Committee in accordance with college bylaws or by the dean in accordance with college bylaws, or is requested by the faculty member for his or her post-tenure review, the PTR Committee shall solicit reviews from at least three (3) valid external reviewers no later than October 1.
- Each PTR Committee shall submit its report required under [Section 3.4.8.6.](#) below no later than December 15.

3. Appointment and Composition of Post-Tenure Review Committee

(1) All post-tenure reviews must be conducted by college-level committees established for the sole purpose of post-tenure review. Each PTR Committee shall include a minimum of three (3) members, provided the number is odd. Deans of larger colleges may opt to appoint a larger committee. The committee is appointed by the dean of the faculty member's college in the following manner:

- Each department may nominate at least one (1) member, but no more than three (3) members of its tenured faculty, to serve on a college-level PTR Committee. The nominees should include no faculty member who is subject to post-tenure review in that cycle. The department nominee may hold the rank of Associate Professor only with prior approval of the dean and only in the event that no full Professor is eligible or available to serve.
- From among the departmental nominees, the dean shall appoint faculty members to serve on a PTR Committee for any specific faculty member (or group of faculty members) undergoing review. The members of a PTR Committee shall be appointed so as to avoid any conflict of interest with any faculty member (or group of faculty members) undergoing review.
- For the purpose of this process, a conflict of interest shall be defined as any professional or personal consideration between a PTR Committee member and a faculty member undergoing post-tenure review which may compromise, or have the appearance of compromising, the independence of the former's judgment during review of the latter.

(2) The composition of the PTR Committee must meet the following requirements:

- Each PTR Committee member must be a tenured full-time faculty member who is at the same or higher academic rank (except as provided under [Section 3.4.8.3.\(1\)](#) above), and whose locus of tenure is at the same campus as the faculty member being reviewed.
- One, and only one, PTR Committee member must hold an appointment in the same department as the faculty member being reviewed, unless there is no such faculty member eligible to serve.

College bylaws may further define the size and membership of a PTR Committee, accounting for the characteristics of the departments and faculties which constitute the college itself.

The Provost, working with the University of Tennessee Office of Academic Affairs and Student Success, will provide instructions, guidelines, and best practices to members of PTR Committees.

Each PTR Committee shall convene and elect a chair. The chair shall solicit and collect all required materials from each faculty member under review and the department head of each faculty member under review. The chair shall subsequently ensure that the committee meets in person for a thorough review of those materials.

4. Materials to be Reviewed by Post-Tenure Review Committee

The PTR Committee must review:

- (1)** a completed EDO (including the department head's evaluation and rating of the faculty member's performance, and student and any peer evaluation of teaching) for each year since the last review;
- (2)** EDO goals for the current review period;
- (3)** the faculty member's current Curriculum Vitae;
- (4)** a narrative, not to exceed two pages, prepared by the faculty member describing the faculty member's milestone achievements and accomplishments since the last review as well as goals for the next post-tenure review period; and
- (5)** if there has been a previous PTR, a copy of the narrative submitted as a part of the faculty member's previous PTR.

Items (1) – (2) above should be supplied by the faculty member's department head. Items (3) – (5) above should be supplied by the faculty member.

The PTR Committee may also review:

- (6)** external reviews, when external reviews are deemed necessary by the PTR Committee in accordance with college bylaws or when external reviews are deemed necessary by the dean of the faculty member's college in accordance with college bylaws. In the event that an external review is not deemed necessary by the PTR Committee or dean, external reviews may be requested by the faculty member undergoing post-tenure review.

When an external review is deemed necessary, or is requested, for a faculty member's post-

tenure review, the materials to be reviewed for that faculty member (i.e., the materials listed under (1) – (5) above), will be sent to no fewer than three external reviewers. At least two external reviewers must provide written reviews.

The selection of the external reviewers for a faculty member is a collaboration between that faculty member and the PTR Committee conducting the review. The faculty member shall submit to the PTR Committee two lists: one list of no fewer than five names of valid reviewers, and a second list of names of individuals who must be excluded from the external review. Relying on its own counsel and expertise, the PTR Committee will create its own list of no fewer than five valid reviewers.

A valid reviewer is a tenured faculty member at a comparable institution of higher education holding the rank of full Professor and a terminal degree in the same discipline, or sufficiently-related discipline, as the faculty member undergoing post-tenure review. Preference should be given to valid reviewers from institutional peers of UTC.

From these two lists, the PTR Committee shall select exactly one name of a valid reviewer from the faculty member's list and two names of valid reviewers from its own list. From this panel of three reviewers, the PTR Committee shall solicit external reviews using a form letter provided by the Provost for this purpose. Each reviewer shall receive the same packet of materials (i.e., the materials listed under (1) – (5) as above), along with clear instructions on timely return of a review to the PTR Committee. Should a reviewer decline to review a candidate for post-tenure review, the PTR Committee may return to the two lists of valid reviewers and select another valid reviewer from whom to solicit a review.

At least two valid external reviewers must supply reviews to the PTR Committee reviewing a candidate for post-tenure review. In the event that two reviews from valid external reviewers cannot be secured, the chair of a PTR Committee may appeal to the Provost for a waiver of this requirement.

The reviews of external reviewers are advisory to the PTR Committee. In its conclusions and report, the PTR Committee should highlight relevant observations made by external reviewers, and describe the role that those observations played in the PTR Committee's conclusions and report.

5. Criteria for Post-Tenure Review

The post-tenure review process should ensure the faculty member has demonstrated continued professional growth and productivity in the areas of teaching, research (including published scholarship and creative achievement), service, and/or clinical care pertinent to his or her faculty responsibilities. The criteria for assessing the faculty member's performance must be consistent with established expectations of the department, college, and UTC and provide sufficient flexibility to consider changes in academic responsibilities and/or expectations. The expectations for faculty performance may differ by college, department, and even among sub-disciplines within a department or program. Those expectations may be commonly-held standards in the discipline or sub-discipline. Those expectations may be stated explicitly in the faculty member's own past annual performance reviews, work assignments, goals or other planning tools (however identified), as well as department or college bylaws, this Handbook (including without limitation this [Section 3.4.8.](#)), and in other generally-applicable policies and procedures (for example, fiscal, human resources, safety, research, or information technology

policies and procedures).

6. PTR Committee's Conclusions and Report

The PTR Committee is charged to review the faculty member's performance during the review period and to conclude whether the faculty member's performance satisfies the expectations for the faculty member's discipline and academic rank. All conclusions and recommendations shall be adopted upon the vote of a simple majority of the PTR Committee. No member of the PTR Committee may abstain or recuse themselves from voting. Based on the judgment of its members, the PTR Committee must conclude either:

- That the faculty member's performance satisfies the expectations for the faculty member's discipline and academic rank; or
- That the faculty member's performance does not satisfy the expectations for the faculty member's discipline and academic rank.

The committee must report its conclusions and recommendations in writing using a standard format prepared by the Provost, including (a) an enumeration of the vote, (b) the supporting reasons for its conclusion, (c) a dissenting explanation for any conclusion that is not adopted unanimously, (d) an identification of any incongruences observed between the faculty member's performance and his or her annual evaluations, (e) a statement of any additional concerns identified or actions recommended, and (f) if applicable, an identification of areas of extraordinary contribution and/or performance.

The PTR Committee shall send its detailed report to the dean of the faculty member's college. The dean shall make a written recommendation to accept or reject the PTR Committee's determination and which shall include the dean's justification for their recommendation. Within thirty (30) days of receipt of the PTR Committee report, the dean shall provide the report along with the dean's recommendation to the faculty member, department head, and Provost.

Upon receipt of the PTR Committee report and the dean's written recommendation, the faculty member and department head shall have thirty (30) days to provide the Provost their independent written responses to the PTR Committee report and the dean's recommendation.

After receipt of the written responses of the faculty member and/or department head, or confirmation that no such response(s) will be provided, the Provost shall review the PTR Committee report, the dean's written recommendation, and any written responses provided by the faculty member and/or department head, before making a final decision on the faculty member's performance during the review period. The Provost shall provide notice of the Provost's final decision to the faculty member, department head, and dean in writing.

The PTR Committee report, the dean's written recommendation, any written response(s) from the faculty member and/or department head, and the Provost's final decision letter shall be maintained in UTC Faculty Records. At the conclusion of each academic year, a summary of all PTR decisions made at UTC that academic year will be compiled and submitted electronically to the University of Tennessee Office of Academic Affairs and Student Success.

7. Appeal

Within thirty (30) days of receipt of the Provost's final decision letter, the faculty member may appeal any conclusion with which the faculty member disagrees. The procedure for appeal is described in [Section 5.3.](#) of this Handbook, except that a final decision by the Chancellor on the appeal shall be made within ninety (90) days of the faculty member's appeal. The decision of the Chancellor on an appeal shall be final and not be appealable to the President. If the Chancellor's decision on an appeal does not concur with the PTR Committee's recommendation, with the dean's written recommendation, or with the Provost's decision, then the Chancellor shall provide supporting reasons for any such non-concurrence in the appeal decision letter.

8. Further Actions

If the PTR Committee concludes that the faculty member's performance has not satisfied the expectations for the faculty member's discipline and rank, a PTR improvement plan must be developed using the same procedures used for the development of an EPPR improvement plan as detailed in Appendix E to [UT Policy BT0006](#).

If the Provost concludes that deficiencies exist in the departmental annual performance review process (including failure of department heads to conduct rigorous annual performance reviews) or other incongruences are observed between the PTR performance review and rankings assigned through the annual performance review process, the Provost must develop a process for addressing the issues.

9. Annual Report to the Board

The Provost shall prepare an annual assessment report of campus post-tenure review processes, procedures and outcomes for submission by the Chancellor to the Board, through the President, no later than June 1 of each year. The report shall include a description of any deficiencies identified in departmental annual performance review processes and the plan for addressing the issues.

3.5. ROLE OF THE FACULTY IN THE EVALUATION PROCESS

In matters of evaluation, including retention, tenure and promotion, the role of the faculty is critical. Each department shall establish a standing Rank, Tenure and Promotion (RTP) Committee for considerations of reappointment, tenure, and promotion for faculty members within the department.

3.5.1. Departmental RTP Committee

1. Membership

The full membership of a departmental RTP Committee shall consist of all tenured faculty members within the academic department, except for the department head, and, if necessary, non-departmental tenured faculty members selected to the committee as provided under [Section 3.5.2.](#) below. Tenured faculty members on leave are eligible to sit on the RTP Committee but are not required to do so. Tenured faculty members on leave who are members of

the committee have the right to vote in absentia on any matters before the committee. The membership of the departmental RTP Committee shall consist of at least three members.

2. Selection of Non-Departmental Members

If there are not three tenured faculty members within the academic department, the committee's membership will be augmented by tenured faculty members from academic departments of similar or related disciplines, generally within the same college, and/or if necessary, from academic departments of non-similar or non-related disciplines. For each vacancy on a departmental RTP Committee that must be filled in order to meet the three- person membership requirement, the department head shall prepare a list of at least two nominees, giving consideration to each nominee's expertise and familiarity with the nature of the discipline. The non-departmental committee members will then be elected by majority vote of all tenured and tenure-track faculty members within the academic department.

3. Procedures

The department head is responsible for calling an organizational meeting of the complete RTP Committee each academic year and for providing the committee with a record of EDO reports for each faculty member being considered for reappointment, tenure, or promotion in that year. The committee will elect a chair at the first called meeting. The departmental RTP Committee shall meet for deliberation and voting on matters before it. The committee's recommendations shall be by majority vote of its members.

In principle, no member of the faculty or administrative chain involved in making recommendations for reappointment, tenure, or promotion should make recommendations on any individual case at more than one level of the review process. Accordingly, no administrator who makes recommendations should serve on a departmental RTP Committee, nor should any such administrator be present during any meeting or deliberations of the committee unless invited by a positive vote of the committee. In particular, the department head shall not be present at any meeting or during any deliberations of the departmental RTP Committee. A faculty member serving on both the departmental RTP Committee and the college-wide Tenure and Promotion Review Committee may vote on a tenure and/or promotion recommendation at only one level of the tenure and promotion review process, either at the departmental RTP Committee level or at the college-wide Tenure and Promotion Review Committee level.

For a promotion recommendation, only those members of the committee already at or higher than the rank to which promotion is being considered are eligible to consider and vote on the promotion recommendation. All promotion recommendations must be considered and voted on by at least three eligible faculty members on the committee. If the committee does not have three departmental members eligible to vote on a promotion recommendation, additional eligible non-departmental members must be selected to the committee in order to meet the three-person requirement pursuant to the process outlined in [Section 3.5.2.](#) above. Members of the committee who are eligible to consider and vote on a promotion recommendation are prohibited from consulting with departmental faculty members who are at a rank lower than the rank to which promotion is being considered. For reappointment, tenure, and promotion decisions, the committee will sit as a whole.

3.5.2. College-Wide Tenure and Promotion Review Committee

Each college shall determine and publish in its bylaws the composition, selection of membership, and procedures of the college-wide committee (or independent review committee) established for the review of tenure and promotion recommendations within the college. For a promotion recommendation reviewed by the committee, only those members of the committee already at or higher than the rank to which promotion is being considered are eligible to consider and vote on the promotion recommendation. The recommendations of the committee shall be advisory to the dean of the college.

3.6. REAPPOINTMENT OF TENURE-TRACK FACULTY

Faculty members holding tenure-track appointments are considered annually for reappointment. A tenure-track faculty member's annual reappointment review is separate from his or her annual performance evaluation, but it may be conducted concurrently with the annual performance evaluation.

3.6.1. First Year of Probationary Period

In the Spring semester of the first year of a faculty member's probationary period, the faculty member must apply for reappointment by submitting to his or her department head the faculty member's objectives for teaching, scholarship and professional/public/community service for the following year. The department head must approve the faculty member's objectives. Approved objectives will be used for the evaluation of the faculty member's performance for the second year of the faculty member's probationary period.

3.6.2. Subsequent Years of Probationary Period

In each subsequent year of a tenure-track faculty member's probationary period in which the faculty member applies for reappointment,²⁰ the faculty member must submit evaluation and reappointment materials to his or her department head for review. The evaluation and reappointment materials that a faculty member must submit are identified on the UTC Academic Affairs website [here](#).

3.7. REAPPOINTMENT REVIEW PROCESS

3.7.1. Regular Probationary Year Review

In each year of the tenure-track faculty member's probationary period in which the faculty member is subject to consideration for reappointment, the department head is responsible for the careful evaluation of the faculty member in determining whether to recommend reappointment of the faculty member for the following year. Departments may elect to require that the departmental RTP Committee perform the initial evaluation and recommendation on reappointment in each year of the faculty member's probationary period and provide such recommendation to the department head. To the extent a department elects to do so, the department must include such a requirement in its departmental bylaws.²¹ Otherwise, the reappointment review process set forth in this [Section](#)

[3.7.1.](#) shall be followed.

Unless otherwise provided in the department's bylaws, the department head's recommendation is the initial recommendation, except for in the mid-probationary review year (i.e., typically, the third year of the probationary period). In the mid-probationary review year, the departmental RTP Committee makes an initial recommendation regarding reappointment as provided under [Section 3.7.2.](#) below.

In the event the department head recommends reappointment, the department head shall submit his or her written recommendation to the dean and inform the faculty member in writing of the recommendation. The department head's recommendation should note positive areas and areas where improvement is needed. If the dean agrees with the department head's recommendation, the faculty member shall be reappointed and the faculty member shall be notified in writing of the dean's decision.

In the event the department head makes a recommendation against reappointment, the department head must provide to the faculty member a letter stating the specific reasons for the recommendation against reappointment. The department head must also notify the RTP Committee of the academic department within five (5) days of providing the faculty member with notification of his or her recommendation. The department head should share with the departmental RTP Committee the basis and rationale for the recommendation. The departmental RTP Committee will then provide an additional written evaluation of the faculty member's record and recommendation. The departmental RTP Committee shall include in its evaluation the number of votes for and against reappointment.

The departmental RTP Committee's evaluation and recommendation must be provided to the department head within seven (7) days of the departmental RTP Committee's receipt of

²⁰ In last year of a faculty member's probationary period (typically, Year 6), a decision regarding tenure for the faculty member is made.

²¹ A department's adoption of such a requirement in its bylaws will modify the reappointment review process as set forth in this [Section 3.7.1.](#) only as to the levels of review and recommendation before the dean's level of review and recommendation.

notification of the department head's recommendation. Upon receipt of the departmental RTP's evaluation, the department head shall submit his or her written recommendation to the dean along with the departmental RTP's evaluation and recommendation. If the dean does not agree with the recommendation against reappointment and decides to reappoint the faculty member, the faculty member shall be reappointed and the faculty member shall be notified in writing of the dean's decision. If the dean agrees with the recommendation against reappointment, the dean shall submit his or her recommendation against reappointment to the Provost.

Upon receipt of the dean's recommendation, the Provost will review the matter and make the final decision whether or not to reappoint the faculty member. The Provost will send a letter to the faculty member notifying the faculty member of the final decision. The Provost will also communicate to the dean, department head, and the departmental RTP Committee (if appropriate) his or her decision and rationale.

The Provost must give notice to a tenure-track faculty member that his or her appointment will not be renewed for the next year pursuant to the schedule and requirements set forth under [Section 3.7.4.](#) below.

3.7.2. Mid-Probationary Review of Probationary Faculty (Enhanced Tenure-Track Review)

In a tenure-track faculty member's mid-probationary review year (i.e., typically, the third year of the probationary period), before the department head makes his or her recommendation, the departmental RTP Committee shall conduct a full review and evaluation (i.e., Enhanced Tenure-Track Review or ETTR) of the faculty member's progress towards tenure as part of the reappointment evaluation undertaken for the faculty member for that year.²²

The faculty member shall assemble a dossier thoroughly documenting progress toward tenure. The dossier must include artifacts, dated after his or her appointment to UTC, that demonstrate work as a teacher;²³ development as a scholar, researcher, or creator; and participation in service and other professional activities. Prior to the beginning of each academic year, the Provost shall provide a list of recommended materials which may be used for such evidence. The faculty member shall submit his or her dossier to the departmental RTP Committee for its review and evaluation.

The departmental RTP Committee shall provide to the department head a written report that will contain a list of the participating tenured faculty members; suggestions for enhancing the faculty member's progress toward tenure; the majority and minority report, if applicable; the summary anonymous vote on whether the faculty member is progressing satisfactorily toward the grant of tenure; and a recommendation for or against reappointment. Upon receipt of the departmental RTP Committee's report, the department head will present and discuss the departmental RTP Committee's report, as well as his or her own written assessment, and develop a plan to address suggested enhancement from the RTP Committee, with the faculty member. Copies of the ETTR documents will be given to the faculty member. A favorable ETTR does not commit the departmental RTP Committee, the department, or the college to a subsequent recommendation for the grant of tenure.

After meeting with the faculty member, the department head shall submit his or her written recommendation for or against reappointment to the dean along with the departmental RTP Committee's report and recommendation. The reappointment review for the faculty member's

²² In the discretion of the department head, the ETTR may be performed in the fourth year of the faculty member's probationary period. A faculty member's ETTR may be performed beyond the fourth year of the probationary period if the faculty member has been granted an extension of their probationary period (with the year to be determined by the department head after consultation with the faculty member and, if applicable, the faculty member's mentor).

²³ In regard to evaluation of librarians, "librarian" should be substituted for the word "teacher".

mid-probationary review year otherwise follows the same process as described under [Section 3.7.1](#) above. An appeal regarding an ETTR may be made under the same procedures applicable to the appeal of an annual performance rating as provided under [Section 3.4.7](#) above.

3.7.3. Roles of the Department Head and RTP Committee in the Reappointment Review Process

The roles of the department head and departmental RTP Committee in the reappointment process for a tenure-track faculty member under a typical six-year probationary period are summarized in the following chart:

Probationary Year	Department Head Role	RTP Committee Role

1	Establish goals and objectives for annual performance and achieving tenure	Providing input on reappointment of faculty is required only in instances where the department head recommends against reappointment*
2	Annual performance evaluation and progress toward tenure	Providing input on reappointment of faculty is required only in instances where the department head recommends against reappointment
3 Mid-Probationary Review Year (ETTR)	Annual performance evaluation and progress toward tenure	Provide input on reappointment and evaluation of faculty member's progress toward tenure
4	Annual performance evaluation and progress toward tenure	Providing input on reappointment of faculty is required only in instances where the department head recommends against reappointment
5	Annual performance evaluation and progress toward tenure	Providing input on reappointment of faculty is required only in instances where the department head recommends against reappointment
6 Tenure Decision Year	Provide evaluation regarding whether faculty met departmental and University standards for awarding tenure	Provide evaluation regarding whether faculty met departmental and University standards for awarding tenure

*As provided under [Section 3.7.1.](#) above, a department may elect to require that the departmental RTP Committee provide the initial recommendation on reappointment to the department head in each year of the faculty member's probationary period.

3.7.4. Notice of Non-Reappointment

Notice that a tenure-track faculty member's appointment will not be renewed for the next year shall be made in writing by the Provost according to the following schedule:

- 1.** In the first year of the probationary period, not later than March 1 for an academic year appointment and no less than three months in advance for any other term of appointment;
- 2.** In the second year of the probationary period, not later than December 15 for an academic year appointment and no less than six months in advance for any other term of appointment;
and
- 3.** In the third and subsequent years of the probationary period, not less than twelve months in advance.

These notice requirements relate only to service in a probationary period with the University. Credit for prior service shall not be considered in determining the required notice. Notice of non-renewal shall be effective upon personal delivery or upon mailing, postage prepaid, to the faculty member's residential address of record at the University.²⁴

3.8. CHANGES TO THE APPOINTMENT

As provided under [Section 3.7.1.](#) above, a faculty member is officially notified of reappointment by letter from the Provost or the dean. A faculty member is officially notified by letter from the Provost of any other changes in the terms of the faculty member's appointment, including, but not limited to, subsequent salary decisions or changes in rank, title or assignment. Any other representations, whether oral or written, concerning adjustments or changes to a faculty member's appointment or concerning a faculty member's reappointment are unauthorized and not binding on UTC. Normally, salary decisions and other changes in employment status are made following approval of the University budget by the Board at its annual meeting in June.

3.9. TERMINATION BEFORE EXPIRATION OF APPOINTMENT TERM

A tenure-track faculty member may be terminated before the expiration of his or her annual appointment term on the same grounds and pursuant to the same procedures applicable to the revocation of tenure and termination of tenured faculty members.²⁵

3.10. TENURE

Tenure is a principle that entitles a faculty member to continuation of his or her annual appointment until relinquishment or forfeiture of tenure or until termination of tenure for Adequate Cause (as defined under [UT Policy BT0006](#)), financial exigency, or academic program continuance. The burden of proof that tenure should be awarded rests with the faculty member. The grant of tenure shifts the burden of proof concerning the faculty member's continuing appointment from the faculty member to the University, except in the case of relinquishment or forfeiture of tenure. More information regarding the Board's policy on tenure can be found [here](#).

3.10.1. Authority to Grant Tenure

Tenure is acquired only by positive action of either the President or the Board, based on the circumstances under which tenure is sought, and is granted in a particular academic unit (department, school, or college). The Board makes the decision whether to grant tenure, based upon the recommendation of the President, to (1) all University Officers as defined in bylaws and adopted by the Board; (2) any faculty member who is to be granted tenure upon initial appointment without serving a probationary period at UTC; and (3) any faculty member to be tenured after serving less than a six-year probationary period, but not including a faculty member who has been employed by the University in a tenure-track position for six years and whose probationary period has been suspended for one or more year(s) in connection with a leave of absence or modified duties assignment under Section 3.3.4.3 above. The President makes the decision whether to grant tenure, based upon the recommendation of the Chancellor, in all other cases. The President

²⁴ See Section III.E.4. of [UT Policy BT0006](#).

²⁵ The grounds and procedures for revocation of tenure and termination of tenured faculty members are set forth in Section III.J. and Appendices B and C of [UT Policy BT0006](#).

or the Board (as applicable according to UT Policy BT0006) may grant tenure at any time during a given year, after confirming that all tenure review and recommendation procedures in Appendix A of [UT Policy BT0006](#) have been followed.

3.10.2. Eligibility for Tenure Consideration

Board policy establishes the following minimum standards for eligibility for tenure consideration:

1. Regular, full-time, tenure-track faculty appointments at the academic rank of instructor, assistant professor, associate professor, or professor are eligible for tenure consideration;
2. Temporary, term, and part-time appointments are not eligible for tenure consideration, except that in the extraordinary circumstances defined in Board policy, faculty members who do not have a full-time appointment may be eligible for tenure consideration.²⁶

3.10.3. Tenure Upon Initial Appointment

No faculty member shall be granted tenure upon initial appointment except by positive action of the Board upon the recommendation of the President, which shall include documentation of compliance with all tenure review and recommendation procedures stated in Appendix A of [UT Policy BT0006](#) and as established under [Section 3.10.7.](#) of this Handbook. The Board will grant tenure upon initial appointment only if (1) the proposed appointee holds tenure at another higher education institution and the Board determines that the President has documented that the proposed appointee cannot be successfully recruited to UTC without being granted tenure upon initial appointment; or (2) the Board determines that the President has documented other exceptional circumstances warranting the grant of tenure upon initial appointment. When necessary between regular meetings of the Board, the Board's executive committee may act on behalf of the Board to grant tenure upon initial appointment in accordance with the provisions of this [Section 3.10.3.](#)²⁷

3.10.4. Criteria for Tenure Consideration

The criteria for appointment and reappointment reflect the basic elements for tenure consideration; however, a positive recommendation for tenure requires demonstrated excellence in performance. Expectations necessarily vary within the respective disciplines of faculty members and in light of the differing ranks of faculty members. The natures of disciplines are such that they emphasize differing levels of performance and differing mixes and types of research and service. Consequently, the tenured faculty members in the disciplines in which tenure-track faculty members work will recommend the standards, degrees of emphasis, and the appropriate types of research and service required for tenure. The individual standards and criteria for tenure for each academic department must be explicitly laid out in the bylaws of the academic department.

A faculty member, at a minimum, must meet the following criteria necessary for the rank of Associate Professor in order to be granted tenure:

1. have a doctorate degree or other terminal degree in his or her discipline or present equivalent training and experience;
2. have achieved a reputation as an accomplished teacher;²⁸

²⁶ See Section III.C. of [UT Policy BT0006](#).

²⁷ See Section III.D. of [UT Policy BT0006](#).

²⁸ In regard to evaluation of librarians, "librarian" should be substituted for the word "teacher".

3. have achieved a good record in research, scholarly, or creative activities;
4. have an established record of effective participation in professional activities other than teaching and research;
5. have demonstrated ability to relate appropriately to students and professional colleagues; and
6. have demonstrated excellence in at least one of the three areas of responsibility (i.e., teaching, service, and research) required for full-time faculty status.

An academic department shall establish more specific criteria for tenure in that academic department that are consistent with the tenure criteria stated in [UT Policy BT0006](#) and this Handbook but may be more restrictive. Departmental criteria for tenure shall be effective upon approval of the dean and Provost and shall be published in the bylaws of the department. Departmental criteria for tenure shall not be required, however, if more-specific criteria have been established by the applicable college, and the dean and Provost have approved application of the college criteria in lieu of departmental criteria.

3.10.5. Tenure Dossier

All tenure candidates must prepare and submit a tenure dossier, which will be reviewed and inform the recommendations made at each stage of the tenure review process. The dossier is standard to the extent that it describes the way in which the candidate has met each of the respective criteria for tenure as listed in this Handbook. The departmental bylaws shall contain a statement of the required contents of the tenure dossier that is consistent with the Faculty Handbook and with applicable college bylaws, unless the dean and the Provost have approved the department's application of tenure dossier requirements established in college bylaws.

The dossier should include a preface that must contain a Curriculum Vita (CV) describing the candidate's education and experience (both prior to coming to UTC and while at UTC) and a one-page executive summary of the same. In addition, the preface to the dossier may contain a summary of the candidate's EDO evaluations. The dossier should be divided into the three distinct components based on the three performance areas outlined in the EDO: (1) teaching and advising; (2) research, scholarship and creative activities; and (3) professional service to the University, profession, and community. The respective components of the dossier should include all documentation for and evidence of activities related to, respectively, the teaching, research, and service in which the candidate has engaged since the candidate's initial appointment at UTC. A teaching philosophy and a record of [Student Ratings of Faculty](#) for the candidate must be included in the dossier. Other materials should be included at the discretion of the candidate, and, if possible, on the advice of the departmental RTP Committee. The departmental bylaws shall set forth information pertaining to appropriate activities of faculty members in the academic department for each of the three areas of professional responsibility.

3.10.6. Requirement for Peer Review Teaching and External Reviews

1. Peer Review of Teaching

Tenure candidates who engage in teaching will be subject to a peer review of their teaching performance as part of the tenure review process. Each academic department will establish procedures for conducting teaching peer reviews for the tenure review process and publish such procedures in its bylaws. Departmental procedures for teaching peer reviews are not required, however, if the dean and the Provost have approved application of college-wide teaching peer review procedures in lieu of departmental procedures. College-wide teaching peer review procedures approved by the dean and Provost will be published in the college bylaws.

2. External Reviews

All dossiers for tenure/promotion must include reviews from no fewer than two (2) external reviewers. Each college or academic department will establish an external review process, which will incorporate, at a minimum, the following requirements:

- The external reviewers must be in the same, or a very similar, academic field.
- The external reviewers must be tenured and at, or above, the rank that the candidate seeks.
- The external reviewers must be at a comparable institution.
- The external reviewers must not have a current conflict of interest with the candidate.
- The departmental RTP Committee and the candidate shall be jointly responsible for selecting the external reviewers.
- Neither the departmental RTP Committee nor the candidate will be permitted to contact the external reviewers during the review process. However, the external reviewers are permitted to contact the chair of the departmental RTP Committee for procedural clarifications.

Each academic department will publish its external review process in its bylaws. Departmental procedures for external reviews are not required, however, if the dean and the Provost have approved application of college-wide external review procedures in lieu of departmental procedures. College-wide external review procedures approved by the dean and Provost will be published in the college bylaws.

The purpose of the external review is *not* to make a recommendation regarding tenure/promotion but to provide an objective evaluation of the faculty member's record to date. This external review will include the performance area of research and may also include the performance areas of teaching and service, as defined by college and departmental bylaws. It is the responsibility of the faculty member seeking tenure/promotion to demonstrate excellence in applicable areas. Examples of accomplishments or evidence of excellence include: peer-reviewed publications; presentations at major, regional, national, or international conferences; substantial contributions to regional, national or international committees or work groups; and regional and national awards/recognition for teaching, research, and professional contributions. This list is illustrative only, and is not exhaustive. Objective standards of record and of

excellence will be defined through college and departmental bylaws.

3.10.7.Procedure for Consideration and Grant of Tenure

A calendar is established annually by the Provost that should be followed during the development of tenure recommendations. The calendar for the tenure review process is available on the UTC Academic Affairs website [here](#).

The candidate will be informed in writing of the progress of his or her tenure candidacy at each stage of the process. The procedure for the consideration and granting of tenure includes the following stages:

1. Submission of Tenure Dossier: The departmental RTP Committee, at its organizational meeting each academic year, will consider a list of candidates for tenure and request tenure dossiers from the candidates. The candidate shall then prepare and submit a tenure dossier to the departmental RTP Committee.
2. RTP Committee's Recommendation: After receiving and reviewing dossiers from each faculty member under consideration for tenure, the departmental RTP Committee (consisting of tenured faculty in the department) holds a preliminary review at which it has an opportunity to request clarifying information from each candidate prior to final consideration and forwarding of recommendations to the department head. The departmental RTP Committee's recommendation is decided upon by majority vote (yes or no) of those committee members present and voting. Votes will be cast anonymously. Abstentions are permitted. A quorum, as specified by departmental bylaws, is required for actions to take place, and the departmental bylaws will specify the minimum number of votes necessary to constitute a positive recommendation. The vote of the departmental RTP Committee is advisory to the department head.

The departmental RTP Committee will forward a written recommendation to the department head, together with records of committee membership, attendance at final discussions, and voting results.

3. Department Head's Recommendation: After making an independent judgment on the tenure candidacy, the department head shall submit his or her recommendation to the dean with a written summary explanation of his or her judgment, with a copy provided to the tenure candidate at the same time. If the department head's recommendation differs from the recommendation of the departmental RTP Committee, the summary must explain the reasons for the differing judgment, and the department head must provide a copy of the summary to the departmental RTP Committee. The departmental RTP Committee may forward a dissenting report to the next level of review, with a copy provided to the tenure candidate at the same time.
4. Dean's Recommendation: All tenure recommendations of the department head, whether positive or negative, shall be reviewed by the dean. The dean must establish a college-wide committee for review of tenure and promotion recommendations or, if a college-wide committee is not established, some other independent peer review committee in addition to the departmental RTP Committee's review. The recommendation of such a college-wide committee shall be advisory to the dean. After making an independent judgment on the tenure candidacy, the dean shall forward his or her recommendation and a summary explanation for the recommendation to the Provost, with a copy provided to the tenure candidate at the same time.
5. Provost's Recommendation: All tenure recommendations of the dean, whether positive or negative, shall be reviewed by the Provost. After making an independent judgment on the tenure candidacy, the Provost shall forward his or her recommendation and a summary explanation for the recommendation

to the Chancellor, with a copy provided to the tenure candidate at the same time.

6. Chancellor's Recommendation: All tenure recommendations of the Provost, whether positive or negative, shall be reviewed by the Chancellor. After making an independent judgment on the tenure candidacy, the Chancellor shall forward only positive recommendations, with a summary explanation for the recommendation, to the President, with a copy provided to the tenure candidate at the same time.
7. President's Action or Recommendation: The President acts only on the Chancellor's positive recommendation for tenure. If the President concurs in the positive recommendation, he or she shall grant tenure if he or she is authorized to do so, and the Chancellor shall give the faculty member written notice of the effective date of tenure. If only the Board is authorized to grant tenure, the President shall submit the recommendation to grant tenure and a summary explanation for the recommendation to the Board. If the President does not concur in the positive recommendation of the Chancellor, the Chancellor shall give the faculty member written notice that tenure will not to be granted.
8. Action by the Board when Required: Only the Board is authorized to grant tenure in certain cases specified in Article III.B. of [UT Policy BT0006](#). In those cases, the Board acts only on the President's positive recommendation for tenure. After positive action by the Board to grant tenure, the President shall give the faculty member written notice of the effective date of tenure.

3.10.8. Appeal of Tenure Decisions

A decision not to grant tenure may be appealed by a tenure candidate pursuant to the appeal procedure under [Section 5.3](#). of this Handbook. A tenure candidate may not initiate an appeal until after the candidate receives notification of the Chancellor's recommendation not to grant tenure.

3.10.9. Locus of Tenure

Tenure is granted in a particular academic unit (e.g., department, school) of UTC in a position appropriate to the faculty member's qualifications. Reorganizations that result in the merger or splitting of departments do not affect the tenure or probationary status of the faculty member involved.

If a tenured faculty member voluntarily transfers from one University of Tennessee campus to another, his or her tenured status is not transferred. However, a review by the responsible administrators in consultation with the tenured faculty of the receiving department may result in an immediate recommendation to the President that tenure at the new campus be granted to the transferred individual; on the other hand, a new probationary period in the receiving department may be established. There shall be no involuntary transfer of faculty members between campuses.

Transfers of tenure between departments at UTC do not require the President's approval, but must be approved by the responsible campus administrators in consultation with the tenured faculty of the receiving unit, with notice to the President. In any event, prior to the effective date of the transfer all conditions relating to tenure must be documented and accepted, in writing, by the transferring faculty member. If a non-tenured faculty member transfers from one existing department to another, a new probationary period must be established and documented under the same guidelines that would be followed if the faculty member came from another institution. All conditions relating to the new probationary period must be documented and accepted, in writing, by the transferring faculty member. If a tenured faculty member accepts a part-time faculty position or an

administrative position with UTC, neither of which can carry tenure, the faculty member retains tenure in the full-time faculty position he or she vacated.²⁹

3.10.10. Grounds for Termination of Tenure

1. Relinquishment or Forfeiture of Tenure

A tenured faculty member relinquishes tenure upon resignation or retirement from the University.³⁰ A tenured faculty member forfeits tenure upon taking an unauthorized leave of

²⁹ Section III.H. of [UT Policy BT0006](#).

³⁰ Under [UT Policy BT0006](#) and for purposes of this section, the "University" refers to The University of Tennessee System.

absence or failing to resume the duties of his or her position following an approved leave of absence. Forfeiture results in automatic termination of employment. The Provost shall give the faculty member written notice of the forfeiture of tenure and termination of employment.³¹

(1) Resignation

Faculty members who desire to resign should provide written notice to their department head of their intent to resign and their intended resignation date. The department head will forward the resignation notice to the dean. Except as otherwise provided in this section, the dean will accept the resignation in writing and forward it to the Office of Human Resources with a copy to the Provost. Since faculty appointments are made for the academic year, it is expected that faculty members who wish to resign will do so effective at the end of the academic year. In all cases, notification of resignation must be made early enough to allow UTC to cover any of the faculty member's scheduled assignments. If a faculty member seeks to resign before the end of the faculty member's stipulated appointment term, the acceptance of the resignation will not become official until accepted in writing by the Provost (or the Provost's designee).

(2) Retirement

Faculty members who wish to retire are expected to provide written notice to their department head of their intention to retire and date of expected retirement at least three months before the intended retirement date. The department head will forward the retirement notice to the dean, Provost and the Office of Human Resources. There is no mandatory retirement age for faculty members, and under normal circumstances, a faculty member controls the decision to retire. The effective date of retirement for faculty members on academic year (nine-month) appointments normally will be at the end of the either the Fall or Spring semester.

2. Extraordinary Circumstances

Extraordinary circumstances warranting termination of tenure may involve either financial exigency or academic program discontinuance. In the case of financial exigency, the criteria and procedures outlined in the Board-approved Financial Exigency Plan for UTC shall be

followed. In the case of academic program discontinuance, the criteria and procedures outlined in [UT Policy BT0009 - The University of Tennessee Procedural Framework for Academic Program Discontinuance](#) shall be followed, and the termination of tenured faculty may take place only after consultation with the faculty through appropriate committees of the department, the college, and the Faculty Senate. If termination of tenured faculty positions becomes necessary because of financial exigency or academic program discontinuance, the campus administration shall attempt to place each displaced tenured faculty member in another suitable position. This does not require that a faculty member be placed in a position for which he or she is not qualified, that a new position be created where no need exists, or that a faculty member (tenured or non-tenured) in another department be terminated in order to provide a vacancy for a displaced tenured faculty member. The position of any tenured faculty member displaced because of financial exigency or academic program discontinuance shall not be filled within three years, unless the displaced faculty member has been offered reinstatement and a reasonable time in which to accept or decline the offer.³²

A decision to terminate a faculty member due to financial exigency or academic program

³¹ Section III.J.1.a. of [UT Policy BT0006](#).

³² Section III.J.1.b. of [UT Policy BT0006](#).

discontinuance may be appealed by the faculty member pursuant to the appeal procedure under [Section 5.4.4](#) of this Handbook.

3. Adequate Cause

"Adequate Cause" for terminating a tenured faculty member means the following:

- (1)** Unsatisfactory Performance in Teaching, Research, or Service, which includes the following and similar types of unsatisfactory performance:
 - (a)** failure to demonstrate professional competence in teaching, research, or service;
 - (b)** failure to perform satisfactorily the duties or responsibilities of the faculty position, including but not limited to failure to comply with a lawful directive of the department head, dean, or Provost with respect to the faculty member's duties or responsibilities;
 - (c)** inability to perform an essential function of the faculty position, given reasonable accommodation, if requested;
 - (d)** loss of professional licensure if licensure is required for the performance of the faculty member's duties;
 - (e)** with respect to members of the Health Sciences Center faculty, failure to be granted or loss of medical staff membership and privileges at affiliated teaching hospitals;
 - (f)** loss of appointment (or substantive alteration of the faculty member's work) with an affiliated entity unless approved in advance by the Provost (or designee) (for example, loss of employment with an affiliated medical practice or loss of "joint faculty" support from Oak Ridge National Laboratory;

tenure is usually linked to application for promotion from the rank of Assistant Professor to the rank of Associate Professor. A tenure-track faculty member at the rank of Assistant Professor must be granted tenure in order to be promoted to the rank of Associate Professor. A tenure-track faculty member initially appointed at the rank of Associate Professor or higher may be granted tenure without receiving a promotion.

Faculty members who wish to be promoted should meet the expectations of the new rank as outlined in the criteria for appointment to rank. In regard to librarian faculty, "librarian" should be substituted for the word "teacher."

3.11.2. Procedure for Promotion Review

A calendar is established annually by the Provost that should be followed during the development of promotion recommendations. The calendar for the promotion process is available on the UTC Academic Affairs webpage [here](#).

The procedure for consideration of and awarding promotion includes the following stages:

1. Submission of Promotion Dossier: The candidate prepares and submits a promotion dossier to the departmental RTP Committee. Similar to tenure dossiers, all promotion dossiers must

³³ Section III.J.1.c. of [UT Policy BT0006](#).

³⁴ See Appendix D of [UT Policy BT0006](#).

³⁵ See Section III.K. of [UT Policy BT0006](#) and [Sections 5.4.2.3.](#) and [5.4.2.4.](#) of this Handbook.

³⁶ See Appendix B of [UT Policy BT0006](#) and [Section 5.4.2.1.](#) of this Handbook.

³⁷ See Appendix C of [UT Policy BT0006](#) and [Section 5.4.2.2.](#) of this Handbook.

include reviews from no fewer than two (2) external reviewers pursuant to the external review process established by the college or academic department (see [Section 3.10.4.2.](#) above).

2. RTP Committee's Recommendation: After receiving and reviewing dossiers from each faculty member applying for promotion, the departmental RTP Committee (consisting of faculty already at or higher rank than the rank the candidate seeks) holds a preliminary review at which it has an opportunity to request clarifying information from each candidate prior to final consideration and forwarding of recommendations to the department head. The departmental RTP Committee's recommendation is decided upon by majority vote (yes or no) of those committee members present and voting. Abstentions are permitted. A quorum, as specified by departmental bylaws, is required for actions to take place.

The departmental RTP Committee will forward a written recommendation to the department head, together with records of committee membership, attendance at final discussions, and voting results.

3. Department Head's Recommendation: The department head will make a written recommendation to the dean and inform the candidate in writing of the recommendation.
4. Dean's Recommendation: The dean will make a written recommendation to the Provost and inform the candidate in writing of the recommendation.

5. Provost's Recommendation: The Provost will make a written recommendation to the Chancellor and inform the candidate in writing of the recommendation.
6. Chancellor's Recommendation: The Chancellor reviews all recommendations concerning promotions and recommends those to be approved to the President. The Chancellor will inform the candidate in writing of the recommendation.
7. President's Action: The President reviews proposed faculty member promotions in rank, evaluates the recommendations submitted by the Chancellor, and makes final decisions on awarding promotions. The President informs the Board of the promotions awarded.

3.11.3. Appeal of Promotion Decisions

A decision not to award promotion may be appealed by a promotion candidate pursuant to the appeal procedure under [Section 5.3](#) of this Handbook. A promotion candidate may not initiate an appeal until after the candidate receives notification of the Chancellor's recommendation not to award promotion.

Chapter 4

Non-Tenure-Track Faculty

4.1. SELECTION OF NEW FACULTY FOR NON-TENURE-TRACK APPOINTMENTS

All appointments to non-tenure-track faculty positions, including full-time and part-time appointments, will be made in accordance with departmental and college bylaws and subject to the provisions of this Faculty Handbook.

4.1.1. Authorization to Search

The dean or other appropriate administrator must obtain authorization from the Provost to begin a search for a non-tenure-track faculty position. Factors considered by the Provost in determining whether to authorize a search for a non-tenure-track position include demonstrated need of the academic department's academic program and availability of funds for the position. The non-tenure-track position may be a new position or an existing position that is or is expected to be vacant. The authorization by the Provost of a search for a new or existing non-tenure-track position does not necessarily mean that an appointment will be made to the position.

4.1.2. Commitment to Diversity

UTC is fully committed to diversity in recruitment at all levels. Efforts must be made by the academic department to advertise position vacancies in an effort to obtain a diverse pool of qualified applicants. For each search, the Director of the Office of Equity and Inclusion ("OEI") will be contacted to advise the academic department as to appropriate search procedures that should be followed.³⁸ Prior to an appointment being offered for a position, the Director of the OEI must certify that appropriate search procedures have been followed in the search for the position.

4.1.3. Search Process

A thorough search and careful selection normally should precede any departmental recommendation of appointment to the dean. The department head should consult with the tenured and tenure-track departmental faculty members to develop a plan for the search process. Under normal circumstances, the tenured and tenure-track departmental faculty members or a faculty member search committee should identify the needs of the program, the characteristics needed in a new faculty member, and a timeline of the procedures to be followed in conducting the search and screening candidates. The department head and the tenured and tenure-track departmental faculty members should approve the plan. The tenured and tenure-track departmental faculty members should have the opportunity to help determine the kind of person needed, the search procedure to be followed, the basic pool of candidates, and the persons to be selected for interview, and to provide an assessment of candidates interviewed. At each of these stages, final responsibility for the departmental recommendation rests with the department head.

4.1.4. Certification of English Language Competency

No individual shall be appointed to a teaching position, unless the department head, in consultation with the departmental faculty members, certifies in writing to the Provost that the individual can communicate effectively with students in the English language. Individuals who teach courses that are conducted primarily in a foreign language are exempt.³⁹ The certification form is available on the UTC Academic Affairs website [here](#).

4.1.5. Recommendation to Appoint

A departmental recommendation of appointment for a non-tenure-track position shall be made by the department head to the dean. If the dean agrees with the departmental recommendation, the department head and dean shall forward the recommendation to the Provost. Each recommendation should be accompanied by a full set of the candidate's credentials and any required forms or certifications. Following a departmental decision to recommend an appointment of a candidate to a position, there may be informal discussions concerning rank, salary and other terms of employment between the department head or dean and the candidate. Such discussions serve merely to shape and influence the recommendations of the department head or dean and do not constitute a binding commitment by UTC.

4.1.6. Letter of Appointment

Official notification of appointment is made by letter from the Provost. The letter of appointment must specify:

1. the rank at which the faculty member is being appointed;
2. the faculty member's initial salary and related financial conditions;
3. the faculty member's general duties and expectations; and
4. the duration of the appointment.

Only the letter of appointment from the Provost to the candidate regarding the terms and conditions of the appointment is binding on UTC. Any other representations concerning the terms and conditions of the appointment, whether oral or written, are not authorized by UTC and not binding on UTC.

The faculty member's written acceptance of the letter of appointment, together with execution of normal university employment forms, completes the initial appointment.

4.2. GENERAL APPOINTMENT TERMS AND CONDITIONS

The employment of non-tenure-track faculty is governed by the terms of the appointment letter, applicable provisions of the Faculty Handbook, college and departmental bylaws, and applicable provisions of University policies and procedures. Non-tenure-track faculty members enjoy the same academic freedom as tenured and tenure-track faculty members.

Conditions necessary to perform assigned duties in a professional manner, including such things as appropriate office space, necessary supplies, support services, and equipment will be provided to non-tenure-track faculty members. Departments should have consistent criteria for deciding teaching assignments. Departments should consider the views of non-tenure-track faculty in setting schedules and other issues that impact quality of teaching and working conditions. Opportunities for faculty development, including travel to scholarly meetings, should be provided whenever possible.

Non-tenure-track faculty members may participate in college and/or departmental activities as outlined in college and departmental bylaws. Depending on stipulations of departmental and college bylaws, non-tenure-track faculty members may have the opportunity to participate in departmental, college, and/or

³⁹ See [UT System Policy Concerning English Language Competency of UT Instructional Staff](#).

university governance, including service on university-wide committees and in other assigned positions. Non-tenure-track faculty members may also serve on graduate committees if the dean, Graduate Council, and Dean of the Graduate School, in consultation with the department head, have evaluated and approved their academic credentials.

The level of representation of non-tenure-track faculty on the Faculty Senate is determined by the Faculty Senate and set forth in the [Faculty Senate Bylaws](#).

4.3. REAPPOINTMENT

A non-tenure-track appointment (whatever its duration) may be renewed for a new term pursuant to the reappointment review process described in this section. A non-tenure-track faculty member's reappointment review is combined with his or her annual performance review in the year in which reappointment is under consideration.

The department head is responsible for the careful evaluation of the faculty member in determining whether to recommend reappointment for a new term. Reappointment recommendations will include consideration of available funding and the faculty member's performance. A non-tenure-track appointment may be, by its nature, funding-limited; the compensation amounts for the position may be funded through a grant, contract, or restricted donation, and it may automatically expire when funding lapses.

The department head will make a recommendation regarding reappointment to the dean. The dean will consider the department head's recommendation and make a recommendation regarding reappointment to the Provost. The Provost will consider the recommendation of the dean and make a final decision regarding reappointment.

The Provost shall provide the faculty member notice of his or her decision in writing. If the Provost decides not to reappoint a non-tenure-track faculty member, the Provost, whenever feasible, should give the faculty member at least (a) one month's written notice of termination of the faculty member's employment or (b) salary equivalent to that which would be paid in the event of one month's notice of the termination of the faculty member's employment.

4.4. NON-TENURE-TRACK FACULTY EVALUATION

All faculty holding non-tenure-track appointments will be evaluated annually as appropriate to the particular appointment. The department head will evaluate annually all non-tenure-track faculty members holding Teaching,⁴⁰ Clinical,⁴¹ or Faculty of Practice⁴² appointments within the department. A non-tenure-track faculty member holding a Research⁴³ appointment will be evaluated by the principal investigator(s) of the research grant or contract, or, if the principal investigator(s) are not able to perform the evaluation, by the department head. Each academic department will be responsible for establishing procedures in the departmental bylaws for the regular review of all non-tenure-track faculty members.

The scope of a non-tenure-track faculty member's evaluation will be determined by the assigned duties specified in the faculty member's appointment letter, and the standards for evaluation should be consistent with the relevant standards of performance for teaching, research, and service as defined at

⁴⁰ See [Section 4.7.1](#), below regarding non-tenure-track Teaching appointments.

⁴¹ See [Section 4.7.3.](#) below regarding non-tenure-track Clinical appointments.

⁴² See [Section 4.7.4.](#) below regarding non-tenure-track Faculty of Practice appointments.

⁴³ See [Section 4.7.2.](#) below regarding non-tenure-track Research appointments.

UTC. Reporting of evaluation results should be consistent within the academic department and the college and are subject to the approval of the dean. The records of non-tenure-track faculty member evaluations will be maintained within the academic department and the Faculty Records Office.

4.5. TERMINATION PRIOR TO EXPIRATION OF APPOINTMENT TERM

A non-tenure-track faculty member may be terminated for Adequate Cause prior to the expiration of their appointment term. The definition of Adequate Cause for non-tenure-track faculty is defined in the same manner as it is for tenured faculty members in [Section J.1.c. of UT Policy BT0006](#) and [Section 3.10.10.3](#) of this Handbook. A recommendation to terminate a non-tenure track faculty member for Adequate Cause may be initiated by the department head or dean. In the event that a department head recommends to the dean and Provost that a non-tenure-track faculty member be terminated for Adequate Cause, the department head and dean shall meet with the faculty member to present the reasons for the recommended termination and to permit the faculty member to respond. If, after this meeting, the dean concludes that Adequate Cause for the termination exists, a recommendation for termination shall be forwarded to the Provost. In the event the dean recommends to the Provost that a non-tenure-track faculty member be terminated for Adequate Cause in the absence of a recommendation from the department head, the dean shall meet with the faculty member to present the reasons for the recommended termination and to permit the faculty member to respond. If, after this meeting, the dean concludes that Adequate Cause for the termination exists, a recommendation for termination shall be forwarded to the Provost. If the Provost agrees with the termination recommendation, the Provost shall inform the faculty member of his or her termination in writing. The Provost shall also notify the faculty member in writing of his or her right to a post-termination hearing under the Tennessee Uniform Administrative Procedures Act (*see* Tenn. Code Ann. § 4-5- 301 *et seq.*).

Non-tenure-track faculty can also be terminated prior to the expiration of their appointment term in the event of Extraordinary Circumstances as defined in [Section J.1.b. of UT Policy BT0006](#) and [Section 3.10.10.2](#) of this Handbook.

4.6. GRIEVANCES AND APPEALS

Non-tenure-track faculty members may exercise the grievance and appeal procedures outlined in [Chapter 5](#) of this Handbook, except for those grievance and appeal procedures that are expressly applicable only to tenured and tenure-track faculty members.

4.7. NON-TENURE-TRACK APPOINTMENTS

4.7.1. Teaching Appointments

UTC may hire non-tenure-track Teaching faculty members for specific teaching assignments; engagement in disciplinary scholarship and/or public or disciplinary service may be added to the terms of employment as outlined by the hiring college or department.

UTC uses the following ranks or titles for Teaching appointments:

Lecturer: This rank is for those who hold the appropriate degree for their discipline (or its professional equivalent) and who are appointed for full or part-time teaching. Teaching appointments at this rank will be made for a definite term of one year or less.

Normally, those holding the rank of Lecturer will:

1. Have a minimum of a master's degree in the teaching discipline, or a master's degree in another discipline along with professional experience in teaching discipline;
2. Have demonstrated ability or potential as a teacher in the discipline;
3. Effectively participate in service activities aligned with the department's needs;
4. Have demonstrated capacity to relate appropriately to students and professional colleagues; and
5. Effectively engage in professional development and/or research activities in cases where college or departmental bylaws identify these activities as an obligation of the position.

Associate Lecturer: Faculty members who have held Teaching appointments at the rank of Lecturer for four (4) years will be considered for promotion to the rank of Associate Lecturer, although a record of superior performance may justify earlier consideration. Teaching appointments at this rank will be made for a definite term of up to three years.

Normally, those holding the rank of Associate Lecturer will:

1. Have a minimum of a master's degree in the teaching discipline, or a master's degree in another discipline along with professional experience in teaching discipline;
2. Have a record as an accomplished teacher in the discipline;
3. Have an established record of effective service activities aligned with the department's needs;
4. Have demonstrated the ability to relate appropriately to students and professional colleagues; and
5. Have a substantial record of professional development and/or research activities in cases where college or departmental bylaws identify these activities as an obligation of the position.

Senior Lecturer: Faculty members who have held Teaching appointments at the rank of Associate Lecturer for six (6) years will be considered for promotion to the rank of Senior Lecturer. However, a record of extraordinary performance at the Associate Lecturer level may justify earlier consideration. Additionally, those faculty holding Teaching appointments who were hired prior to the creation of the Associate Lecturer position in 2019 will be considered for promotion to Senior Lecturer after ten (10) years of service at any Teaching appointment rank(s). Teaching appointments at this rank will be made for a definite term of up to five years.

Normally, those holding the rank of Senior Lecturer will:

1. Have a minimum of a master's degree in the teaching discipline, or a master's degree in another discipline along with professional experience in teaching discipline;
2. Have a significant record as an accomplished teacher in the discipline;
3. Have an extended record of effective service activities aligned with the department's needs;

4. Have demonstrated a continuing ability to relate appropriately to students and professional colleagues; and
5. Have a substantial record of professional development and/or research activities in cases where college or departmental bylaws identify these activities as an obligation of the position.

Distinguished Lecturer: This rank is for those Senior Lecturers who hold a degree appropriate to their discipline (or its professional equivalent) and who have demonstrated excellence in teaching. Tenured faculty members within the academic department will evaluate and make recommendations for appointments to the rank of Distinguished Lecturer, in accordance with departmental and college bylaws. Ordinarily, this rank is reserved for senior scholars with established national reputations in their discipline. Teaching appointments at this rank will be made for a definite term of up to five years.

All Teaching appointments are renewable subject to availability of funds, satisfactory performance, and staffing needs.

Each academic department shall establish more specific criteria for the appointment/promotion to Teaching ranks within the department, subject to the approval of the dean and Provost. The departmental criteria shall be consistent with, but may be more restrictive than, the criteria outlined in this Faculty Handbook and any criteria established by the college within which the department resides and shall be published in the departmental bylaws. Departmental criteria for appointment/promotion to Teaching ranks shall not be required, however, if more specific criteria have been established by the applicable college, and the dean and Provost have approved application of the college criteria in lieu of departmental criteria. College criteria for appointment/promotion of faculty members to Teaching ranks within the college must be approved by the Provost and published in the college bylaws.

4.7.2. Research Appointments

UTC may hire non-tenure-track Research faculty members to conduct research and ordinarily does not expect them to engage in teaching or perform public or disciplinary service as a condition of their employment. UTC may hire Research faculty members at any time to meet research needs within the various academic programs. Expectations of teaching duties and service may be added to the terms of employment. Research appointments are supported on extramural funding provided by research grants and contracts; therefore, the appointment periods correspond to the available funding.

UTC uses the following ranks or titles for Research appointments:

Research Assistant Professor: This rank is for those who have completed a doctoral degree or terminal degree appropriate to the discipline. Individuals holding such positions demonstrate an ability to initiate independent research and obtain external funding and have demonstrated capacity to relate appropriately to students and professional colleagues.

Research Associate Professor: This rank is for those who have typically held the rank of Research Assistant Professor for four (4) years; have completed a doctoral degree or terminal degree appropriate to the discipline; have a good record of sustained scholarly activity and external financial support; and have demonstrated the ability to relate appropriately to students

and professional colleagues. Research Associate Professors have research qualifications and accomplishments consistent with those for appointment at the rank of Associate Professor.⁴⁴

Research Professor: This rank is for those who have typically held the rank of Research Associate Professor for six (6) years; have completed a doctoral degree or terminal degree appropriate to the discipline; have a significant record of sustained, externally funded,

⁴⁴ See [Section 3.2.1.2](#) of this Handbook regarding criteria for appointment to the rank of Associate Professor.

scholarly activity that has culminated in national and/or international recognition among their peers; and have demonstrated a continuing ability to relate appropriately to students and professional colleagues. Research Professors have demonstrated research qualifications and accomplishments consistent with those for appointment at the rank of Professor.⁴⁵

All Research appointments typically will be made for a definite term of one year or less but may be made for a definite term longer than one year that corresponds to the available extramural funding for the research being conducted. Research appointments may be renewed subject to continued availability of funding, satisfactory performance, and staffing needs.

Each academic department shall establish more specific criteria for the appointment/promotion to Research ranks within the department, subject to the approval of the dean and Provost. The departmental criteria shall be consistent with, but may be more restrictive than, the criteria outlined in this Faculty Handbook and any criteria established by the college within which the department resides and shall be published in the departmental bylaws. Departmental criteria for appointment/promotion to Research ranks shall not be required, however, if more specific criteria have been established by the applicable college, and the dean and Provost have approved application of the college criteria in lieu of departmental criteria. College criteria for appointment/promotion of faculty members to Research ranks within the college must be approved by the Provost and published in the college bylaws.

4.7.3. Clinical Appointments

UTC may hire non-tenure-track Clinical faculty members to perform professional services and to provide instruction to students in a clinical setting. Faculty members holding Clinical appointments generally are not expected to conduct research or perform public or disciplinary service as a condition of their employment. However, expectations of scholarship and service may be added to the terms of employment.

UTC uses the following ranks or titles for Clinical appointments:

Clinical Assistant Professor:⁴⁶ This rank is for those who have completed a doctoral degree or terminal degree appropriate to the discipline and are licensed or certified to practice the profession. Individuals holding such positions demonstrate an ability to teach students in a clinical setting and have a demonstrated ability to relate appropriately to students and professional colleagues. Clinical appointments at this rank will be made for a definite term of up to three years and may be renewed subject to continued availability of funding, satisfactory performance, and staffing needs.

Clinical Associate Professor: This rank is for those who have typically held the rank of Clinical Assistant Professor for four (4) years; have completed a doctoral degree or a terminal degree appropriate to the discipline; are licensed or certified to practice the profession; and have demonstrated the ability to relate appropriately to students and professional colleagues. Individuals holding such positions have demonstrated clinical and teaching abilities consistent

with those for appointment at the rank of Associate Professor.⁴⁷ Clinical appointments at this rank will be made for a definite term of up to three years and may be renewed subject to continued availability of funding, satisfactory performance, and staffing needs.

Clinical Professor: This rank is for those who have typically held the rank of Clinical

⁴⁵ See [Section 3.2.1.3](#) of this Handbook regarding criteria for appointment to the rank of Professor.

⁴⁶ Effective August 1, 2018, all non-tenure-track faculty appointments at the rank of Clinical Instructor will be converted to appointments at the rank of Clinical Assistant Professor.

⁴⁷ See [Section 3.2.1.2](#) of this Handbook regarding criteria for appointment to the rank of Associate Professor.

Associate Professor for six (6) years; have completed a doctoral degree or a terminal degree appropriate to the discipline; are licensed or certified to practice the profession; and have demonstrated a continuing ability to relate appropriately to students and professional colleagues. Individuals holding such positions have demonstrated clinical and teaching qualifications and accomplishments consistent with those for appointment at the rank of Professor.⁴⁸ Clinical appointments at this rank will be made for a definite term of up to five years and may be renewed subject to continued availability of funding, satisfactory performance, and staffing needs.

Each academic department shall establish more specific criteria for the appointment/promotion to Clinical ranks within the department, subject to the approval of the dean and Provost. The departmental criteria shall be consistent with, but may be more restrictive than, the criteria outlined in this Faculty Handbook and any criteria established by the college within which the department resides and shall be published in the departmental bylaws. Departmental criteria for appointment/promotion to Clinical ranks shall not be required, however, if more specific criteria have been established by the applicable college, and the dean and Provost have approved application of the college criteria in lieu of departmental criteria. College criteria for appointment/promotion of faculty members to Clinical ranks within the college must be approved by the Provost and published in the college bylaws.

4.7.4. Faculty of Practice Appointments

UTC may hire non-tenure-track Faculty of Practice faculty members to meet instructional and research needs, with the specific intent of bringing practicing professionals into the classroom and research laboratories.

UTC uses the following ranks or titles for Faculty of Practice appointments:

Assistant Professor of Practice:⁴⁹ This rank is for those who have completed a doctoral degree or terminal degree appropriate to the field, are licensed or certified to practice the profession where appropriate, or have substantial professional experience. Individuals holding such positions demonstrate an ability to teach and/or conduct research based on their experience and practice in the profession and have a demonstrated capacity to relate appropriately to students and professional colleagues. Faculty of Practice appointments at this rank will be made for a definite term of up to three years and may be renewed subject to continued availability of funding, satisfactory performance, and staffing needs.

Associate Professor of Practice: This rank is for those who have typically held the rank of Assistant Professor of Practice for four (4) years; have completed a doctoral degree or a terminal degree appropriate to the field, are licensed or certified to practice the profession where appropriate, or have substantial professional experience; and have demonstrated the ability to relate appropriately to students and professional colleagues. Individuals holding such positions have demonstrated practice in the profession and teaching and/or research abilities consistent with those for appointment at the rank of Associate Professor.⁵⁰ Faculty of Practice appointments at this rank will be made for a definite term of up to three years and may be renewed subject to continued availability of funding, satisfactory performance, and staffing needs.

⁴⁸ See [Section 3.2.1.3](#) of this Handbook regarding criteria for appointment to the rank of Professor.

⁴⁹ Effective August 1, 2018, all non-tenure-track faculty appointments at the rank of Instructor of Practice will be converted to appointments at the rank of Assistant Professor of Practice.

⁵⁰ See [Section 3.2.1.2](#) of this Handbook regarding criteria for appointment to the rank of Associate Professor.

Professor of Practice: This rank is for those who have typically held the rank of Associate Professor of Practice for six (6) years; have completed a doctoral degree or a terminal degree appropriate to the field; are licensed or certified to practice the profession where appropriate, or have substantial professional experience; and have demonstrated a continuing ability to relate appropriately to students and professional colleagues. Individuals holding such positions have demonstrated practice in the professional and teaching or research accomplishments consistent with those for appointment at the rank of Professor.⁵¹ Faculty of Practice appointments at this rank will be made for a definite term of up to five years and may be renewed subject to continued availability of funding, satisfactory performance, and staffing needs.

Each academic department shall establish more specific criteria for the appointment/promotion to Faculty of Practice ranks within the department, subject to the approval of the dean and Provost. The departmental criteria shall be consistent with, but may be more restrictive than, the criteria outlined in this Faculty Handbook and any criteria established by the college within which the department resides and shall be published in the departmental bylaws. Departmental criteria for appointment/promotion to Faculty of Practice ranks shall not be required, however, if more specific criteria have been established by the applicable college, and the dean and Provost have approved application of the college criteria in lieu of departmental criteria. College criteria for appointment/promotion of faculty members to Faculty of Practice ranks within the college must be approved by the Provost and published in the college bylaws.

4.7.5. Adjunct Faculty Appointments

Individuals who provide compensated or uncompensated service to the instructional and/or research programs of UTC on a semester-by-semester basis will receive Adjunct Faculty appointments. Normally the dean, as a designee of the Provost and in consultation with the department head, will issue letters of appointment to Adjunct Faculty members listing their specific duties and compensation. In coordination with the Provost, each dean will be responsible for developing protocols appropriate to the college in order to insure consistency in Adjunct Faculty appointments.

Exempt employees of UTC may receive an Adjunct Faculty appointment in an academic

department other than the employee's primary appointment. Such arrangements must be approved by the employee's supervisor and must not conflict with the execution of his or her primary duties.

All Adjunct Faculty members who teach must hold the appropriate degree required for teaching within the academic discipline. Adjunct Faculty members may supervise clinical experiences or assume other responsibilities within the guidelines set forth in university, college, and departmental policies. Individuals with Adjunct Faculty appointments are not eligible for tenure.

4.7.6. Visiting Faculty Appointments

Academic programs may invite Visiting Faculty members to teach, participate in scholarly work, or both within the program. The Visiting Faculty member shall have the professional credentials and level of education required of faculty members in the academic program.

Visiting Faculty members do not participate in the governance of the academic department. A Visiting Faculty appointment is typically for an academic year but may be extended upon recommendation of the department head and dean. One-year Visiting Faculty members are not subject to annual performance reviews. The Provost will issue letters of appointment to Visiting

⁵¹ See [Section 3.2.1.3](#) of this Handbook regarding criteria for appointment to the rank of Professor.

Faculty members. Individuals with Visiting Faculty appointments are not eligible for tenure.

4.7.7. Distinguished Scientist Appointments

Distinguished Scientist appointments may be awarded to individuals who contribute significantly to nationally and internationally recognized research (e.g., scientists employed at Oak Ridge National Laboratory). The salary of an individual appointed as such is paid by the individual's primary employer, not UTC. A Distinguished Scientist appointment is typically for one year but may be extended by the Provost upon recommendation of the department head and dean. One-year Distinguished Scientist faculty members are not subject to annual performance reviews. The Provost will issue letters of appointment to Distinguished Scientist faculty members. Individuals with Distinguished Scientist appointments are not eligible for tenure.

4.7.8. Intercampus Academic Appointments

Intercampus Academic appointments are sometimes authorized when it appears that a faculty member at one campus has expertise that qualifies him/her for participation in the work of an academic department on another campus, and when the academic department has need for his/her services. The definition and extent of such intercampus participation is determined by mutual agreement between the faculty member and the respective department heads, deans and Provosts involved. In these cases, the following guidelines are observed:

1. The appointment is normally without salary or tenure in the cooperating academic department awarding the intercampus appointment; tenure (if any) and salary continue to be linked with the faculty member's home academic department (i.e., the department from which the visiting faculty member is coming).
2. The department head of the home academic department recommends the intercampus appointment to the department head of the cooperating academic department following information discussion or negotiation.

3. The appointment is made by the cooperating academic department subject to the approval of the dean, Provost, and Chancellor.
4. The title of the faculty member in the cooperating academic department is determined by mutual agreement between the department head and the faculty member, subject to the approval of the dean and Provost.

4.8. PROMOTION

4.8.1. Guidelines for Promotion

Promotion is a recognition of promise and a sign of confidence that a faculty member is capable of greater accomplishments and of assuming greater responsibilities within UTC. The policy of UTC is to make promotion decisions objectively, equitably, impartially and strictly on the basis of merit. Faculty members holding non-tenure-track appointments eligible for promotion who wish to be promoted to a higher rank must meet the criteria for appointment to the higher rank outlined in this Faculty Handbook and in college and departmental bylaws. Promotion criteria should be weighted in relation to a faculty member's assigned responsibilities.

4.8.2. Promotion Review Procedures

Each department shall establish procedures governing the review and consideration of applications for promotion by non-tenure-track faculty that are consistent with the procedures established in this Faculty Handbook and college bylaws, but which may be more restrictive. Departmental procedures shall be effective upon approval by the dean and the Provost and shall be published in the bylaws of the department. Departmental shall not be required, however, if the dean and the Provost have approved application of procedures established in college bylaws in lieu of departmental procedures.

A calendar is established annually by the Provost that should be followed for the review and consideration of applications for promotion by non-tenure-track faculty. The calendar for the promotion review process is available on the UTC Academic Affairs website [here](#).

The procedure for consideration of and awarding promotion includes, at a minimum, the following stages:

1. Submission of Promotion Dossier. The candidate must compile and submit to their department head a promotion dossier to initiate the promotion review process. Specific departmental and/or college requirements for promotion dossiers should be published in departmental and/or college bylaws. At a minimum, promotion dossiers must include:
 - A cover letter from the candidate that includes a request for consideration for promotion, an explanation of the candidate's rank and responsibilities, and a summary of the candidate's record as it relates to the criteria for promotion to the desired rank. The letter should also outline the candidate's contributions in each applicable performance area of responsibility (e.g., teaching/advising/librarianship; research/scholarly activities; and/or service) based on the candidate's assigned responsibilities and annual objectives and the criteria for appointment to the

desired rank.

- A complete, up-to-date curriculum vitae.
 - All annual performance evaluations of the candidate at the candidate's current rank.
 - Documentation of the candidate's contributions in each applicable performance area of responsibility (e.g., teaching / advising / librarianship; research / scholarly activities; and/or service) based on candidate's assigned responsibilities and annual objectives and the criteria for appointment to the desired rank.
2. Department Head's Recommendation. After making an independent judgment on the promotion candidacy, the department head will make a written recommendation to the dean and inform the candidate in writing of the recommendation. A department may elect to require that a departmental committee consisting of departmental tenured faculty, tenure-track faculty and/or non-tenure-track faculty at or above the rank desired by the candidate, perform an initial evaluation of the promotion application and provide a recommendation to the department head before the department head submits a recommendation to the dean. To the extent a department elects to do so, the department must include such a requirement in its departmental bylaws.
 3. Dean's Recommendation. After reviewing the department head's recommendation and making an independent judgment on the promotion candidacy, the dean will make a written recommendation to the Provost and inform the candidate in writing of the recommendation.
 4. Provost's Decision. After reviewing the dean's recommendation and making an independent judgment on the promotion candidacy, the Provost will decide whether or not the candidate will be promoted.

4.8.3. Appeal of Promotion Decisions

A decision by the Provost not to award promotion may be appealed by a promotion candidate pursuant to the appeal procedure under **Section 5.3** of this Faculty Handbook.

Chapter 5

Faculty Discipline, Grievance and Appeal Procedures

5.1. INTRODUCTION

Faculty members are entitled to fair, impartial and honest resolutions of problems that may arise in relation to employment. This chapter outlines principles and procedures designed to promote fair resolutions within a reasonable time period and addresses formal appeals in the sections on general appeals ([Section 5.3.](#) below) and special appeals ([Section 5.4.](#) below). Except as otherwise expressly provided, the disciplinary, grievance, and appeal procedures described in this chapter apply to all tenured, tenure-track, and non-tenure-track faculty.

In all cases, faculty members are entitled to notice regarding the grounds on which an administrative action or decision has been taken. Faculty members are encouraged to first informally bring complaints or grievances to the lowest administrative level at which an adverse recommendation, decision, or action was taken. Additionally, informal grievances may be submitted to the faculty ombudsperson for resolution through mediation. Every effort should be made to expeditiously resolve grievances informally before submitting a formal appeal.

A faculty member may initiate a formal appeal under the applicable general or special appeal procedures outlined in this chapter. A formal appeal must be initiated within the applicable time periods specified in this Handbook or University policy or, if not specified, no more than one year from the date of the adverse recommendation, decision, or action in question.

5.2. FACULTY OMBUDSPERSON

The Chancellor, with the advice and consent of the Faculty Senate Executive Committee, shall select a faculty ombudsperson. It is expected that the ombudsperson will be experienced in both alternative dispute resolution and university faculty affairs (including tenure, promotion, evaluation, dispute resolution, and governance), and he or she shall be responsible for facilitating informal conflict resolution at the request of faculty members. Specifically, the ombudsperson serves as a consultant for faculty members needing advice to resolve problems and may serve as an informal mediator if the faculty member has not started a formal appeal (i.e., general appeal or special appeal).

The faculty ombudsperson is not an advocate for either the faculty or UTC, but rather a supporter of fair practices and mutual respect, fostering probity and timeliness in the administration of campus policies and practices. Subject to the provisions of this Handbook, University policy, and the law, the ombudsperson will be guided by the [International Ombudsman Association Code of Ethics](#). The ombudsperson's responsibilities as set forth in this Handbook do not include grievances initiated by administrators, students, or staff. The ombudsperson is appointed under UTC's human resources policies and procedures and is compensated as described in his or her appointment letter. The Chancellor, with the advice and consent of the Faculty Senate Executive Committee, shall renew the term of the ombudsperson.

5.2.1. Consultant Role

As a consultant, the ombudsperson acts as a resource for information on University policies, the faculty member's rights and responsibilities, and procedures of appeal and due process. The ombudsperson helps faculty members decide how best to solve problems early and generally at the lowest levels. If the faculty member has initiated a formal appeal through a formal appeal process, he or she may continue to consult the ombudsperson for a neutral opinion and advice, but the ombudsperson is not permitted to participate actively in formal appeals. Except as required by law or University policy, consultations with the ombudsperson shall not be communicated to a third party unless the faculty member gives his or her permission or the faculty member brings an administrative complaint or legal action against the University or another University employee. For purposes of this [Section 5.2.1.](#) and [Section 5.2.2.](#) below, the term "administrative complaint" refers to a complaint filed with an administrative agency outside of the University such as the Equal Employment Opportunity Commission, the Tennessee Human Rights Commission, and the Office for Civil Rights within the Department of Education.

5.2.2. Mediator Role

As an informal mediator, the ombudsperson serves as a communication channel and dispute resolution facilitator. As used in this context, informal mediation is a flexible concept that may involve investigation by the ombudsperson and direct participation in the conflict resolution as well as the more traditional role of facilitating communication and conflict resolution. The ombudsperson's mediation services do not supersede or replace appeals through the formal appeal processes, but they may be used before those processes are initiated. The ombudsperson is independent of both the faculty member and the administration. If a faculty member requests informal mediation by the ombudsperson, the ombudsperson has sole discretion as to whether a complaint warrants mediation and as to the manner in which any investigation and mediation is to be conducted. Mediation by the ombudsperson should involve only those employees or others with a need to be involved in either providing information or reaching a resolution. Except as required by law, the ombudsperson will not communicate with individuals not involved in the mediation process unless the faculty member gives his or her permission or the faculty member brings an administrative complaint or legal action against the University or another University employee.

The ombudsperson is not permitted to:

- (1) address matters subject to a special appeal procedure described in [Section 5.4.](#) below;
- (2) provide legal advice;
- (3) assist in problems that are unrelated to the University; or
- (4) represent a faculty member in a formal appeal procedure or hearing.

The ombudsperson does not make binding decisions for the University or overrule administrative decisions. Rather, the ombudsperson makes recommendations based upon his or her understanding of the situation, University policies and procedures, experience, and sense of fairness.

5.2.3. Relationship with the Faculty Senate

The Faculty Senate shall provide ongoing advice and assistance for the ombudsperson on the rules and policies applicable to University faculty. The ombudsperson shall issue a report to the Faculty Senate once each year on (a) the number of faculty members served; (b) the types of matters handled; (c) any recommended change to University or faculty rules or policies and the basis for the recommended change; and (d) any other matters that the ombudsperson or the Faculty Senate shall deem necessary or advisable in connection with their respective roles in faculty support and governance. The annual report of the ombudsperson shall not disclose any information that the ombudsperson is required to keep confidential in accordance with this section or ombudsperson best practices.

5.3. PROCEDURE FOR GENERAL APPEALS

5.3.1. Appeal Through the Administrative Channel

Except for the types of grievances for which a faculty member must pursue a formal appeal under a special appeal procedure described under [Section 5.4.](#) below, a faculty member may pursue a formal appeal through the administrative channel. The administrative channel through which an appeal may progress includes: the department head of the department to which the faculty member belongs; the dean of the college to which the faculty member belongs; the Provost; and the Chancellor. The Chancellor's decision is final.

To initiate an appeal through the administrative channel, the faculty member must write a letter to the administrator at the first administrative level at which a contested recommendation or decision was made within sixty (60) calendar days after receipt of notice of the adverse recommendation or decision. The letter should (a) notify the administrator that an appeal is being made, (b) outline the nature of the appeal, and (c) state the desired action.

Before the sixty-day appeal period runs, the faculty member may submit in writing to the administrator a request for an extension of the appeal period beyond the sixty-day deadline. Upon receipt of the faculty member's request, the administrator, for good cause, may extend the appeal period for a reasonable amount of time as determined by the administrator, and in such case, the administrator shall provide written notice to the faculty member of the granted extension of time to appeal.

If the appeal is not resolved to the faculty member's satisfaction at the first administrative level at which the contested recommendation or decision was made, the faculty member may pursue the appeal through each succeeding administrative level. Upon receipt of a negative decision by an administrator at one level, the faculty member will have ten (10) calendar days to appeal in writing to the next administrative level. At each level, the administrator ideally should inform the faculty member of his or her decision in writing within thirty (30) calendar days of receipt of the appeal.

5.3.2. Review by the Faculty Administrative Relations Committee

Except as otherwise provided in this chapter, when a faculty member who has initiated a formal appeal through the administrative channel procedure receives a negative decision by the Provost, the faculty member may appeal the Provost's decision to the Chancellor directly or request review by the Faculty Administrative Relations Committee ("FARC") prior to the Chancellor's review as

provided under [Section 5.5.2.](#) below. The faculty member will have ten (10) calendar days after receipt of the Provost's decision to request a FARC review.

5.4. PROCEDURES FOR SPECIAL APPEALS

Special appeal procedures are provided for cases involving the following:

- Complaint of alleged discrimination, unlawful harassment, or violation of the sexual misconduct policy ([Section 5.4.1.](#) below);
- Disciplinary sanctions against a tenured faculty member for adequate cause ([Section 5.4.2.](#) below);
- Disciplinary sanctions against a non-tenured faculty member for adequate cause ([Section 5.4.3.](#) below);
- Termination of a faculty member due to extraordinary circumstances (i.e., financial exigency or academic program discontinuance) ([Section 5.4.4.](#) below).

5.4.1. Complaints of Alleged Discrimination or Violation of the Title IX Policy

Complaints that a faculty member has violated a University policy prohibiting discrimination, including but not limited to [UT Policy HR0220 - Equal Employment Opportunity](#), [UT Policy HR0280 - Sexual Harassment & Other Discriminatory Conduct](#), and the [Policy on Sexual Harassment, Sexual Assault, Dating and Domestic Violence, and Stalking](#) ("Title IX Policy"), will be investigated in accordance with the applicable policy. Any disciplinary action taken against a faculty member for violation of the University's anti-discrimination policies and any appeal of such disciplinary action must be in accordance with [Section 5.4.2.](#) (tenured faculty) or [Section 5.4.3.](#) (non-tenured faculty) below.

5.4.2. Disciplinary Sanctions Against a Tenured Faculty Member for Adequate Cause

1. Termination for Adequate Cause Based on Unsatisfactory Performance in Teaching, Research, or Service⁵²

The following procedures shall apply to termination of a tenured faculty appointment for unsatisfactory performance in teaching, research, or service (see Appendix B to [UT Policy BT0006](#)).

(1) Suspension with Pay or Reassignment Pending Completion of Termination Proceedings

After consultation with the President of the Faculty Senate or the Faculty Senate Executive Committee, the Provost may suspend a faculty member with pay, or change his or her assignment of duties, pending completion of the University's termination proceedings described in this Section 5.4.2.1. The Provost may combine action under this Section 5.4.2.1.(1) with any other procedures under Section 5.4.2.1.

(2) Tenured Faculty's Recommendation

The department head shall direct the tenured departmental faculty to consider the faculty member's performance in teaching, research, and service, and, by an anonymously cast vote taken in accordance with applicable department or college bylaws, to make a recommendation on the question of whether the faculty member's performance constitutes Adequate Cause for termination. The faculty recommendation shall be advisory to the department head. If an Enhanced Post-Tenure Performance Review (EPPR) has been completed in the preceding four years, the report of the EPPR peer committee shall be provided to the tenured faculty, along with any other evaluative information provided for their review. The faculty member under review shall be provided with a copy of the material provided to the tenured faculty and shall be given a reasonable opportunity to submit responsive written materials before the vote of the tenured faculty.

(3) Department Head's Recommendation

The department head shall consider the faculty member's performance in teaching, research, and service, and the recommendation of the tenured departmental faculty, and

⁵² The steps and procedures under [Section 5.4.2.1](#), for the termination of a tenured faculty member for unsatisfactory performance in teaching, research, or service within the definition of Adequate Cause are intended to be consistent with the requirements and procedures set forth under Appendix B of [UT Policy BT0006](#). In the event of any conflict or inconsistency between Board policy and this Faculty Handbook, Board policy will control.

make a recommendation on the question of whether the performance constitutes Adequate Cause for termination. The department head shall forward his or her recommendation and the reasoning supporting the recommendation to the dean, together with the history of efforts to encourage the faculty member to improve his or her performance and a report of the recommendation of the tenured faculty (including the anonymously cast vote tally) on the question of whether the faculty member's performance constitutes Adequate Cause for termination.

(4) Dean's Recommendation

The dean shall consider the faculty member's performance in teaching, research, and service, and the recommendation of the tenured departmental faculty and department head, and make a recommendation on the question of whether the performance constitutes Adequate Cause for termination. The dean shall forward his or her recommendation and the reasoning supporting the recommendation to the Provost, together with the recommendations of the tenured faculty and the department head.

(5) Decision by the Provost

(a) Review by the Provost

- (i) If the Provost concludes that Adequate Cause for termination may exist, he or she shall call the faculty member to a meeting to discuss the possibility of a mutually satisfactory resolution of the matter.

- (ii) If a mutually satisfactory resolution is not achieved within thirty (30) calendar days, the Provost shall ask the Faculty Senate (or appropriate committee or Executive Council of the Faculty Senate) to make a recommendation as to whether Adequate Cause for termination exists. The recommendation of the Faculty Senate, along with supporting reasoning, shall be provided to the Provost within thirty (30) calendar days of the request and shall be advisory to the Provost.
- (iii) If the Provost concludes that Adequate Cause does not exist, then the Provost shall provide the faculty member with written notice of the conclusion (with a copy to the dean and the department head), and shall include in the notice any further instructions regarding the matter as may be necessary.

(b) Sanctions Less Than Termination for Adequate Cause

- (i) If the Provost concludes Adequate Cause exists but that a sanction other than termination or suspension without pay should be imposed, then the Provost may impose the lesser sanction. The faculty member may appeal the lesser sanction to the Chancellor, whose decision shall be final and not appealable to the President.
- (ii) If the Provost concludes Adequate Cause exists but that the sanction should be suspension without pay rather than termination, the Provost shall employ the procedures set forth in Section 5.4.2.1.(5)(c) below, all as appropriately tailored to reflect that the proposed sanction is suspension without pay rather than termination. If the faculty member wishes to contest the suspension without pay, the procedures shall be those set forth in Section 5.4.2.1.(7) below, all as appropriately tailored to reflect that the proposed sanction is suspension without pay rather than termination.

(c) Termination for Adequate Cause

(i) Notice of Adequate Cause and Opportunity to Respond

Before deciding that the faculty member's appointment should be terminated for Adequate Cause, the Provost shall give the faculty member written notice, including a statement of the grounds for termination, framed with reasonable particularity, and the opportunity to respond to the stated grounds and the proposed termination in a meeting with the Provost. The faculty member may choose to respond in writing instead of, or in addition to, a meeting with the Provost. Any written response must be submitted to the Provost within ten (10) calendar days of delivery of the written statement of the grounds for termination.

(ii) Notice of Termination

If, after considering any information provided by the faculty member and after consulting with the Chancellor and the President, the Provost concludes that the faculty member's appointment should be terminated for Adequate Cause, the Provost shall provide written notice of termination to the faculty member (1) providing a statement of the grounds for termination, framed with reasonable particularity, and the date on which the termination will become effective unless the faculty member elects to contest the termination in a pre-termination hearing before a hearing tribunal (as provided under Section 5.4.2.1.(7)(a) below); (2) providing notice of the faculty member's right to contest the proposed termination

in a pre-termination hearing before a tribunal, as described under Section 5.4.2.1.(7)(a) below, or in a post-termination hearing conducted under the provisions of the Uniform Administrative Procedures Act; and (3) providing notice that the faculty member has fifteen (15) calendar days after receipt of the written notice to elect in writing to contest the termination and to elect in writing the form of hearing. Selection of one type of hearing waives the opportunity to contest the termination through the other type of hearing. The Provost shall send a copy of the written notice to the Faculty Senate at the same time.

(6) Failure to Contest Termination

If the faculty member does not contest the charge(s) in writing and make the required hearing election within fifteen (15) calendar days after receipt of the written notice described in Section 5.4.2.1.(5)(c)(ii) above, the faculty member shall be terminated, and no appeal of the matter will be heard within the University.

(7) Options to Contest Termination

The rights provided in this Section 5.4.2.1.(7) are in lieu of any other rights of grievance or appeal in this Handbook or any appeal to the President.

(a) Pre-Termination Hearing before a Tribunal and Final Decision by the Chancellor

If the faculty member makes a timely election to contest the charge(s) through a hearing by a University tribunal, the faculty member must confirm in writing the decision to waive the right to a hearing under the Uniform Administrative Procedures Act, and the Chancellor shall ask the Faculty Senate, or a designated committee of the Faculty Senate, to appoint a tribunal within fifteen (15) calendar days and shall notify the faculty member of this action. The matter then shall proceed in accordance with the tribunal procedures described under this Section 5.4.2.1.(7)(a), with the faculty member's termination stayed pending the conclusion of these procedures.

(i) Composition of the Tribunal

The University tribunal shall consist of members of the faculty and the administration. Either the Chancellor or the faculty member may challenge the appointment of a tribunal member on the ground of bias or conflict of interest. A challenge shall be judged by the Faculty Senate, or a designated committee of the Faculty Senate, whose decision on the challenge shall be final and not subject to appeal.

(ii) Notice of hearing

The Chancellor shall give the faculty member written notice of the hearing date at least thirty (30) calendar days in advance. The Chancellor shall issue a scheduling order to ensure that the tribunal's written findings, reasoning, and conclusions are submitted to the Chancellor within one hundred twenty (120) calendar days from the date the faculty member has been provided with written notice of termination

under Section 5.4.2.1.(5)(c)(ii) above. A scheduling order shall not be modified except by leave of the Chancellor upon a showing of good cause.

(iii) Representation

If the University intends to be represented by legal counsel, the written notice of the hearing date shall so advise the faculty member. The written notice shall also state the faculty member's right to be represented by legal counsel or other representative of his or her choice. If the faculty member intends to be represented by legal counsel, he or she must notify the tribunal chairperson within ten (10) calendar days of receipt of the written notice of the hearing date. If the faculty member fails to give timely notice of legal representation, the hearing date shall be postponed at the University's request.

(iv) Waiver of Hearing

If, at any time prior to the hearing date, the faculty member decides to waive his or her right to a hearing and respond to the charges only in writing, the tribunal shall proceed to evaluate all available evidence and rest its recommendation upon the evidence in the record.

(v) Pre-Hearing Preparation

The faculty member and the University shall have a reasonable opportunity prior to the hearing to obtain witnesses, specific documents, or other specific evidence reasonably related to the charge(s).

(vi) Evidence

The tribunal is not bound by legal rules of evidence and may admit any evidence of probative value in determining the issues. The tribunal shall make every reasonable effort, however, to base its recommendation on the most reliable evidence. If the charge is "failure to demonstrate professional competence in teaching, research, or service," the evidence shall include the testimony of qualified faculty members from UTC and/or other comparable institutions of higher education.

(vii) Confrontation and Cross-Examination of Witnesses

The faculty member and the University shall have the right to confront and cross-examine all witnesses. If a witness cannot or will not appear, but the tribunal determines that his or her testimony is necessary to a fair adjudication of the charge(s), the tribunal may admit as evidence the sworn affidavit of the witness. In that event, the tribunal shall disclose the affidavit to both parties and allow both parties to submit written interrogatories to the witness.

(viii) Adjournments

The tribunal shall grant adjournments to allow either party to investigate evidence to which a valid claim of surprise is made. The tribunal may grant one such adjournment for a period of no more than five (5) calendar days. If the tribunal wishes to grant an adjournment for more than five (5) calendar days, or wishes to grant more than one adjournment, the tribunal shall notify the Chancellor of the proposed adjournment, provide an explanation of the need for the adjournment, and provide a recommendation regarding the length of the adjournment. If the Chancellor concurs in the tribunal's recommendation that an adjournment be granted, the Chancellor shall give the faculty member written notice of the date on which the hearing will resume.

(ix) Burden of Proof

The burden of proof that Adequate Cause exists rests with the University and shall be satisfied only by clear and convincing evidence in the record considered as a whole.

(x) Findings and Conclusions

The tribunal shall make written findings and conclusions and shall provide a copy to the faculty member at the time of submission to the Chancellor.

- (1) If the tribunal concludes Adequate Cause for termination has not been established, it shall so report to the Chancellor, with supporting reasons. In the case of a split decision, a minority report should be included.
- (2) If the tribunal concludes Adequate Cause for termination has been established but that a sanction other than termination should be imposed, it shall so recommend to the Chancellor, with supporting reasons. In the case of a split decision, a minority report should be included.
- (3) If the tribunal concludes Adequate Cause for termination has been established and that termination is the appropriate sanction, it shall so report to the Chancellor, with supporting reasons. In the case of a split decision, a minority report should be included.

(xi) Transcript of the Hearing

A verbatim record of the hearing shall be made, and a transcript shall be provided to the faculty member and the Chancellor at the time of the tribunal's submission of its findings, reasoning, and conclusions.

(xii) Final Decision by the Chancellor

Upon receipt of the tribunal's findings, reasoning, and conclusions, the Chancellor shall provide an opportunity for written argument by the parties and may provide the parties an opportunity to present oral argument. After considering the tribunal's findings, reasoning, and conclusions and any arguments of the parties, the Chancellor will determine whether Adequate Cause has been established and whether termination is the appropriate sanction.

If the Chancellor concludes that Adequate Cause has not been established, the Chancellor shall provide the faculty member with written notice of the conclusion (with a copy to the tribunal, Provost, dean, and department head), and shall include in the notice any further instructions regarding the matter as may be necessary.

If the Chancellor concludes that Adequate Cause has been established but that a sanction other than termination should be imposed, including without limitation suspension without pay, the Chancellor may impose the lesser sanction by written notice to the faculty member (with a copy to the tribunal, Provost, dean, and department head). The notice shall include the date on which the sanction will become effective. The decision of the Chancellor shall be final and not appealable to the President.

If the Chancellor concludes that Adequate Cause has been established and that termination is the appropriate sanction, the Chancellor shall provide the faculty member with a written notice of termination stating the grounds for termination (with a copy to the tribunal, Provost, dean, and department head). The notice of termination may include or adopt the written findings and conclusions of the tribunal if applicable to the Chancellor's decision. The notice shall include the date on which termination will become effective. The decision of the Chancellor shall be final and not appealable to the President.

(b) Post-Termination Hearing and Final Decision under the Uniform

Administrative Procedures Act

(i) Contested Case Procedures

If the faculty member makes a timely election to contest the charge(s) under the Uniform Administrative Procedures Act (UAPA), the Chancellor shall appoint an administrative judge, the faculty member's employment will be terminated on the date specified in the notice provided under Section 5.4.2.1.(5)(c)(ii) above, and the matter shall proceed post-termination in accordance with the contested case procedures promulgated by the University under the UAPA. The UAPA contested case procedures are published in the Compiled Rules and Regulations of the State of Tennessee ([Tenn. Comp. R. & Regs. § 1720-01-05-.01 et seq.](#)).

(ii) Initial Order

In accordance with the UAPA contested case procedures, upon completion of the

hearing, the administrative judge shall render an initial order, which either party may appeal to the Chancellor within fifteen (15) calendar days. In addition, the Chancellor, on his or her own motion, may elect within fifteen (15) calendar days to review the administrative judge's initial order.

(iii) Final Order

The administrative judge's initial order shall become the final order unless review is sought by either party or the Chancellor within the fifteen-day period. If review is sought, the Chancellor shall review the initial order and issue a final order in accordance with applicable provisions of the UAPA contested case procedures. The final order, whether rendered by the Chancellor or by virtue of neither party appealing the initial order, shall be the final decision on the charge(s) within the University. If the University's final order is favorable to the faculty member and concludes that the faculty member's employment should not have been terminated for Adequate Cause, then full restitution of salary, academic position and tenure lost during the termination will be made.

(iv) Judicial Review

If the final order is unfavorable to the faculty member, he or she is entitled to judicial review of the final order in accordance with applicable provisions of the UAPA.

2. Termination for Adequate Cause Based on Misconduct⁵³

The following procedures shall apply to termination of a tenured faculty appointment, or termination of a tenure-track appointment before expiration of the annual term, for misconduct within the definition of Adequate Cause (see Appendix C to [UT Policy BT0006](#)).

(1) Suspension or Reassignment Pending Completion of Termination Proceedings

The Provost may combine action under this Section 5.4.2.2.(1) with any other procedures in Section 5.4.2.2.

(a) Suspension with Pay or Reassignment of Duties

After consultation with the President of the Faculty Senate or the Faculty Senate Executive Committee, the Provost may suspend a faculty member with pay, or change his or her assignment of duties, pending completion of the University's termination proceedings described in this Section 5.4.2.2.

(b) Suspension without Pay

After consultation with the Chancellor, the President, and the President of the Faculty Senate or the Faculty Senate Executive Committee, the Provost may suspend a faculty member without pay pending completion of termination proceedings only for the following types of alleged misconduct and only in accordance with the procedures

outlined in Section 5.4.2.5. below entitled "Expedited Procedure for Termination or Suspension Without Pay in Certain Cases of Misconduct:"

- (i) alleged misconduct involving: (1) acts or credible threats of harm to a person or University property; or (2) theft or misappropriation of University funds, property, services, or other resources; or
- (ii) indictment by a state or federal grand jury, or arrest and charge pursuant to state or federal criminal procedure, for: (1) a felony; or (2) a non-felony directly related to the fitness of a faculty member to engage in teaching, research, service, or administration.

⁵³ The steps and procedures under [Section 5.4.2.2.](#) for the termination of a tenured faculty member for misconduct within the definition of Adequate Cause are based on and intended to be consistent with the requirements and procedures set forth under Appendix C of [UT Policy BT0006](#). In the event of any conflict or inconsistency between Board policy and this Faculty Handbook, Board policy will control.

If the University's final determination after either a UAPA proceeding or an ad hoc hearing committee proceeding is favorable to the faculty member and concludes both that the faculty member's employment should not be terminated for Adequate Cause and that the faculty member should not have been suspended without pay pending completion of termination proceedings, then full restitution of salary, academic position and tenure lost during the suspension without pay will be made.

(2) Consultation with Tenured Faculty

The department head shall consult with the departmental tenured faculty before making a recommendation regarding whether a faculty member's alleged misconduct constitutes Adequate Cause for termination.

(3) Department Head's Recommendation

If the department head concludes that a faculty member's alleged misconduct constitutes Adequate Cause for termination, he or she shall forward a recommendation and the reasoning supporting the recommendation to the dean. The recommendation shall include a report of the department head's consultation with the tenured faculty.

(4) Dean's Recommendation

If the dean concludes that a faculty member's alleged misconduct constitutes Adequate Cause for termination, he or she shall forward a recommendation and the reasoning supporting the recommendation to the Provost.

(5) Decision by the Provost

(a) Review by the Provost

- (i) If the Provost concludes that Adequate Cause for termination may exist, he or she shall call the faculty member to a meeting to discuss the possibility of a mutually satisfactory

resolution of the matter.

- (ii) If the Provost concludes that Adequate Cause does not exist, the Provost shall provide the faculty member with written notice of the conclusion (with a copy to the dean and the department head), and shall include in the notice any further instructions regarding the matter as may be necessary.

(b) Sanctions Less than Termination for Adequate Cause

- (i) If the Provost concludes that Adequate Cause exists but that a sanction other than termination or suspension without pay should be imposed, the Provost may impose the lesser sanction. The faculty member may appeal the lesser sanction to the Chancellor, whose decision shall be final and not appealable to the President.
- (ii) If the Provost concludes that Adequate Cause exists but that the sanction should be suspension without pay rather than termination, the Provost shall employ the procedures set forth in Section 5.4.2.2.(5)(c) below, all as appropriately tailored to reflect the proposed sanction is suspension without pay rather than termination. If the faculty member wishes to contest the suspension without pay, the procedure shall be those set forth in Section 5.4.2.2.(7) below, all as appropriately tailored to reflect that the proposed sanction is suspension without pay rather than termination.

(c) Termination for Adequate Cause

- (i) Notice of Adequate Cause and Opportunity to Respond

Before deciding that the faculty member's appointment should be terminated for Adequate Cause, the Provost shall give the faculty member written notice, including a statement of the grounds for termination, framed with reasonable particularity, and the opportunity to respond to the stated grounds and the proposed termination in a meeting with the Provost. The faculty member may choose to respond in writing instead of, or in addition to, a meeting with the Provost. Any written response must be submitted to the Provost within ten (10) calendar days of delivery of the written statement of the grounds for termination.

- (ii) Notice of Termination

If, after considering any information provided by the faculty member and after consulting with the Chancellor and the President, the Provost concludes that the faculty member's appointment should be terminated for Adequate Cause, the Provost shall provide written notice of termination to the faculty member (1) providing a statement of the grounds for termination, framed with reasonable particularity, and the date on which the termination will become effective unless the faculty member elects to contest the termination in a pre-termination hearing before an ad hoc committee (as provided under Section 5.4.2.2.(7)(a) below); (2) providing notice of the faculty member's right to contest the proposed termination in a pre-termination hearing before an ad hoc committee, as described under Section 5.4.2.2.(7)(a) below, or in a post-termination hearing conducted under the

provisions of the Uniform Administrative Procedures Act; and (3) providing notice that the faculty member has fifteen (15) calendar days after receipt of the written notice to elect in writing to contest the termination. Selection of one type of hearing waives the opportunity to contest the termination through the other type of hearing. The Provost shall send a copy of the written notice to the Faculty Senate at the same time.

(6) Failure to Contest

If the faculty member does not contest the charge(s) of misconduct in writing within fifteen (15) calendar days after receipt of the written notice described in Section 5.4.2.2.(5)(c)(ii) above, the faculty member shall be terminated, and no appeal of the matter will be heard within the University.

(7) Options to Contest the Termination

The rights provided in this Section 5.4.2.2.(7) are in lieu of any other rights of grievance or appeal in this Handbook or any appeal to the President.

1. Pre-Termination Hearing before an Ad Hoc Committee and Final Decision by the Chancellor

If the faculty member contests the charge(s) of misconduct but elects to waive his or her right to formal hearing under the contested case procedures of the UAPA, the faculty member must confirm in writing the decision to waive the right to a hearing under the UAPA, and the Chancellor shall appoint an ad hoc hearing committee to conduct an informal hearing on the charges, with the faculty member's termination stayed pending the conclusion of the procedures set forth in this Section 5.4.2.2.(7)(a).

(i) Notice of Hearing

The Chancellor shall give the faculty member written notice of the hearing date at least thirty (30) calendar days in advance. The Chancellor shall issue a scheduling order to ensure that the hearing committee's written findings, reasoning, and conclusions are submitted to the Chancellor within one hundred twenty (120) calendar days from the date the faculty member has been provided with written notice of termination under Section 5.4.2.2.(5)(c)(ii) above. A scheduling order shall not be modified except by leave of the Chancellor upon a showing of good cause.

(ii) Legal Counsel

The faculty member may be represented before the hearing committee by legal counsel or other representative of his or her choice. If the faculty member intends to be represented by legal counsel, he or she must notify the committee chairperson within ten (10) calendar days of receipt of the written notice of the hearing date. If the faculty member fails to give timely notice of legal representation, then the hearing date shall be postponed at the University's request.

(iii) Adjournments

The hearing committee shall grant adjournments to allow either party to investigate evidence to which a valid claim of surprise is made. The hearing committee may grant one such adjournment for a period of no more than five (5) calendar days. If the hearing committee wishes to grant an adjournment for more than five (5) calendar days, or wishes to grant more than one adjournment, the hearing committee shall notify the Chancellor of the proposed adjournment, provide an explanation of the need for the adjournment, and provide a recommendation regarding the length of the adjournment. If the Chancellor concurs in the hearing committee's recommendation that an adjournment be granted, the Chancellor shall give the faculty member written notice of the date on which the hearing will resume.

(iv) Written Report

The hearing committee shall make a written report of its findings, reasoning, and conclusions to the Chancellor. In the case of a split decision, a minority report should be included.

(v) Final Decision by the Chancellor

Upon receipt of the hearing committee's findings, reasoning, and conclusions, the Chancellor shall provide the opportunity for written argument by the parties and may provide the parties an opportunity to present oral argument. After considering the hearing committee's findings, reasoning, and conclusions and any arguments of the parties, the Chancellor will determine whether Adequate Cause has been established and whether termination is the appropriate sanction.

If the Chancellor concludes that Adequate Cause has not been established, the Chancellor shall provide the faculty member with written notice of the conclusion (with a copy to the hearing committee, Provost, dean, and department head), and shall include in the notice any further instructions regarding the matter as may be necessary.

If the Chancellor concludes that Adequate Cause has been established but that a sanction other than termination should be imposed, including without limitation suspension without pay, the Chancellor may impose the lesser sanction by written notice to the faculty member (with a copy to the hearing committee, Provost, dean, and department head). The notice shall include the date on which the sanction will become effective. The decision of the Chancellor shall be final and not appealable to the President.

If the Chancellor concludes that Adequate Cause has been established and that termination is the appropriate sanction, the Chancellor shall provide the faculty member with a written notice of termination stating the grounds for termination (with a copy to the hearing committee, Provost, dean, and department head). The notice of termination may include or adopt the written findings, reasoning, and conclusions of the hearing committee if applicable to the Chancellor's decision. The notice shall include the date on which termination will become effective. The

decision of the Chancellor shall be final and not appealable to the President.

2. Post-Termination Hearing and Final Decision under the Uniform Administrative Procedures Act

(i) Contested Case Procedures

If the faculty member makes a timely election to contest the charge(s) under the Uniform Administrative Procedures Act (UAPA), the Chancellor shall appoint an administrative judge, the faculty member's employment will be terminated on the date specified in the notice provided under Section 5.4.2.2.(5)(c)(ii) above, and the matter shall proceed post-termination in accordance with the contested case procedures promulgated by the University under the UAPA. The UAPA contested case procedures are published in the Compiled Rules and Regulations of the State of Tennessee ([Tenn. Comp. R. & Regs. § 1720-01-05-.01 et seq.](#)).

(ii) Initial Order

In accordance with the UAPA contested case procedures, upon completion of the hearing, the administrative judge shall render an initial order, which either party may appeal to the Chancellor within fifteen (15) calendar days. In addition, the Chancellor, on his or her own motion, may elect within fifteen (15) calendar days to review the administrative judge's initial order.

(iii) Final Order

The administrative judge's initial order shall become the final order unless review is sought by either party or the Chancellor within the fifteen-day period. If review is sought, the Chancellor shall review the initial order and issue a final order in accordance with applicable provisions of the UAPA contested case procedures. The final order, whether rendered by the Chancellor or by virtue of neither party appealing the initial order, shall be the final decision on the charge(s) within the University. If the University's final order is favorable to the faculty member and concludes that the faculty member's employment should not have been terminated for Adequate Cause, then full restitution of salary, academic position and tenure lost during the termination will be made.

(iv) Judicial Review

If the final order is unfavorable to the faculty member, he or she is entitled to judicial review of the final order in accordance with applicable provisions of the UAPA.

3. Disciplinary Suspension Without Pay for Adequate Cause⁵⁴

Suspension without pay may be imposed as a disciplinary sanction against a tenured faculty member for (1) unsatisfactory performance in teaching, research, or service within the definition of Adequate Cause or (2) misconduct within the definition of Adequate Cause.

If the proposed sanction is suspension without pay for a definite term (no more than one year), the procedures applicable to termination as described in [Section 5.4.2.1.](#) and [Section 5.4.2.2.](#)

above (as applicable and as tailored to reflect that the proposed sanction is suspension without pay rather than termination) shall be offered in connection with the suspension.

4. Other Disciplinary Sanctions for Adequate Cause⁵⁵

Disciplinary sanctions that do not involve termination or suspension without pay may be imposed against a tenured faculty member for (1) unsatisfactory performance in teaching, research, or service within the definition of Adequate Cause or (2) misconduct within the definition of Adequate Cause.

If the proposed sanction does not involve termination or suspension without pay, the following steps will be followed before the sanction is issued:

- (1) The department head shall make a recommendation to the dean.
- (2) The dean shall make a recommendation to the Provost.
- (3) The Provost shall give the faculty member written notice of the proposed sanction and the supporting reason(s) and shall offer him or her an opportunity to respond both in writing and in person.

The faculty member may appeal the proposed sanction through the administrative channel appeal procedure under [Section 5.3.](#) above, except that a decision by the Chancellor on appeal will be the final decision for the University and not appealable to the President. The sanction shall be held in abeyance until conclusion of the appeal.

5. Expedited Procedure for Termination (or Suspension Without Pay) in Certain Cases of Misconduct

(1) Grounds for Termination or Suspension Without Pay

⁵⁴ The steps and procedures under [Section 5.4.2.3.](#) for the suspension without pay of a tenured faculty member for Adequate Cause are based on and intended to be consistent with the requirements and procedures set forth under Section III.K. of [UT Policy BT0006](#). In the event of any conflict or inconsistency between Board policy and this Faculty Handbook, Board policy will control.

⁵⁵ The steps and procedures under [Section 5.4.2.4.](#) for disciplinary suspension with pay or other sanctions of a tenured faculty member for Adequate Cause are based on and intended to be consistent with the requirements and procedures set forth under Section III.K. of [UT Policy BT0006](#). In the event of any conflict or inconsistency between Board policy and this Faculty Handbook, Board policy will control.

In the following cases of alleged misconduct by a tenured faculty member, the Provost, after consulting with the Chancellor, the President, and the President of the Faculty Senate or the Faculty Senate Executive Committee, may invoke an expedited procedure to accomplish termination or suspension without pay, with comprehensive due process procedures to be offered after termination or suspension without pay:

- (1) alleged misconduct (i) involving acts or credible threats of harm to a person or University property, including without limitation, sexual harassment or other sexual misconduct; or (ii) theft or misappropriation of University funds, property, services, or other resources; or

- (2) indictment by a state or federal grand jury, or arrest and charge pursuant to state or federal criminal procedure, for: (i) a felony; or (ii) a non-felony directly related to the fitness of a faculty member to engage in teaching, research, service, or administration.

(2) Procedures Required *Before* Expedited Termination or Suspension Without Pay

Under the expedited procedure, the faculty member shall be offered the following process before termination or suspension without pay:

- (a) notice of the charges;
- (b) an explanation of the evidence; and
- (c) an informal opportunity to refute the charges in a meeting with the Provost.

(3) Procedures Required *After* Expedited Termination or Suspension Without Pay

After termination or suspension without pay, the faculty member shall be offered the full range of due process options in other Adequate Cause proceedings under Section 5.4.2.1. (unsatisfactory performance) and Section 5.4.2.2. (misconduct) above, except that the termination or suspension without pay shall not be stayed pending the outcome of an ad hoc hearing committee if the faculty member elects that method of contesting the action. If the University's final determination after either a UAPA proceeding or an ad hoc hearing committee proceeding is favorable to the faculty member and concludes that the faculty member should not have been suspended without pay or that the faculty member's employment should not have been/should not be terminated for Adequate Cause, then full restitution of salary, academic position and tenure lost during the suspension without pay or termination will be made.

5.4.3. Disciplinary Sanctions Against a Non-Tenured Faculty Member for Adequate Cause

A non-tenured faculty member's employment may be terminated before the end of the faculty member's stipulated appointment term only with the approval of the Chancellor and only for Adequate Cause.

A tenure-track faculty member's employment may be terminated at the end of the faculty member's stipulated appointment term without the required minimum advance notice of non-reappointment,⁵⁶ only with the approval of the Chancellor and only for Adequate Cause.

The following steps and procedures shall apply to disciplinary sanctions against a non-tenured faculty member.

⁵⁶ See [Section 3.7.4.](#) of this Handbook regarding the minimum advance notice required for notice of non-reappointment of a tenure-track faculty member.

1. Termination for Adequate Cause Based on Unsatisfactory Performance in Teaching, Research, or Service

The steps and procedures detailed in [Section 5.4.2.1.](#) above will be followed for the termination of a non-tenured faculty member for unsatisfactory performance within the definition of Adequate Cause before the end of the faculty member's stipulated appointment term. The same steps and procedures will be followed for the termination of a tenure-track faculty member for unsatisfactory performance within the definition of Adequate Cause at the end of the faculty member's stipulated appointment term without the required minimum advance notice of non-reappointment.

2. Termination for Adequate Cause Based on Misconduct

The steps and procedures detailed in [Section 5.4.2.2.](#) above will be followed for termination of a non-tenured faculty member for misconduct within the definition of Adequate Cause before the end of the faculty member's stipulated appointment term. The same steps and procedures will be followed for the termination of a tenure-track faculty member for misconduct within the definition of Adequate Cause at the end of the faculty member's stipulated appointment term without the required minimum advance notice of non-reappointment.

3. Disciplinary Suspension Without Pay for Adequate Cause

The steps and procedures detailed in [Section 5.4.2.3.](#) above will be followed for disciplinary suspension without pay of a non-tenured faculty member during the faculty member's stipulated appointment term.

4. Other Disciplinary Sanctions for Adequate Cause

The steps and procedures detailed in [Section 5.4.2.4.](#) above will be followed for disciplinary sanctions of a non-tenured faculty member during the faculty member's stipulated appointment term which do not involve termination or suspension without pay.

5.4.4. Termination Due to Extraordinary Circumstances (i.e., Financial Exigency or Academic Program Discontinuance)

In the event of the termination of a faculty member due to financial exigency or academic program discontinuation, the faculty member may appeal the decision in writing to the Provost within ten (10) calendar days after receipt of the notice of termination.

Upon receipt of the appeal, the Provost shall convene a Faculty Hearing Committee which shall consist of the Provost, the faculty member's dean and five faculty members elected by the Faculty Senate. The Provost shall chair the Hearing Committee. The Hearing Committee shall ensure a prompt and expeditious hearing that is fair and unbiased although procedural requirements of formal adjudication shall not be required. The Hearing Committee shall evaluate whether established procedures were followed and appropriate criteria applied in arriving at the decision to terminate. The Hearing Committee shall not review the decision concerning the discontinuance of

an academic program, the declaration of the financial exigency, or the decisions that led to necessary funding reductions. A recommendation will be sent from the Hearing Committee to the Chancellor to uphold or reverse the action of termination. The Chancellor will make a final decision and notify the faculty member of the decision in writing. The Chancellor's decision may be appealed to the Board.⁵⁷

5.5. APPELLATE REVIEW ROLE OF THE FACULTY ADMINISTRATIVE RELATIONS COMMITTEE

⁵⁷ See UTC Financial Exigency Policies and Procedures.

The Faculty Administrative Relations Committee (FARC) is a standing committee of the Faculty Senate. The FARC may serve in an appellate review role as provided in this [Section 5.5](#).

5.5.1. Membership

The FARC consists of six faculty members. Two committee members are elected each year for three-year terms by the full faculty in accordance with the [Faculty Senate Bylaws](#). Attendance of three committee members shall constitute a quorum for a FARC meeting. The chairperson of the FARC is elected by the committee members in accordance with the [Faculty Senate Bylaws](#). The chairperson will preside over FARC meetings but shall not vote on a matter unless there is a tie-vote among committee members at a meeting.

5.5.2. Request for a FARC Review

As provided under [Section 5.3.2](#), above, when a faculty member who has initiated a formal appeal through the administrative channel procedure receives a negative decision by the Provost, the faculty member may appeal the Provost's decision to the Chancellor directly or request a review by the FARC prior to the Chancellor's review. The faculty member will have ten (10) calendar days from receipt of the Provost's decision to request a FARC review.

In order to request a review by the FARC, the faculty member must submit a written request to the FARC chairperson, with a copy to the Provost. The faculty member's written request should state the nature of the faculty member's appeal, the status of the appeal, and the faculty member's desired outcome.

If the matter lies within the FARC's purview (as specified in [Section 5.5.3](#), below), the FARC will review the matter. If the matter does not lie within the FARC's purview, the matter will not be reviewed by the FARC, and the faculty member's appeal will continue to the Chancellor for determination.

5.5.3. Purview and Scope of Review

Matters that lie within the purview of the FARC include, but are not limited to, tenure decisions, promotion decisions, non-reappointment decisions, annual performance rating appeals, and allegations of academic freedom violations. Notwithstanding the foregoing, matters that are subject to one of the special appeal procedures set forth under [Section 5.4](#), above lie outside of the FARC's purview and may not be reviewed by the FARC.

For matters submitted to the FARC for review, the FARC does not replace the role of faculty and administrators in making employment-related decisions. Instead, it is guided by the aim of maximizing the protection of the principles of academic freedom, due process, and fairness. Accordingly, for each matter submitted to the FARC for review, the FARC, at a minimum, is obligated to consider whether or not the decision under review was made in accordance with University policies, procedures, and regulations, including, but not limited to, this Handbook and departmental and collegiate bylaws. For example, in reviewing a tenure decision, the FARC, at a minimum, must make a finding and recommendation regarding whether or not the applicable tenure procedures in this Handbook and in collegiate and departmental bylaws were followed. The FARC will gather evidence and make findings and recommendations and provide a report of its findings and recommendations to the Chancellor and the faculty member.

Chapter 6

Benefits and Leaves of Absence

6.1. INTRODUCTION

The University of Tennessee provides a comprehensive program of benefits for faculty members and full-time non-tenure-track faculty members as set forth in UT Human Resources policies and this Faculty Handbook.

UT policies governing benefits and leaves of absence are established in the UT Human Resources policies and may be amended from time to time. The following sections are intended as a general summary of the most important benefits and leaves of absence and are provided for information purposes and do not guarantee that any particular benefit or leave request will be granted. In the event of any conflict or inconsistency between UT Human Resources policies and this Faculty Handbook, the UT Human Resources policies will control.

Certain benefits and leaves of absence are available to both nine-month and twelve-month faculty members. Other benefits and leaves are applicable only to nine-month faculty members. Twelve-month faculty members have certain leave benefits, which are not applicable to nine-month faculty members.

6.2. BENEFITS

The University of Tennessee offers a core employee benefits package with traditional benefits such as health and dental care, life insurance, deferred compensation and retirement plans as well as various leaves of absence, educational assistance, and other benefits, including longevity pay. A summary of benefits that may be available to UTC faculty can be found on the [UTC Office of Human Resources website](#). Benefit availability is based upon employment status as defined in [UT Policy HR0105 - Employment Status](#).

6.3. LEAVES OF ABSENCE

A leave of absence must be requested by a faculty member and approved in advance by the faculty member's department head and/or other administrator as appropriate. Each request for leave must be in writing and specify the length of the leave period. Leaves of absence normally shall not exceed two years and are normally without university compensation. For more information regarding the University's policies on leaves of absence, please see [UT Policy HR0355 - Leave of Absence](#).

Department heads should consult with the UTC Office of Human Resources to be sure a requested leave of absence complies with University policy. For more information regarding obtaining leave approvals and the recording of leave, faculty members should contact the [UTC Office of Human Resources](#). Normally, a faculty member on a leave of absence must complete his or her annual Evaluation and Development by Objectives (EDO) process in the appropriate time frame in order to be eligible for a merit pay increase for that year.

6.3.1. Leave Available to All Regular Full-Time Faculty Members

1. Family and Medical Leave

The University provides for family and medical leave for eligible employees, as appropriate, for childbirth, adoption, foster care placement of a child, serious illness of a spouse, child or parent, or the employee's own serious illness. Family and medical leave requests should be made through the UTC Office of Human Resources. The dean or department head and the Provost will work in consultation with the UTC Office of Human Resources to determine the length of a faculty member's family and medical leave and any work restrictions associated with such leave. For more information regarding family and medical leave, please see [UT Policy HR0338 - Family and Medical Leave](#).

2. Court Leave

Subject to the terms and requirements of [UT Policy HR0315 - Court Leave](#), a faculty member may be granted leave by his or her department head, without loss of pay, to serve as a witness or on a jury in a court or other legal proceeding. A faculty member must provide to his or her department head a copy of the summons or subpoena for jury or witness duty. Court leave must be approved in advance by the department head. Before approving a request for court leave, the department head shall consult with the UTC Human Resources Director to determine whether approval is in accordance with UT Policy HR0315. If the faculty member's absence is expected to create undue hardships in the academic department, the faculty member may wish to respond to the summons or subpoena with a letter requesting that he or she be excused until a later time (stating the hardships that would be caused by an extended absence). Should such a request not be granted by the court, the academic department must make arrangements to cover for the faculty member during his or her absence.

3. Funeral and Bereavement Leave

Faculty members may be granted leave with pay for bereavement and/or to attend the funeral of a close relative. Funeral/bereavement leave must be approved in advance by the department head and the UTC Human Resources Director. For information regarding funeral and bereavement leave, please see [UT Policy HR0340 - Funeral and Bereavement Leave](#).

4. Military Leave

Faculty members may be granted leave for military duty with or without pay. For information regarding leave for military duty, please see [UT Policy HR0370 - Military Leave](#).

5. Educational Leave

UTC may grant leave to regular full-time faculty members, with or without pay, to continue their education and/or participate in research, grants, or fellowships. Educational leave for faculty members must be requested in writing and approved in advance by the Provost and the UTC Human Resources Director. Such approval must specify the length of the leave, which normally should not exceed two years. Each request for leave will be evaluated on its own

merits and university approval will depend upon the evidence provided as to the enhancement of the faculty member's value to the University resulting from the leave. Any approved leave extending beyond the current fiscal year is subject to budgetary constraints or funding availability or both. For more information regarding educational leave, please see [UT Policy HR0335 - Educational Leave](#).

6. Personal Leave

A regular full-time faculty member may request leave without pay for personal reasons by making a request in writing to his or her department head. Personal leave is approved or disapproved on an individual basis and predicated on departmental needs and requirements. During a personal leave, the faculty member is always in a leave without pay status.

7. Holidays

The University recognizes the holidays identified under [UT Policy HR0350 - Holidays](#). When a recognized holiday falls on Saturday, it shall be observed on the preceding Friday. When a recognized holiday falls on Sunday, it shall be observed on the following Monday. All regular full-time faculty member employees, as defined under [UT Policy HR0105 - Employment Status](#), qualify for compensation for recognized holidays. More information regarding designated holidays and associated compensation matters can be found under [UT Policy HR0350 - Holidays](#).

6.3.2. Additional Benefits and Leave for Faculty Members on Nine-Month Appointments

1. Annual/Vacation Leave

Faculty members employed on regular full-time academic year (nine-month) appointments do not accrue annual leave under [UT Policy HR0305 - Annual Leave \(Vacation\)](#). However, subject to any Summer semester responsibilities and submitting all reports for the Spring semester, a faculty member on an academic year appointment is considered to be on vacation beginning after the Spring semester Commencement. The faculty member should return back to work at least seven (7) days prior to the first day of the Fall semester in order to give sufficient time to participate in scheduled faculty meetings, committee work, advising and other activities necessary for the satisfactory resumption of the work of the department for the Fall semester. Exceptions on an individual basis may be made by the department head. Faculty members on academic year (nine-month) appointments who are not teaching during the Summer semester are expected to be available during the summer months for communication with their college and departmental faculty colleagues and UTC administrators.

2. Sick Leave

Faculty members employed on regular full-time academic year (nine-month) appointments do not accrue sick leave under [UT Policy HR0380 - Sick Leave](#). However, see [Section 6.3.2.3.](#) below regarding family care policies applicable to nine-month faculty members.

3. Family Care

Certain nine-month faculty members may be eligible for leave or additional benefits under circumstances where: (1) the faculty member has a serious illness or has primary responsibility for the care of a child or an ill or disabled parent, spouse, or other family member; or (2) the faculty member is managing the arrival of a child through birth, adoption, or foster care. Such additional benefits may include modified duty assignments and extending the probationary period for a tenure-track faculty member. For more information regarding benefits and leave related to family care reasons, see the UTC Faculty and Family Care Policy.

4. Summer Semester

Faculty holding regular full-time academic year (nine-month) appointments may teach Summer semester courses and are paid compensation for teaching such courses, unless such courses are "banked" by the faculty member toward extended periods of release in other semesters as provided under [Section 6.3.2.5](#) below. A nine-month faculty member's total compensation in a year from teaching Summer semester courses may not exceed twenty-five percent (25%) of the faculty member's academic year salary.

The Provost, in consultation with the department head and dean, determines compensation for Summer semester courses. Compensation for a Summer semester course is primarily determined based on the level of student enrollment in the course and the qualifications of the faculty member teaching the course. The amount paid for a Summer semester course in which student enrollment is less than fully subscribed may be less than the amount paid for a course in which student enrollment is fully subscribed. Application of the appropriate percentages of faculty members' full-time effort and pay for teaching Summer semester courses should be consistent among faculty. Colleges, subject to the approval of the Provost, may cap the total amount of compensation paid for teaching Summer semester courses offered within the college.

5. Semester Banking

Semester banking is available to faculty members who hold regular full-time academic year (nine-month) appointments. Subject to the conditions set forth in this section, permission may be granted to substitute Summer semesters of teaching, or to "bank" such semesters, toward extended periods of release from regular duties in other semesters. Acceptable practice also allows a faculty member to teach (without additional compensation) a larger than normal course load during semesters of the academic year in order to bank the additional courses for released time in subsequent semesters.

Such periods of released time are not considered leaves of absence since they represent substitution of one working period for another and do not entail any redirection of the normal duties of the faculty member. Evaluation and approval of a request for a semester banking arrangement is subject to the following conditions and considerations:

- (1) Service for the semester must be performed before the semester may be "banked" toward a period of release from regular duties in subsequent semesters.

- (2) The duties performed during the "banked" semester (e.g., advising, committee work, etc.) must be coextensive with the duties required for the semester from which the faculty member is to be released.
- (3) The needs of the department and college will be a major consideration.
- (4) The financial and educational resources of the department and college must not be jeopardized in order to effect the substitution.
- (5) Credit for "banked" semesters will not result in additional pay at termination of the faculty member's employment.

A request for a semester banking arrangement will be evaluated by the department head, in consultation with the Office of Human Resources, and the department head will submit his or her recommendation regarding the request to the dean. The request must be approved by the dean.

6.3.3. Additional Benefits and Leave for Faculty Members on Twelve-Month Appointments

1. Annual/Vacation Leave

Faculty members on regular full-time twelve-month appointments accrue annual leave as provided under [UT Policy HR0305 - Annual Leave \(Vacation\)](#).

2. Sick Leave

Faculty members on regular full-time twelve-month appointments accrue sick leave as provided under [UT Policy HR0380 - Sick Leave](#).

3. Family Care

Certain twelve-month faculty members may be eligible for leave or additional benefits under circumstances where: (1) the faculty member has a serious illness or has primary responsibility for the care of a child or an ill or disabled parent, spouse, or other family member; or (2) the faculty member is managing the arrival of a child through birth, adoption, or foster care. Such additional benefits may include modified duty assignments and extending the probationary period for a tenure-track faculty member. For more information regarding benefits and leave related to family care reasons, see the UTC Faculty and Family Care Policy.

6.3.4. Professional Development Leave

1. Eligibility

Full-time tenured faculty members are eligible to apply for professional development leave if they have completed a minimum of six consecutive years of service in a full-time appointment immediately prior to the time the professional development leave is to begin.

2. Application and Approval Procedure

An eligible faculty member interested in applying for professional development leave should submit the [Application For Leave or Faculty Development Grant](#) to his or her department head. The department head will review the application and will make a recommendation to the dean. The dean will review the application and make a recommendation to The Deans Council to the Provost. The Deans Council to the Provost will review annually all applications requesting leave for the following academic year and make recommendations to the Provost. The Provost will make the final decision on each application.

3. General Criteria for Awarding Leave

Professional development leave is awarded on the merits of a faculty member's specific proposal for professional development. The award is an investment by UTC in the expectation that the leave will enhance the faculty member's ability to contribute to the objectives of UTC and to student development.

The improvements sought during professional development leave should benefit the work of the faculty member, department, college, and university. Only professional development leave proposals that meet this criterion will be accepted and approved by UTC. The purposes for which professional development leave may be granted include:

- (1) research on significant problems and issues;
- (2) important creative or descriptive work in any means of expression;
- (3) post-doctoral study at another institution; and
- (4) other approved projects, including innovations in teaching and learning.

4. Duration of Leave and Compensation

Professional development leave may be granted for either:

- (1) one-half the faculty member's annual appointment period at the faculty member's full base salary rate; or
- (2) the faculty member's full annual appointment period at one-half of the faculty member's full base salary rate.

Compensation shall be paid monthly, unless approved otherwise.

5. Additional Compensation and Benefits

- (1) For the period of a faculty member's professional development leave, the faculty member normally will be permitted to accept only such grants, contracts, awards, fellowships, and other additional compensation as are given to support the approved professional leave project or are consistent with university policies. The approval of the Provost must be obtained prior to accepting any compensation beyond that specified in [Section 6.3.4.4.](#) above. A fellowship, grant-in-aid, or government-sponsored exchange lectureship may be accepted for the period of the leave if acceptance will promote the purpose of the leave and is approved by the Provost.
- (2) If approved by the Provost, a faculty member on leave normally will be permitted to earn compensation from an outside source in accordance with the Policy on Compensated Outside Services set forth in [Chapter 7](#) of this Handbook.

- (3) To the extent permitted by state law, all benefits available to the faculty member under normal service shall be available during professional leave.

Chapter 7

Compensated Outside Services, Ethical Conduct of Faculty, and Intellectual Property

7.1. COMPENSATED OUTSIDE SERVICES POLICY

7.1.1. Purpose

Full-time faculty members agree to devote themselves to UTC's mission of teaching, research, and public service. Fulfillment of these responsibilities demands a full-time, one hundred percent (100%) commitment to a faculty member's regular UTC duties and responsibilities, including the responsibility to remain current in the discipline to which the faculty member is appointed. For many faculty members, an important way to remain current in their disciplines involves testing and applying their academic skills and abilities to real-world problems outside of their regular UTC duties. UTC encourages faculty members to engage in consulting and other related outside services which are associated with the disciplines of their appointments and which develop their professional expertise. By engaging in such outside services, many faculty members improve their disciplinary skills; serve educational institutions, professional organizations, business, industry, and government; and bring positive recognition to UTC.

The purpose of the Compensated Outside Services Policy set forth in this [Section 7.1](#) is to ensure that professional development of the faculty is encouraged and, at the same time, ensure that faculty meet their regular UTC duties and responsibilities in a timely and effective manner.

7.1.2. General Principles and Application

1. This policy has three governing ideas. One is that the faculty development and University "value" of compensated outside services is partly determined within the culture of the academic discipline; thus, rather than having a centralized and unilateral requirement, the responsibility of determining faculty development and University "value" of compensated outside services is delegated to the departmental level. Secondly, as a means of promoting accountability, this policy calls for regular and open communications between the faculty member and his or her department head regarding the faculty member's compensated outside services. Finally, because other faculty activities (teaching, research, service) often are gauged as a percent-of-effort, this policy similarly gauges compensated outside services on a percent-of-effort basis.
2. While compensated outside services may be valuable for both faculty members and UTC, the primary responsibility of faculty members is to fulfill the teaching, research, and service commitments of their full-time appointments to UTC. Faculty members have a responsibility not to undertake external activities that substantially burden or interfere with their commitments to UTC. A full-time appointment includes an obligation to maintain a meaningful presence on behalf of UTC in the performance of responsibilities, including by being accessible on campus to students, staff, and colleagues. Compensated outside services must not result in a conflict of interest or a conflict of commitment with respect to the faculty member's regular UTC duties and responsibilities.
3. Compensated outside services are not part of and cannot be substituted for a faculty member's full-time teaching, research, and service commitments to UTC. Correspondingly, a faculty member's annual

- performance evaluation is based only on the faculty member's performance of the duties and responsibilities of his or her appointment to UTC.
4. Subject to and consistent with the requirements of this policy, college and departmental bylaws may further define the nature and allowable time commitments of appropriate compensated outside services for faculty members within the college or department. A faculty member's department head and dean are responsible for assessing the value of the faculty member's compensated outside services.
 5. The guidelines and requirements of this policy primarily apply to compensated outside services provided by faculty members pursuant to long-term arrangements or continuing/recurring short-term arrangements with outside clients. The guidelines and requirements of this policy do not apply to:
 - (1) Compensated outside services provided by faculty members pursuant to non-recurring, short-term arrangements (which are typically not compensated except for modest honoraria), such as participation in symposia, accreditation visits, research paper presentations, exhibitions, or recitals; however, faculty members must notify and secure approval from their department heads in advance of such activities.
 - (2) Compensated outside services provided by faculty members on academic year (nine-month) appointments during the Summer semester term, except as provided under [Section 7.1.3.6.](#) below.
 - (3) Compensated outside services provided by faculty members pursuant to sponsored grants or contracts subject to UT Fiscal Policies on Sponsored Grants and Contracts.⁵⁸
 6. This policy shall be construed to be consistent with all other provisions of this Handbook and other University policies, including policies regarding conflicts of interest (see [UT Policy GE0002 - Conflicts of Interest & Commitment](#)), intellectual property (see [Statement of Policy on Patents, Copyrights, and Other Intellectual Property](#)), and academic freedom (see [UT Policy BT0006](#) and [Chapter 2](#) of this Handbook).

7.1.3. Specific Guidelines and Requirements

1. Restriction on Use of University's Name

During the conduct of compensated outside services, faculty members shall not make any use of the name of The University of Tennessee or of any of its constituent institutions (e.g., UTC or any other UT campus or institute) for any purpose other than professional identification; nor may faculty members claim any University or institutional responsibility for the conduct or outcome of such services.

2. Approval to Engage in Compensated Outside Services

Should a faculty member wish to pursue compensated outside services, the faculty member shall submit to his or her department head for approval a Compensated Outside Services Approval Form indicating the proposed plan for such services and the general percent of effort to be allocated to the services in the year ahead. The department head shall review the faculty member's plan as part of the faculty member's annual review and come to an agreement with the faculty member on the plan. If, after the faculty member's plan is approved, the faculty member has an opportunity to pursue a new compensated outside service or if any significant changes to an agreed plan arise before the faculty member's next annual review, the faculty member must notify the department head and submit a new or revised approval form for the department head's approval.

3. Reporting of Compensated Outside Services

As part of a faculty member's annual review, the faculty member must report his or her previous year's allocation of effort regarding compensated outside services on a Compensated Outside Services Certification Form.

4. Use of UTC Resources

Faculty members are not permitted to engage in compensated outside services that involve significant direct expense to UTC or significant use of UTC facilities, equipment, or services, except as permitted in this section. Faculty members who wish to use UTC resources to conduct compensated outside services must enter into a written agreement with UTC specifying the nature of the services to be performed; the kind of resources (equipment, supplies, material, services, etc.) to be used; the extent of use of the UTC resources; and the fee schedules and procedures regarding the compensation to be paid to UTC for the use of the resources. The compensation to be paid to UTC should be the fair market value for such resources, but, at a minimum, it shall not be less than UTC's cost for the resources. The written agreement must be approved in advance by the faculty member's department head, the dean, and the Chief Business Officer.

5. Restrictions on Compensated Outside Services Effort

A faculty member is expected to perform his or her UTC duties and responsibilities during the entire period of the faculty member's appointment term, and such performance of his or her UTC duties and responsibilities comprises the faculty member's total one hundred percent (100%) university effort for the appointment term. Accordingly, for a faculty member holding an academic year (nine-month) appointment, the faculty member's 100% university effort should be for the nine-month term.⁵⁹ For a faculty member holding twelve-month appointment, the faculty member's 100% university effort should be for the twelve-month term.⁶⁰

A faculty member's total compensated outside services efforts should not be more than twenty percent (20%) over his or her total 100% university effort during the faculty member's appointment term. The department head and dean have the discretion to restrict a faculty member's compensated outside service efforts to a percentage less than 20% over the faculty member's total 100% university effort during the appointment term. Such further limitation on a faculty member's compensated outside services efforts is particularly appropriate in cases where the faculty member's performance of his or her assigned UTC duties and responsibilities does not meet expectations for rank, as determined by the annual performance evaluation of the faculty member.

6. Summer Semester Term

A nine-month faculty member who does not have an appointment to perform work for UTC

⁵⁹ In order to determine the faculty member's 100% university effort for the nine-month term, granted released-time taken by the faculty member during the nine-month term should be counted toward the 100% effort. Accordingly, if a faculty member takes one month of

granted released-time during the nine-month term, the faculty member's compensated outside services efforts will remain limited to 20% over the faculty member's 100% effort for a nine-month schedule (i.e., the amount of the faculty member's allowable compensated outside efforts will not be decreased for that academic year). For example, in some departments, 20% over a faculty member's 100% university effort normally corresponds to one day per week that the faculty member is allowed to perform compensated outside services. If the faculty member in such a department takes one month of released-time during the nine-month term, the faculty member's compensated outside services will not be limited to less than one day per week; the limitation will remain at one day per week.

⁶⁰ In order to determine the faculty member's 100% university effort for the twelve-month term, annual leave taken and granted released-time taken by the faculty member during the twelve-month term should be counted toward the 100% effort.

during the Summer semester term (e.g., to teach Summer semester courses) is not subject to any quantity restrictions on his or her compensated outside services efforts during the Summer semester term.

A nine-month faculty member who has an appointment to perform work for UTC during the Summer semester term (e.g., to teach Summer semester courses) shall be limited in his or her compensated outside services efforts during the Summer semester term as established by written agreement between the department head and the faculty member.

7. "Extra Services Pay" Activities

Activities for which a faculty member is reimbursed by UTC as "extra services pay" under [UT Policy HR0406 - Compensation](#) may be counted as compensated outside services effort. The total of activities of a faculty member covered by both extra services pay activities and compensated outside services should not be more than twenty percent (20%) over the faculty member's total 100% university effort for his or her appointment term.

8. Non-Compliance

A faculty member's failure to comply with the requirements of this policy and/or applicable college or departmental bylaws with respect to the performance of outside compensated services may be considered as a negative factor during annual reviews, promotion and tenure decisions, salary determinations, and requests for released time or other institutional support. Serious and/or continuing noncompliance also may result in more severe disciplinary action, including, but not limited to, reduction in allowable compensated outside services, salary reduction, restitution for cost of equipment, and termination for adequate cause. A faculty member found to have violated this policy may appeal the finding and any resulting disciplinary action pursuant to the applicable appeal procedures provided in [Chapter 5](#) of this Handbook.

7.2. ETHICAL CONDUCT OF FACULTY

7.2.1. Employee Code of Conduct

In carrying out its educational, research, and public service missions, the University relies on the ethical and responsible conduct of all employees. The University's Employee Code of Conduct under [UT Policy HR0580 - Code of Conduct](#) was developed to supplement and clarify existing University policies, procedures, and rules. Employees are expected to familiarize themselves with the Code and to abide by it.

7.2.2. Conflicts of Interest Policy

The purpose of the Conflicts of Interest Policy is promote the highest standards of objectivity and integrity for its employees and others engaged in carrying out the University's mission in the areas of instruction, research, and public service. All UTC faculty members are subject to and must comply with the Conflicts of Interest Policy set forth under [UT Policy GE0002 - Conflicts of Interest & Commitment](#).

7.2.3. Research and Scholarship Integrity

Public confidence in the integrity of the research and scholarship conducted at the University is critical to the fulfillment of the University's objectives as a public institution of higher education and is a critical responsibility of individual educators and scholars. Faculty members who engage in research and scholarly activities must familiarize themselves with and abide by [UT Policy RE0001 - Policy and Procedures on Responsible Conduct in Research and Scholarly Activities](#).

7.2.4. Acceptable Use of Information Technology Resources

All faculty members are expected be familiar with and must comply with [UT Policy IT0110 - Acceptable Use of Information Technology Resources](#) relating to their use of University information technology resources.

7.3. INTELLECTUAL PROPERTY POLICY

All faculty members are subject to and must comply with the [UT Policy BT0011 - Statement of Policy on Patents, Copyrights, and Other Intellectual Property](#). The goal of the policy is to promote the progress of science and the arts and the development of the University and faculty. Patents, copyrights, and licensing of intellectual property provide a means for developing and using inventions and creations. The policy was established to ensure that those creative developments in which the University has an equity interest will be used in a manner most likely to benefit the public and at the same time provide compensation to those faculty and staff who invent and create.

Chapter 8

Procedure for Faculty Handbook Revisions

8.1. BOARD OF TRUSTEES POLICY

The Board of Trustees' *Policy on Faculty Handbook Revisions* ([UT Policy BT0007](#)), adopted in 1992, and any subsequent amendments, governs the revision of faculty handbooks. [Section 8.2.](#) below sets out the general procedures to be followed. In the event of any conflict or inconsistency between the Board's policy and this handbook, the Board's policy will control.

8.2. UTC PROCEDURE

The Handbook Committee of the Faculty Senate will initiate proposed revisions to the Faculty Handbook, after consultation with the Provost and campus administration. Each recommendation of the Handbook Committee will be presented at the next meeting of the Faculty Senate as a motion briefly outlining the reason(s) for the proposed revision and specifying the precise change(s) to be made. Adoption of the motion by the Faculty Senate constitutes a recommendation of the Faculty Senate to the Chancellor for revision of the Faculty Handbook.

The Chancellor will submit his or her recommendations, if any, concerning the proposed revision to the chief academic officer for the system. The chief academic officer for the system will submit his or her recommendations, if any, to appropriate vice presidents, the general counsel, and the President.

If the proposed revision involves a substantive change in policy matters as outlined in [UT Policy BT0007](#), the President, in consultation with the vice presidents and the general counsel, will present his or her recommendation concerning the proposed revision, if any, to the Board, or appropriate committee of the Board, if the President determines to go forward with seeking approval for the proposed revision. Final approval of all other proposed revisions of the Handbook lies with the President, in consultation with the vice presidents and the general counsel.

Appendix 4-B

UTC College of Arts & Sciences Bylaws

Preamble

The College of Arts and Sciences (“College”) proudly celebrates and champions liberal education, an approach to teaching and learning that emphasizes a broad and well-rounded course of study in the arts, the humanities, the natural sciences, mathematics, and the behavioral and social sciences. Our College administration and faculty believe that a liberal arts and sciences education prepares students to think critically and creatively, to communicate clearly, and to reflect on complexity, diversity, and change along our social, cultural, technological, and scientific horizons. Such preparation cultivates in our students a sense of personal and social responsibility, intellectual curiosity, and practical skills.

The College aims for excellence in undergraduate and graduate education as its principal mission, a mission that requires quality instruction, research, creative expression, and learning that takes place both inside of and beyond the classroom. As the heart of the University’s rich General Education curriculum, the College is committed to strengthening the intellectual life of all UTC students as they develop an appreciation of the arts, the humanities, the natural sciences, mathematics, and the behavioral and social sciences.

Values

Faculty, staff, and students in the College value a positive work and learning environment as we embrace cultural and intellectual diversity and practice innovative teaching and mentorship. We value offering a foundational education that leads to a life that is enriched by the pursuit of continuous learning. We value and promote scholarly research and creative expression. We value being engaged with the Chattanooga community, as well as our regional and global partners and our ever-expanding intellectual communities.

Mission – Putting our values into practice, we collectively...

- provide and foster an environment for intellectual curiosity and a foundation for life-long learning, thinking, reflection, and growth;
- equip students with transferrable skills – critical thinking, communication, and complex problem-solving skills – that are needed to adapt and succeed in a rapidly evolving world;
- advance cultural and intellectual diversity;
- advance new knowledge through research (theoretical and applied) and creative activities;
- advance integrated service as a part of personal and social responsibility.

Vision

The enduring vision of UTC’s College of Arts and Sciences is to transform lives through a modern liberal arts and sciences education.

Definitions

Throughout the following bylaws, the word “faculty” includes, unless otherwise specified, both tenure-track faculty (tenured and probationary faculty alike) with tenure homes in the College and non-tenure-track

faculty who likewise contribute in both critical and innumerable ways to the mission of the College. The term “voting faculty” is defined in Article III.A of these bylaws.

Bylaws

I College Leadership and Structure

I.A Dean

The Dean administers the College and bears responsibility for the success of its programs.

I.A.1 Responsibilities

The Dean leads development and implementation of the College’s strategic plan and ensures alignment with the University’s strategic plan; communicates on a regular basis with the faculty and staff through regularly scheduled meetings and communications highlighting the accomplishments of the College faculty and students; manages the budget and fiscal affairs of the College; evaluates performance of Department Heads and staff within the College; reviews recommendations for appointment, retention, tenure, and promotion within the College, and makes subsequent recommendations to the Provost regarding the same; assesses need and advocates for additional resources for the College; and assesses the performance of and recommends changes in academic programs within the College.

I.A.2 Appointment and Evaluation

The Dean serves at the pleasure of the Provost and the Chancellor. The Provost conducts an annual performance evaluation of the Dean.

I.B Associate Dean

An Associate Dean facilitates and implements the objectives set by the Dean, toward the strategic goals of the College, in collaboration with Department Heads and other campus leaders. An Associate Dean is typically an associate or full professor from a department within the College.

I.B.1 Responsibilities

As assigned by the Dean, an Associate Dean may assess and document College progress toward strategic goals; coordinate student success initiatives in the College and within departments; supervise academic scheduling across the College; support reappointment, tenure, and promotion (RTP) work within the College; empanel and chair committees of the College as directed by the Dean; manage provisional College budgets such as those for summer school or part-time faculty; evaluate non-tenure track faculty within the College; chair the College Executive and Tenure and Promotion Committees; and support the work of the College in other capacities as needed.

I.B.2 Appointment and Evaluation

The Dean appoints an Associate Dean through the standard search process used for upper-level campus administrative positions. The Dean appoints a search committee representative of the College's disciplinary diversity and chaired by a full professor who is tenured within the College. The search committee will solicit applications, seek input from all appropriate College constituencies, and report to the Dean a list of unranked acceptable candidates. The report will be advisory to the Dean, who makes the appointment. The administrative appointment of an Associate Dean, like other administrative offices,

does not carry tenure. An Associate Dean serves at the pleasure of the Dean, Provost, and Chancellor. The Dean conducts an annual performance evaluation of an Associate Dean.

I.C Assistant Dean

An Assistant Dean supports the Dean and Associate Deans in facilitating and implementing the objectives set by the Dean, toward the strategic goals of the College in collaboration with Department Heads and other campus leaders. An Assistant Dean is typically an associate or full professor from a department within the College.

I.C.1 Responsibilities

As assigned by the Dean, an Assistant Dean may facilitate and coordinate the administration of the College's graduate programs; represent the College to the Graduate School; work with the Dean and appropriate campus offices in developing communication resources that promote and celebrate the undergraduate and graduate programs in the College; chair the College Curriculum Committee; oversee and coordinate General Education offerings across the College; and support the work of the College in other capacities as needed.

I.C.2 Appointment and Evaluation

The Dean appoints an Assistant Dean through the standard search process used for administrative positions. The Dean appoints a search committee representative of the College's disciplinary diversity and chaired by a full professor who is tenured within the College. The search committee will solicit applications, seek input from all appropriate College constituencies, and report to the Dean a list of unranked acceptable candidates. The report will be advisory to the Dean, who makes the appointment. The administrative appointment of an Assistant Dean, like other administrative offices, does not carry tenure. An Assistant Dean serves at the pleasure of the Dean, Provost, and Chancellor. The Dean conducts an annual performance evaluation of an Assistant Dean.

I.D Department Head

A Department Head is responsible to the Dean and the Faculty within the Department for the administration of the Department.

I.D.1 Responsibilities

The Department Head leads the Department toward development and implementation of the

Department's strategic plan, in alignment with the College and University strategic plans; plans and provides for the success of the Department's academic mission; manages responsibly Department budgets and plans for the allocation of departmental resources; evaluates performance of faculty and staff within the Department; reviews recommendations for reappointment, tenure, and promotion within the Department, and makes subsequent recommendations to the Dean regarding the same; assesses need and advocates for additional resources for the Department; and assesses the performance of and recommends changes in academic programs within the Department.

I.D.2 Appointment and Evaluation

The Dean appoints the Department Head in consultation with the faculty within the Department. That said, the Department Head is not elected, though Department Head searches historically have been conducted by a search committee that includes department faculty and any number of stakeholders, e.g., alumni, community and/or business leaders who share interest in the Department's successful leadership, representatives from the Office for Undergraduate Research and Creative Endeavor, representatives from the Office of Research and Sponsored Programs, representatives from the Office of the Vice Chancellor for Research and Dean of the Graduate School, and/or representatives from the Development Office. Search committees ultimately make a recommendation to the Dean on acceptable candidates for the appointment.

After consultation with the Department and its faculty, the Dean selects no fewer than five (5) search committee members from individuals who have been nominated to serve and/or by invitation. Typically, the search for a Department Head is chaired by another Department Head (current or former) from within the College.

The Dean should work to ensure that the Department has representation on the search committee from across the various ranks and divisions within the Department. It is not uncommon for search committee membership to include additional leaders from outside the Department (other Department Heads, graduate program coordinators, and the like) as such a search is for a peer, i.e., another department-level leader who understands the complexities, the nuances, and the demands on individuals who hold such positions.

The administrative appointment of the Department Head, like all other administrative offices, does not carry tenure. The Department Head serves at the pleasure of the Dean, Provost, and Chancellor. The Dean conducts an annual evaluation of the Department Head.

I.E Divisional Structure

The College recognizes that Departments, including departmental faculty and academic programs, may have significant and important interdisciplinary connections, and so categorizes its Departments within divisions, or clusters, of related disciplines. The table below articulates the four divisions within the UTC College of Arts and Sciences.

Division	Departments

Arts	Department of Art
	Department of Performing Arts

	Department of Communication
	Department of English
<i>Humanities</i>	Department of History
	Department of Modern and Classical Languages and Literatures
	Department of Philosophy and Religion
	Department of Biology, Geology, and Environmental Science
<i>Natural Sciences and</i>	Department of Chemistry & Physics
	Department of Mathematics
<i>Mathematics</i>	Department of Political Science and Public Service
	Department of Psychology
<i>Behavioral and</i>	Department of Social, Cultural, and Justice Studies
<i>Social</i>	
<i>Sciences</i>	

The College likewise houses and supports a vibrant Humanities program, the Women's, Gender, and Sexuality Studies program, the Army ROTC Military Science and Leadership program, and numerous, interdisciplinary minors.

II College Governance

II.A College Leadership

II.A.1 Charge

College administrators meet regularly to advance communication and planning. The Department Heads of separate divisions, as described in Section I.E, may meet separately on matters of common interest.

II.A.2 Membership and Meetings (with Department Heads)

College leadership meetings include the Dean, the Dean's administrative staff, any Associate Deans or Assistant Deans, and all Department Heads. The Dean chairs and sets the agendas for all meetings, which are typically twice a month during the fall and spring terms, and then as needed during the summer. The Dean may call additional meetings at her or his discretion. When a Department Head is unable to attend, she or he must designate a departmental representative, e.g. an associate head, to attend as a representative of the respective Department.

II.B Executive Committee

The Executive Committee is an advisory body to the Dean.

II.B.1 Charge

The Executive Committee provides advice and counsel to the Dean on matters of strategic planning and governance. It reviews these bylaws during the spring term of each odd-numbered year and may propose changes which are then subject to approval by the full faculty of the College.

II.B.2 Membership and Meetings

An Associate Dean chairs the Executive Committee. Regular membership consists of two separate representatives from each division of the College, as described in Section I.E. The Dean consults with the Department Heads in each division and then appoints committee members from that division. Members will serve for staggered 3-year terms and at least one academic year must elapse between terms of service.

II.C College Tenure and Promotion (T&P) Committee

The College Tenure and Promotion (T&P) Committee is advisory to the Dean.

II.C.1 Charge

The College T&P Committee reviews and makes recommendations to the Dean regarding candidates for tenure and promotion within the College. The College T&P Committee uses the

UTC Faculty Handbook, these College bylaws, and bylaws from the relevant Department to review recommendations for faculty tenure and promotion forwarded by departmental RTP committees within the College and thereby recommended to the Dean by the relevant Department Head. The College T&P Committee's purview extends to the areas of fairness and high standards.

II.C.2 Membership and Meetings

An Associate Dean chairs the College T&P Committee and serves as a non-voting member of this group. Regular membership consists of two representatives from each division of the College, as described in Section I.E. The Dean consults with the Department Heads in a division and then appoints the committee members from that division. Excepting the chair, who may serve as often as appointed by the Dean, a term of an appointment to the College T&P Committee is two academic years.

In the event that an Associate Dean, as chair of the College T&P Committee, is him/herself a candidate for promotion, another Associate Dean or an Assistant Dean shall serve as a proxy, convene the College T&P Committee, ensure that proper procedures are followed in discussing the candidate's dossier and supporting materials, and oversee the vote on the candidate's promotion. The proxy, as chair of the College T&P Committee, will serve as a non-voting member.

II.C.3 Confidentiality

It is imperative that the chair (i.e., an Associate or Assistant Dean) and all members of the College T&P Committee maintain strict confidentiality on matters discussed in College T&P Committee meetings. Only the chair of the College T&P Committee shall make a recommendation on a candidate's tenure and/or promotion to the Dean. Otherwise, all matters that are discussed in meetings of the College T&P Committee remain strictly confidential.

II.C.4 Split Vote

In cases of a split vote, the Dean may reconvene the College T&P Committee to ensure high standards and fairness are upheld.

II.D Curriculum Committee

The Curriculum Committee reviews curriculum proposals originating from departments within the College.

II.D.1 Charge

The Curriculum Committee reviews all curriculum proposals from departments within the College, upholds high academic standards, and ensures coherence amongst disciplines.

II.D.2 Membership and Meetings

An Assistant Dean chairs the Curriculum Committee, and the regular membership consists of two representatives from each division of the College, as described in Section I.E. Excepting the chair, who may serve as often as appointed by the Dean, a term of an appointment to the Curriculum

Committee is two academic years.

II.E CAS Diversity Committee

II.E.1 Charge

The CAS Diversity Committee assists the Dean and departments with the development and review of the diversity goals and strategies of the College and the University.

II.E.2 Membership and Meetings

The chair of the College Diversity Committee is elected from among the committee's membership. The committee consists of eight members, with representatives from each division of the College, as described in I.E. Members may be nominated by their Department Head and shall be selected by the Dean (or her or his designee). Both faculty and staff are eligible for membership.

Members shall serve terms of two years and membership shall be staggered to ensure rotation amongst the membership. No member of the Committee may serve more than four consecutive years. An Associate or Assistant Dean designated by the Dean may serve as an ex officio member of the Committee. The CAS Diversity Committee will meet at least once each semester.

III Faculty Rights & Responsibilities

As members of the larger University, the faculty of the College enjoy certain rights and responsibilities with respect to academic freedom, freedom of expression, tenure, equity and diversity, and ethics. The College expects all tenured and tenure-track faculty members to make significant contributions to a) teaching and corollary activities that include advisement and mentorship of our students; b) research, scholarship, and creative activity; and c) service to the College, University, public, and profession. It is recognized that individual contributions may not be equal in these three areas. Accordingly, more limited achievement in one area may be offset by excellence in the other two areas. Any such differentiation among the three dimensions of faculty participation must be consistent with the commitment of the University and its mission. Successful faculty members will share that commitment. These bylaws neither expand nor abridge the rights and responsibilities of faculty, as outlined in the UTC Faculty Handbook.

III.A Definition of Voting Faculty Members

The College defines a voting faculty member (in matters related to College governance) as a full-time faculty member whose home Department resides within the College.

III.B Rights

Within the College, voting faculty members may participate in discussions about governance (including these bylaws), serve on College committees, and vote on ballots held within the College. Departmental bylaws provide detail about specific voting faculty member rights within each Department.

III.C Responsibilities

The College expects a tenured and tenure-track faculty member to contribute in each of the following three areas, according to her or his assignment: teaching and advising; research, scholarship, and/or creative activity; and service to Department, College, University, public (as such service relates to a faculty member's discipline or area of expertise), and/or the profession. Non-tenure track faculty members are likewise expected to contribute to the missions of the Department, College, and University.

III.D Teaching and Variable Work Assignments

Because of great diversity among our departments and units within the College, it is not feasible to specify precise College guidelines to be used in determining teaching responsibilities. However, both departmental bylaws and practice should be consistent with these general College guidelines.

Teaching responsibilities may vary among tenured and tenure-track faculty within each Department, and teaching responsibilities may change over time for individual faculty as their contributions to research, scholarship, creative activity, and service vary. As such, differential

work assignments may be required. Factors to be considered in differentiated teaching assignments include: external funding that serves the mission of the University and requires active administrative or scholarly involvement; administrative duties at the Department, College, or University level that are beyond those typically expected of tenure-track faculty; a high level of research, scholarship, and/or creative activity; active

supervision of theses and student-led research/creative activity which may be considered an intensive form of non-classroom teaching; instruction in a variety of courses that requires unusual preparation time; and/or instruction of large classes without grading (or other) assistance. In the event that a faculty member either requests or has reduced teaching responsibilities for any of these reasons, the Department Head must notify or otherwise consult with the Dean to ensure that resources are available to cover what may result in additional instructional costs (i.e., adjunct pay or overload pay for other faculty to cover classes).

Departmental bylaws provide detail about specific responsibilities for faculty members and may require additional or more specific responsibilities beyond those described above. For example, a Department may require non-tenure track faculty to engage in advising and service or a department may require service by all tenured and tenure-track faculty members.

III.E Course Syllabi

It is the responsibility of the faculty to prepare and make available course syllabi on or before the first day of each new semester/term. Syllabi should be made available to students via the University learning management system. Syllabus guidelines and resources are provided by the Walker Center for Teaching and Learning. <https://www.utc.edu/walker-center-teaching-learning/information-services/syllabus-resources.php>

III.F Collegiality

In addition to the three main criteria for tenure and promotion – teaching and advising; research, scholarship, and/or creative activity; and service – faculty should be mindful that collegiality is an integral part of the health and well-being of any department and the College as a whole. Collegiality (or the lack thereof), therefore, tends to impact effectiveness in the three main criteria for tenure and promotion. It follows, then, that collegiality (or the lack thereof) may impact annual performance evaluations. For that reason, faculty should be mindful of the College’s “Statement on Collegiality”:

Collegiality requires the capacity to relate well and constructively with peers and members (faculty, staff, students and administrators) of our campus community. Collegial behavior and support for the common good, therefore, is highlighted by civility and respect for one another, particularly as we may disagree with one another from time to time. Even in our disagreement, we must work well with one another as we share in institutional and departmental goals and responsibilities.

III.G Faculty Participation in Commencement Exercises

Faculty in the College are expected to attend at least one (1) commencement exercise each year.

IV Tenure-Track Faculty

Throughout the following pages, the phrase “tenure-track faculty” applies to tenure-eligible and tenured faculty alike.

IV.A Selection of New Faculty for Tenure-Track Appointments

IV.A.1 Authorization to Search and Letter of Appointment

As stated in the Faculty Handbook, the Dean “must obtain authorization from the Provost to begin a search for a tenure-track faculty position” (Section 3.1). Before doing so, the Dean will request proposals to replace faculty or to search for new full-time faculty from Department Heads, who should consult with Department colleagues on curricular need, programmatic changes, and the like. Doing so ensures that requests align with student needs, strategic growth within the Department, and strategic initiatives (i.e., new academic and/or research areas) on campus.

IV.A.2 Authorization to Search and Letter of Appointment

Per Section 3.1.6 of the Faculty Handbook, “Only the letter of appointment from the Provost to the candidate regarding the terms and conditions of the appointment is binding on UTC. Any other representations concerning the terms and conditions of the appointment, whether oral or written, are not authorized by UTC and not binding on UTC. The new faculty member's written acceptance of the letter of appointment, together with execution of normal UTC employment forms, completes the initial appointment to employment between UTC and the faculty member.” (See Section 3.1. of the Faculty Handbook for additional information about “Recommendations to Appoint” and “Official Notification of Appointment” to ensure proper appointment procedures.)

IV.A.3 Startup Costs

No startup costs will be included in the letter of appointment without prior review and approval by the Dean.

IV.B Commitment to Diversity

The College proudly supports diversity and inclusion in its many forms through our daily activities and our strategic plan. Specifically, Goal 3 of the College’s strategic plan, including subgoals, reads as follows:

Goal 3: The College of Arts and Sciences embraces cultural and intellectual diversity. The College of Arts and Sciences—its leadership, faculty, and staff—is committed to a campus culture that respects the inherent worth of every person and that is enriched by our diverse backgrounds.

- a. Participate in the implementation of an institutional diversity plan by creating a college-level diversity plan which defines and sets clear metrics for diversity of faculty, staff, and students.*
- b. Advocate for a culture of inclusion, including physical and technological access for students, faculty and staff with disabilities.*
- c. Increase opportunities for students, faculty, and staff to have an international or study abroad*

- experience to ensure first-hand exposure to global examples of cultural, architectural, intellectual and scientific achievement.*
- d. *Offer educational opportunities that promote an awareness of and an appreciation of divergent worldviews.*
 - e. *Showcase and promote multidisciplinary and interdisciplinary research, teaching, and creative activities.*

Like the University as a whole, the College is committed both to *recruiting* outstanding faculty from a diverse pool of applicants and to *retaining* our colleagues who enrich the College and our Departments in part because of our diverse backgrounds, experiences, research areas, and more. As such, we emphasize that each Department should advertise position vacancies in an effort to obtain a diverse pool of qualified applicants. For each search, the Director of the Office of Equity and Inclusion ("OEI") is contacted to advise our Departments regarding appropriate search procedures that should be followed. (See the Faculty Handbook, Section 3.1.2. for more information.)

IV.C Criteria/Standards for Appointment to Faculty Ranks

Departments within the College shall provide their faculty members with the resources necessary to perform assigned duties, including office space, office and pedagogical supplies, support services, and equipment. Departments within the College likewise must have consistent criteria for assigning teaching duties to all faculty members.

IV.C.1 Criteria for Appointment to Faculty Rank

Criteria for appointment to faculty ranks reflect the rigorous preparation necessary for University teaching, research, creative activity, the various service activities expected of the faculty members of a major university, and the diversity of missions performed by the College's numerous Departments. For all faculty ranks, effective advising and mentorship is understood to be part of the task of teaching.

UTC has established the following general criteria that faculty members are expected to meet for the appropriate rank. Each Department within the College must establish its own metrics and standards for evaluating such criteria for faculty rank appointments within the Department, and the Department's specific metrics and standards shall be published in the Department's bylaws.

An **Assistant Professor** is expected to:

1. have a doctorate degree or other terminal degree in his or her discipline or present equivalent training and experience;
2. show potential or have demonstrated ability as a teacher;
3. show potential or have demonstrated evidence of research, scholarship, and/or creative activities;
4. have demonstrated willingness to participate effectively in professional activities other than teaching and research; and
5. have demonstrated ability to relate appropriately to students and professional colleagues.

An **Associate Professor** is expected to:

1. have a doctorate degree or other terminal degree in his or her discipline or present equivalent training and experience;
2. have achieved a reputation as an accomplished teacher – demonstrated through student evaluations that are indicative of success in the classroom (or various modalities) and through teaching evaluations that are performed by peers, mentors, and/or the Department Head;
3. have achieved a good record in research, scholarship, and/or creative activities;
4. have an established record of effective participation in professional activities other than teaching and research;
5. have demonstrated ability to relate appropriately to students and professional colleagues; and
6. have demonstrated excellence in at least one of the three areas of responsibility (i.e., teaching, research, and service) required for full-time faculty status.

A **Professor** is expected to:

1. have a doctorate degree or other terminal degree in his or her discipline or present equivalent training and experience;
2. have achieved and maintained a reputation as an accomplished teacher – demonstrated through student evaluations that are indicative of success in the classroom (or various modalities) and through teaching evaluations that are performed by peers, mentors, and/or the Department Head;
3. have achieved and maintained a significant record in research, scholarship, and/or creative activities;
4. have achieved and maintained a significant record of effective participation in professional activities other than teaching and research;
5. have demonstrated an ongoing ability to relate appropriately to students and professional colleagues; and
6. have demonstrated excellence in at least two of the three areas of responsibility (i.e., teaching, research, and service) required for full-time faculty status.

The previous “Criteria for Appointment to Faculty Rank” section is adapted from and aims to be consistent with Section 3.2.1.1 - 3.2.1.3 of the Faculty Handbook.

IV.C.2 Completion of the Terminal Degree after Hire

A faculty member who has not completed the terminal degree in his or her discipline (e.g., Ph.D.) but who otherwise meets all of the other criteria for the rank of Assistant Professor may be initially appointed to a tenure-track full-time academic year appointment at the rank of Assistant Professor and noted as "All But Dissertation" or "ABD," subject to the following conditions:

If appointed in August, the faculty member will be required to complete his or her terminal degree on or before July 31 after completing his or her first full academic year (i.e., Fall and Spring semesters) in order to retain the rank of Assistant Professor; or

If appointed in January, the faculty member will be required to complete his or her terminal degree on or before July 31 after completing half of his or her first academic year (i.e., the Spring semester) in order to retain the rank of Assistant Professor; or

Such conditions as are imposed by the Provost at the time of the faculty member's initial appointment and set forth in the initial appointment letter.

The faculty member's failure to complete his or her terminal degree within the applicable time period set forth in this section constitutes adequate cause for terminating the faculty member's employment. The tenure probationary period for a faculty member initially appointed under such circumstances is treated in an identical manner as the tenure probationary period for a faculty member initially appointed at the rank of Assistant Professor who already has his or her terminal degree at the time of the appointment.

IV.D Reappointment Process

All departments within the College abide by reappointment processes that are described in the Faculty Handbook. See Section 3.7 of the Faculty Handbook ("Reappointment Review Process").

IV.D.1 RTP Committee's Role in the Reappointment Process

The Faculty Handbook provides that the departmental RTP Committee will perform a reappointment review of a tenure-track faculty member only if the Department Head recommends non-reappointment, or otherwise, only in the faculty member's mid-probationary review year (i.e., year 3). However, each Department may elect for its RTP Committee to provide the initial recommendation on reappointment in each year of the faculty member's probationary period.

IV.D.2 Reappointment Materials Reviewed by the RTP Committee

Department bylaws shall determine processes for reappointment review and which materials, in keeping with any requirements set forth in the Faculty Handbook, are evaluated by the departmental RTP Committee during reappointment review.

IV.E Tenure

IV.E.1 Criteria for Tenure Consideration

Candidates for tenure must, at a minimum, meet the criteria for appointment to the rank of Associate Professor in order to be awarded tenure. Each Department within the College establishes and publishes in departmental bylaws specific departmental criteria and standards for tenure.

IV.E.2 Peer Review of Teaching

Peer review of teaching is an excellent way for our colleagues to receive constructive input on teaching effectiveness. Prior to consideration for tenure and/or promotion, tenure-track faculty who have teaching responsibilities will be subject to a peer review of their teaching performance. Peer evaluations of tenure-track faculty classroom and/or online teaching is a part of the tenure and/or promotion review process. That is, peer evaluations are to be included in tenure and/or promotion dossiers. Departments in the College shall establish procedures for conducting teaching peer reviews for the tenure and/or promotion review processes and publish such procedures in departmental bylaws.

IV.E.3 External Review Process

As stated in the Faculty Handbook, “The purpose of the external review is *not* to make a recommendation regarding tenure/promotion but to provide an objective evaluation of the faculty member's record to date in the three performance areas of teaching, research, and service.” See Section 3.10.4 of the Faculty Handbook for related information.

In keeping with the Faculty Handbook, the College requires that the review of dossiers for tenure and promotion must include reviews by at least two (2) external reviewers. Should fewer than two (2) external reviews be returned by the end of this process, the chair of the departmental RTP Committee will note the efforts made to solicit reviewers and their reviews.

Prior to October 8th in the year that a tenure-eligible faculty member applies for tenure and/or promotion, the faculty member will provide the departmental RTP Committee with a dossier (hard copy or electronic) that documents evidence of effectiveness in the “three performance areas of teaching, research, and service.”

The departmental RTP Committee and the candidate for tenure and/or promotion should collaborate to generate a list of appropriate reviewers. In doing so, the candidate will provide a list of potential external reviewers, no fewer than four (4), that the departmental RTP Committee will review. Each potential reviewer should be identified by name, title, institution, and be accompanied by a brief rationale for her or his selection. The departmental RTP Committee will choose at least two (2) reviewers from the faculty member's list. The Committee will then generate a list of potential external reviewers, no fewer than four (4), that the faculty member will review. Each potential reviewer should be identified by name, title, institution, and be accompanied by a brief rationale for her or his selection. From the Committee's list, the candidate will choose no fewer than two (2) reviewers. No fewer than four (4) external reviewers remain at this point.

By November 1st, the chair of the departmental RTP Committee, in collaboration with the Department Head, will solicit via email a minimum of four (4) and a maximum of seven (7) external reviewers using a “neutral” template letter supplied by the College. (In the event that the Department Head is being evaluated for tenure and/or promotion, the cover letter will be sent by the chair of the departmental RTP Committee and the Dean of the College.) Should some of the selected reviewers decline, the Committee would go back to the two lists and continue the process until at least three (3) reviewers agree to submit an external review of the candidate's materials. Reviewers will then be provided with the candidate's dossier and they will be asked to supply two things by no later than January 15th: 1) a one-to-two page letter of evaluation, and 2) a copy of their curriculum vitae.

External reviewers should be selected based on the following guidelines.

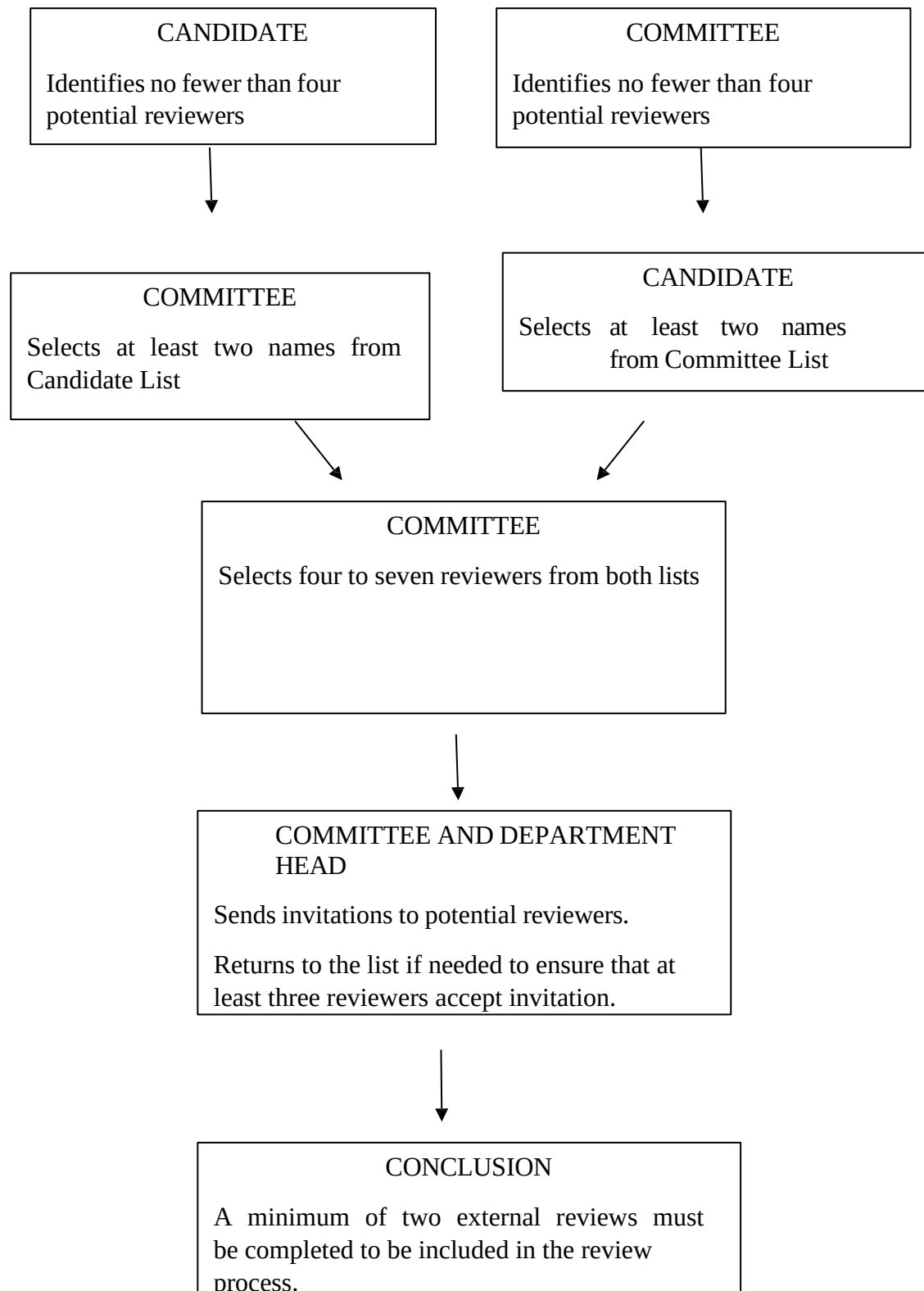
- Reviewers should be tenured and at or above the rank that the candidate seeks.
- Reviewers should be at a peer institution, an aspirant peer institution, or an institution that is universally recognized as excellent.
- Reviewers should not have had a working relationship with the candidate (dissertation director, chairperson, co-author, etc.). That is, there should be no conflict of interest with the candidate.
- Reviewers should not be in contact with the candidate about the review process from the time that they accept the external review assignment. The candidate should also not attempt to

contact the external reviewer.

Candidates must not contact external reviewers during the review process. In the event that the external reviewers should be contacted during the review process – for example, to clarify procedures or deadlines – only the chair of the departmental RTP Committee or the Department Head may contact the reviewers. In the event that the Department Head is being evaluated for tenure or promotion, the chair of the departmental RTP Committee or the Dean will communicate with the external reviewers.

External reviews will be delivered directly to the chair of the departmental RTP Committee.

FLOW CHART FOR EXTERNAL REVIEW PROCESS



IV.E.4 Quorum for RTP Committee's Tenure and Promotion Recommendations

A majority of the eligible voting faculty must be present for departmental RTP Committee votes on a candidate's tenure and/or promotion. This majority of the eligible voting faculty (i.e., both associate and full professors voting on candidates who seek promotion to the rank of associate professor, and only full professors voting on candidates who seek promotion to the rank of full professor) is considered the minimum requirement. Departmental bylaws may contain further policies on a quorum that is required for the departmental RTP Committee to make recommendations regarding tenure and promotion.

V Non-Tenure-Track Faculty

V.A Selection of New Faculty for Non-Tenure-Track Appointments

The College follows standard University hiring procedures when searching for both full-time and part-time non-tenure-track faculty. Because lecturers are full-time faculty, the Dean will interview all candidates for lecturer positions in the College.

V.B General Appointment Terms and Conditions

The appointment terms and conditions applicable to non-tenure-track faculty within the Department should be published in departmental bylaws. See Faculty Handbook, Section 4.2. For example, the level of participation allowed non-tenure-track faculty in departmental activities must be outlined in departmental bylaws.

V.C Evaluations of Non-Tenure-Track Faculty

Each department is responsible for establishing procedures in its bylaws the regular evaluation of non-tenure track faculty members within the department. See Faculty Handbook, Section 4.4.

V.D Non-Tenure-Track Faculty Rank Appointments/Promotions

The College may hire non-tenure-track teaching faculty members for specific teaching assignments. Ordinarily, our non-tenure track colleagues are not expected to engage in research, scholarly productivity, or creative activity. Some of non-tenure-track faculty are, however, expected to participate in service as a condition of employment.

The University and the College use the following ranks or titles for Teaching appointments:

Lecturer: This rank is for those who hold the appropriate degree for their discipline (or its professional equivalent) and who are appointed for full or part-time teaching. All Teaching appointments at this rank will be made for a definite term of one year or less.

Associate Lecturer: Faculty members who have held Teaching appointments at the rank of Lecturer for a minimum of four (4) years may be considered for promotion to the rank of Associate Lecturer. Teaching appointments at this rank will be made for a definite term of up to three years.

Senior Lecturer: Faculty members who have held Teaching appointments at the rank of Associate Lecturer for a minimum of eight (8) years may be considered for promotion to the rank of Senior Lecturer. Teaching appointments at this rank will be made for a definite term of up to five years.

Distinguished Lecturer: This rank is for those Senior Lecturers who hold a degree appropriate to their discipline (or its professional equivalent) and who have demonstrated excellence in teaching. Tenured faculty members within the academic

department will evaluate and make recommendations for appointments to the rank of Distinguished Lecturer, in accordance with departmental and college bylaws.

Appointments are renewable subject to availability of funds, satisfactory performance, and staffing needs. Each Department shall establish the criteria and process for evaluating applications for promotion of departmental faculty members holding Teaching appointments, subject to the approval of the Dean and Provost. The departmental criteria and process for evaluating promotion decisions shall be published in departmental bylaws, and they must be consistent with the Faculty Handbook as well as expectations for excellence in teaching within the College. (See Section 4.7. of the Faculty Handbook for additional information.)

VI Documenting Success in Teaching and Advisement (for all faculty)

Documentation of effective teaching should attest to the quality of a faculty member's instruction. Such documentation may take many forms, including but not limited to the following.

- Student evaluations. Candidates may provide student evaluations of their teaching. Candidates may likewise ask their Department Head to review student evaluations over a period of years and write a summary of evident trends. Additionally, if the evaluations point to problems which have been resolved, i.e., improvements in teaching, the Department Head may wish to explain.
- Representative syllabi and/or assessments of course planning and structure with regard to courses taught. Candidates may include representative syllabi of courses taught for the first time and/or syllabi of courses taught for the first time by a new pedagogical method or a new delivery system (viz. online). Candidates may wish to annotate such syllabi in order to make clear those elements which they believe document a commitment to effective teaching.
- Peer or Department Head observations of classroom teaching. Candidates should invite their Department Head, a faculty mentor, and/or department colleagues to observe their classroom teaching. It is reasonable to expect the observer to provide a written evaluation of observed strengths and weaknesses, along with justification of the evaluation. Because all Departments in the College have departmental bylaws, candidates should follow departmental bylaws for teaching observations.
- Performance of students with regard to any appropriate outcomes measures (departmental examinations, external tests, etc.). Candidates may ask their Department Head to provide comparative student outcome results, if available. Otherwise, candidates are invited to discuss with their Department Head any means by which they may be better able to document student outcomes in their courses.
- Awards for teaching excellence. Candidates may wish to document nominations for and/or receipt of prestigious teaching awards. Effective documentation of such honors often depends on frank assessment by the Department Head of their relative significance.
- Participation in professional development activities related to teaching. Such activities may include both those candidates have attended individually and those candidates have attended with colleagues, e.g., the Instructional Excellence Retreat.
- Participation in on-campus, regional, or national curriculum development activities.
- Teaching philosophy or a statement on successful and effective teaching.
- Development and promulgation of innovative teaching materials and/or innovative teaching methods. Candidates may elect to include in the dossier examples of innovative teaching materials or narrative accounts of innovative teaching methods. It is good practice to discuss such content with colleagues and/or with the Department Head. It is likewise good practice to provide context for and explanation of those materials and methods. Candidates may ask their Department Head and/or colleagues to review this content in order to determine the appropriateness or necessity of such materials.
- Committee service directly related to the improvement of teaching.
- Receipt of instructional or curricular grants from external agencies (with information for each citation regarding title of project and nature of the accomplishments). Determining whether individual grants are better reported under teaching or research is not always easy. Candidates must not, however, double report this grant information. A brief note in one section indicating where fuller documentation of an activity may be found offers a means of avoiding this problem.
- Research and refereed publication in pedagogy or the scholarship of teaching and learning. The comment above on where to report is relevant here also.

VII Documenting Success in Research, Scholarship, and/or Creative Achievement (for all faculty)

Documentation of such success should attest to the quality of the candidate's scholarship, research, or creative achievement. Such documentation may take many forms, but it should always be clear what type of publication is included in the CV, i.e., monograph, edited collection, review essay, peer reviewed article, individually-authored article, creative work, screen play, etc. Such documentation may include the following.

- Books and monographs published (with bibliographic information for each citation). Including works not published in an attempt to make the dossier appear stronger in fact weakens the dossier. Candidates may describe unpublished works as "in progress" and seek independent evaluation of such work. If candidates are not providing copies of the publications themselves, complete and accurate citation information must be in the CV, including number of pages. Custom-published works merit inclusion, but care should be taken to distinguish such books from those which go through the traditional vetting, i.e., peer review, process.
- Articles published in refereed scholarly journals (with bibliographic information for each citation). Published statements of editorial policies provide effective documentation regarding the refereed status of a publication. Candidates may also include information about the acceptance rate of journals in which their articles appear.
- Reviews of books and monographs in the candidate's field.
- Other articles. Articles published through less formal processes (e.g., in academic newsletters, community bulletins, etc.) may offer valuable documentation of research, scholarship, and/or creative achievement. However, distinguishing clearly between refereed and non-refereed publications can enhance the credibility of the dossier. In general, candidates must take care not to mix genres of publications (e.g., including a poem or a column from a local newspaper among articles).
- Commissioned Research. Candidates may have conducted research in the discipline as part of a commissioned project and published the results. Be sure that any such efforts that result from paid consulting are so identified. Distinguishing clearly between research and scholarly or creative efforts for which a candidate is paid and those conducted independently will enhance the credibility of the dossier.
- Scholarly notes, reviews of scholarly books, etc. (with bibliographic information for each citation).
- Scholarly presentations (with information for each citation regarding the title of the presentation, the name of the organization sponsoring the meeting, the site of the meeting, and the date of the meeting). Correspondence with meeting organizers and program materials often will emphasize the competitive nature of the program for which a candidate is selected. Less formal presentations may offer valuable documentation of research or may be included more appropriately under the categories of teaching or service. Distinguishing clearly between refereed and non-refereed presentations can enhance the credibility of the dossier.
- Receipt of basic or applied research grants from external agencies (with information for each citation regarding the title of the project, the agency from which the grant was obtained, and the term of the grant).
- Submission of a substantive research report or creative project to an external sponsor or entity.
- Authorship of grant proposals. Candidates may be the Principal Investigator and likely the lead author on individual and/or group grants. Even when the grant has an instructional or service orientation, the basic work of authoring a grant proposal, particularly where it requires significant investigation, can itself be considered a contribution to research or creative activity.

- Citations of research, scholarship, or creative activity in other works published. Even a modest reference may suggest the influence of a candidate's work on the candidate's field.
- UTC awards, grants, and fellowships for research, scholarship, and creative activity.
- External awards, grants, and fellowships for research, scholarship, and creative activity. Do not neglect to mention modest grants from local foundations, state agencies, and organizations, so long as the received support indicates recognition of your professional expertise.
- Recitals, art exhibitions, creative and/or dramatic performances (with information for each citation regarding publication, sites, dates, and whether the activity was invited or juried, local, regional, national or international). Candidates may explore means of obtaining reactions that go beyond local notoriety.
- Critical reviews of the candidate's recitals, art exhibitions, creative works, etc. Candidates may ask their Department Head to invite critics to observe their work.
- Electronic publication. Scholarly work is scholarly work, regardless of the medium in which it is published. As is the case with print publications, candidates must be careful to contextualize and identify their published works as peer-reviewed/refereed or not. That is, the same care must be given to citation and documentation for electronic publications that we have come to expect for print publications.

VIII Documenting Success in Service (for all faculty)

Supporting documentation of success in service should attest to the quality of the service performed by the candidate consistent with a) her or his professional expertise and b) her or his role in the department, the College, and/or the University communities. Such documentation may include the following.

- Receipt of public service grants from external agencies (with information for each citation regarding title of project, the granting agency, and the term of the grant).
- Successful completion of external public service assignments (with information for each citation regarding title of project and the nature of the accomplishments).
- External assessments of candidate's public service activity.
- UTC awards and grants for public service activity.
- Citations of public service in works of research or scholarship.
- External awards, grants, and fellowships for service activity.
- Service in campus governance (with information for each citation regarding offices held and assignments completed).
- Assessments of institutional service. Candidates may request of committee chairs and colleagues written evaluations of the candidate's contributions to a committee in instances where such contributions exceed the norm.
- Public service that aligns with a candidate's professional expertise. Although candidates should not cite activities which have no relation to their academic assignment, candidates should not neglect activities which reflect their expertise.

IX Ratification and Amendments of the Bylaws

IX.A Ratification

The College may ratify these bylaws with approval of two-thirds of the voting faculty casting a ballot at a business meeting of the College. If ratified by the voting faculty, these bylaws must be approved by the Dean and Provost before the bylaws may become effective. These bylaws shall go into effect upon the first day of the next full calendar month after ratification by the voting faculty, subject to their approval by the Dean and Provost.

IX.B Amendments

IX.B.1 Proposal

The Dean may propose an amendment to these bylaws, often after consultation with the Executive Committee of the College.

Alternatively, a group of at least a dozen voting faculty in the College may propose an amendment to these bylaws, provided those voting faculty represent at least four Departments housed within the College. Any such amendment must be delivered as a written document to the Dean, who must share the amendment with the Executive Committee.

IX.B.2 Distribution

The Dean shall distribute any duly proposed amendment for consideration by the full voting faculty of the College.

IX.B.3 Voting

At the next business meeting of the College which takes place at least ten (10) working days after the distribution of the amendment, the full voting faculty will consider the proposed amendment. If at least two-thirds of the voting faculty casting a ballot at that meeting approve the amendment, then it shall be forwarded to the Dean and Provost for review and approval. An amendment shall go into effect upon the first day of the next full calendar month after approval by the voting faculty, subject to their approval by the Dean and Provost.

Appendix 4-C
Departmental Bylaws

Department of Biology, Geology, and Environmental Science
University of Tennessee at Chattanooga

Approved August 1, 2022

Table of Contents

I.	INTRODUCTION.....	4
II.	DEPARTMENTAL MEETINGS, VOTING, AND MEMBERSHIP	4
A.	Frequency of Meetings	4
B.	Voting Procedures	4
C.	Voting Membership	4
D.	Adoption and Amendment of Departmental Bylaws	5
E.	Curricular and Key Programmatic Changes	5
III.	DEPARTMENTAL COMMITTEES.....	6
A.	Standing Committees.....	6
B.	Ad hoc Committees.....	7
IV.	HIRING	8
A.	Faculty Searches	8
1.	Search Committee Composition.....	8
2.	Search Procedures	8
B.	Department Head Searches.....	8
1.	Department Head Search Committee Composition.....	8
2.	Department Head Search Procedures	8
C.	Staff Searches	9
1.	Staff Search Committee Composition	9
2.	Staff Search Procedures.....	9
V.	PEER MENTORING	10
A.	Peer Review of Faculty Instruction	10
B.	Peer Mentoring of New Faculty.....	10
VI.	REAPPOINTMENT, PROMOTION, AND TENURE OF TENURE-TRACK FACULTY AND EDO EVALUATIONS OF FULL-TIME FACULTY	
	11	
A.	Reappointment, Tenure, and Promotion of Tenure-Track Faculty.....	11
1.	Standard Format for RTP Folder and Dossier for Tenure-Track Faculty.....	11
2.	Reappointment of Tenure-Track Faculty	13
3.	Tenure and Promotion of Tenure-Track Faculty.....	14

4.	External Review Process for Promotion and Tenure	23
5.	Departmental Tenure Recommendations.....	23
B.	Evaluation and Development by Objectives (EDO).....	23
VII.	EVALUATIONS OF NON-TENURE-TRACK FACULTY	24
A.	Reappointment and Promotion	25
1.	Standard Format for Non-Tenure-Track Faculty Reappointment and Promotion Materials	25
2.	Reappointment of Non-Tenure-Track Faculty	27
3.	Promotion of Non-Tenure-Track Faculty	28
4.	Departmental Non-Tenure-Track Faculty Recommendations	33
VIII.	EVALUATION OF ADJUNCT FACULTY	34

I. INTRODUCTION

The Department of Biology, Geology, and Environmental Science ("BGE" or "Department") has established these bylaws ("Bylaws") that serve to mediate fair understanding of procedures and policies among faculty and staff at the University of Tennessee at Chattanooga ("UTC"). Our unified department maintains and promotes disciplinary identities and strengths in the areas of Biology, Geology and Environmental Science. These Bylaws govern the Department within the College of Arts and Sciences ("CAS") at UTC. If any policy or procedure in these Bylaws should be found to conflict with policies or procedures of (1) CAS, (2) UTC, or (3) the University of Tennessee Board of Trustees, the higher level policies and procedures shall take precedence.

II. DEPARTMENTAL MEETINGS, VOTING, AND MEMBERSHIP

A. Frequency of Meetings

Departmental faculty and staff meet approximately biweekly during fall and spring semesters. The Department Head may cancel meetings if there is no business or may schedule additional meetings if needed.

B. Voting Procedures

1. Voting will typically take place during departmental meetings.
2. At least two-thirds (>67%) of the voting membership shall constitute a quorum.
3. A majority vote (>50%) by a quorum will be sufficient to carry a measure.
4. When necessary due to time constraints and/or upcoming CAS or University deadlines, the Department Head and/or faculty may allow proxy voting or electronic voting, except where prohibited by University policy. Circumstances under which proxy or electronic voting may be allowed include:
 - a. A faculty member is unable to attend a meeting.
 - b. An issue was discussed at a faculty meeting, but no vote was taken because additional information is needed.
 - c. An issue that requires a response arises when classes are not in session.
 - d. A majority of faculty have met face-to-face and discussed the issue.
 - e. Circumstances make it impossible or inconvenient to meet.
 - f. There is nothing to be gained by meeting in person.
 - g. Issues that do not require a vote by the full faculty (e.g., departmental committees).
5. For matters for which University policy requires that an anonymous vote be taken, votes shall be cast anonymously by written ballot.
6. Notwithstanding any provision in this Section I. to the contrary, the membership and voting procedure requirements applicable to the departmental Reappointment, Tenure and Promotion (RTP) Committee under the Faculty Handbook apply.

C. Voting Membership

1. Tenured faculty, tenure-track faculty, full-time non-tenure-track faculty, faculty associates, laboratory coordinators, and professional advisors may vote on curricular issues, degree requirements, programs, bylaws, annual performance review standards, scholarships and awards, allocation of resources, hiring, etc.
2. Tenured faculty may vote on issues related to termination of tenured faculty for adequate cause, promotion, tenure, and reappointment (when necessary) of tenure-track faculty and non-tenure-track faculty if assigned to the Non-Tenure-Track Reappointment and Promotion Committee (NTTRP). Only tenured faculty holding at least the rank to which a tenure-track candidate seeks promotion are eligible to consider an applicant's request.
3. Lecturer faculty holding the rank of Associate Lecturer, Senior Lecturer or Distinguished Lecturer and tenured faculty serving on the NTTRP Committee may vote on issues related to promotion of non-tenure-track faculty. Only lecturers holding at least the rank to which a candidate seeks promotion are eligible to consider an applicant's request. The NTTRP Committee will consist of all Lecturer faculty holding the rank of Associate-, Senior- or Distinguished Lecturer and two tenured faculty, one appointed by the Department Head and another appointed by the co-chairs of the RTP Committee. The chair of the NTTRP Committee will be a Senior or Distinguished Lecturer appointed by the Department Head.
4. Phased retirement faculty, retired faculty, and part-time faculty do not have voting rights, but they are welcome to attend meetings and are invited to participate in an advisory capacity.
5. Temporary suspension of a voting procedure or membership policy must be supported by at least three-fourths (>75%) of the voting membership.

D. Adoption and Amendment of Departmental Bylaws

Adoption and amendment of these Bylaws requires a vote to adopt/amend by at least two-thirds (>67%) of a quorum of the voting membership. The normal departmental voting requirements of a simple majority (>50%) of a quorum of the voting membership do not apply to votes to adopt or amend these Bylaws. Amendments to these Bylaws will become effective only upon approval of the CAS Dean and Provost.

E Curricular and Key Programmatic Changes

Prior to open department discussion and voting on curricular changes, the faculty who have expertise in the relevant discipline will be given an opportunity to provide input on the proposal at hand. After that, the discussion will be opened up to the full Department and motions can be made.

Curriculum proposals for courses and/or major program changes that are exclusively of consequence to that program and do not affect other programs in the Department must receive a majority of votes by the faculty in that discipline. The results of that vote will be presented as an information item to the department faculty.

III. DEPARTMENTAL COMMITTEES

The Department has multiple standing committees and creates ad hoc committees as needed. Each year, the Department Head requests committee preferences and then assigns faculty to committees and identifies committee chairs – except for the Reappointment, Tenure, and Promotion (RTP) Committee, which consists of all tenured Departmental faculty members except the Department Head and whose chair is elected by members of the RTP Committee.

A. Standing Committees

Currently, the Department has 22 standing committees (described in the following table).

Committee	Purpose of committee
AIPG Committee	Maintains relationships and coordinates activities with student group American Institute of Professional Geologists (AIPG)
Assessment and Retention	Develops annual outcomes and compiles annual assessment reports for BGE's four academic programs
Curriculum Planning	Develops and monitors undergraduate and graduate curricula; assists faculty in the preparation of curriculum proposals; advises the Department on curriculum proposals
Departmental Honors Committee	Sets guidelines for and manages review of departmental honors thesis proposals
Development	Manages fundraising initiatives and development activities in coordination with relevant UTC offices
EDGE Advisory	Maintains relationships and coordinates activities with student environmental group EDGE
Equipment	Assesses current and future equipment needs and develops short- and long-range priority lists
Field Station	Oversees use, maintenance, and development of field stations
Geology Club	Maintains relationships and coordinates activities with Geology Club student group
Graduate	Makes decisions regarding admission to the MS Environmental Science program; makes recommendations to full BGE faculty concerning curriculum, policies, and procedures
Hiring Planning	Assesses existing and future needs to hire departmental faculty and staff; recommends discipline-specific hires to sustain and improve BGE programs
Natural History Museum	Oversees use, maintenance, and improvement of museum collections of plants, fungi, and animals
Newsletter and Public Relations	Develops and coordinates BGE newsletter and organizes public relations activities of the Department
Non-Tenure-Track Reappointment and Promotion Committee	Reviews NTT faculty portfolios and makes recommendations for reappointment and promotion. Composed of two tenured representatives and all Associate, Senior and Distinguished Lecturers

Pre-Professional Advisory	Advises pre-professional students; arranges recruitment visits; keeps records concerning student acceptance rates

Reappointment, Tenure, and Promotion	Reviews faculty dossiers and makes recommendations for reappointment, tenure, and promotion. Composed of all tenured faculty members, except the Department Head
Schedule	Schedules classes; develops and implements procedures for ensuring BGE's instructional effort is equitably divided
Space Planning	Assesses current and future space needs of BGE; recommends allocation of space for Department
Strategic Plan	Develops, revises, and leads assessment of BGE Strategic Plan
Student Awards & Relations	Recommends students for annual awards, scholarships, and recognition; develops faculty-student events that connect students to the Department
Tri-Beta Advisory	Maintains relationships and coordinates activities of Department's honor society, Beta Beta, Beta
Wildlife Zoology Club	Maintains relationships and coordinates activities with student wildlife group
WINS	Maintains relationships and coordinates activities with Women in the Natural Sciences (WINS) student group

B. Ad hoc Committees

The Department Head may create ad hoc committees as needed, and assign faculty to serve on these committees. The Department Head will consider faculty work load, interest, and expertise when making ad hoc committee assignments.

IV. HIRING

All BGE search committees must follow all applicable procedures and requirements of CAS, the Office of Equity and Inclusion (OEI), the Faculty Handbook, Human Resources, the University, and the University of Tennessee System.

A. Faculty Searches

1. Search Committee Composition

Faculty search committees are established by the Department Head, subject to the following principles: (1) all or some members of the committee will have substantive knowledge of the discipline that the position involves; and (2) the committee will be diverse to the extent possible with regard to factors such as rank, gender, ethnicity, and race. Search committees are normally composed of faculty in BGE; however, an outside person might be added to the committee if the Department Head and faculty believe it would enhance the ability of the committee to assess candidate qualifications. Faculty members not assigned to the search committee are welcome to participate in the review of applicants.

2. Search Procedures

Initial candidate evaluations and virtual interviews are conducted by the search committee. The full Department will have the opportunity to: (1) provide input regarding candidates who are selected for on-campus interviews; (2) participate in on-campus interviews; and (3) provide input into the final ranking of candidates recommended for hiring.

Appointments to tenure-track positions should satisfy relevant Faculty Handbook criteria for appointment to faculty rank (Section 3.2.1 of Faculty Handbook) and criteria in these Bylaws for tenure and promotion.

B. Department Head Searches

1. Department Head Search Committee Composition

Department head search committees are established by the CAS Dean with the advice and input of BGE, subject to the following principles: (1) committee will be composed primarily of faculty from the Department; (2) committee will be diverse to the extent possible with regard to rank, gender, ethnicity, and race; and (3) committee will include a sitting or former head of another department that is acceptable to the CAS Dean.

2. Department Head Search Procedures

The Department Head is supervised and evaluated by the CAS Dean. Therefore, the CAS Dean takes an enhanced role in determining the search process and selection and appointment of the Department Head, and specific procedures for department head searches are determined by the CAS Dean and upper-level administrators. Regardless of the specific process, a successful candidate must have strong support of both the CAS Dean and BGE faculty and staff. These requirements apply to external and internal department head searches.

C. Staff Searches

1. Staff Search Committee Composition

Staff search committees are established by the Department Head, subject to the following principles: (1) the committee will include departmental administrators and staff with substantive knowledge of the duties of the staff position; (2) the committee will include at least one regular faculty member; and (3) the committee will be diverse to the extent possible with regard to rank, gender, ethnicity, and race. The Department Head typically serves as chair of staff search committees.

2. Staff Search Procedures

Candidate evaluations, interviews, and final recommendations for hiring are made by the search committee. The search committee will keep the faculty informed of its progress during the search.

V. PEER MENTORING

A. Peer Review of Faculty Instruction

The Department's peer review of instruction program is intended to assist new tenure-track and non-tenure-track faculty in improving the quality of their teaching. Two (2) members of the RTP Committee will observe a lecture and a laboratory (where applicable) of each faculty member every semester until all regular course preparations have been evaluated or for a minimum of two years. Each evaluator submits a written report (BGE Peer Evaluation of Instruction Form) to the faculty member for each lecture and each lab reviewed. The report is included in the faculty member's yearly evaluation materials (i.e. with their EDO Performance Report), as well as in the tenure and promotion materials for tenure-track faculty.

B. Peer Mentoring of New Faculty

All new tenure-track and non-tenure-track faculty members will be assigned a faculty mentor. The duties of the mentor are to answer questions and provide guidance on a range of topics including professional development, teaching effectiveness, departmental issues, and RTP procedures. The Department Head will inform new faculty members of their mentor assignment in writing no later than the second week of their first semester at UTC. The faculty member has the right to request, in writing, a new faculty mentor.

VI. REAPPOINTMENT, PROMOTION, AND TENURE OF

TENURE-TRACK FACULTY AND EDO EVALUATIONS OF FULL-TIME FACULTY

The UTC Faculty Handbook and CAS Bylaws address faculty reappointment, tenure, promotion, and annual evaluation. Generally, faculty performance is evaluated within the Department by two distinct but complimentary processes: (1) review by tenured faculty serving on the RTP Committee and review by the Department Head; and (2) review by annual EDO by the faculty member and Department Head.

RTP Committee discussions and deliberations of departmental colleagues are confidential and should be treated as such. That is, RTP Committee discussions and deliberations of candidates must not be shared with anyone outside of the RTP Committee members who actively participated in the candidate's review, including sharing information with candidates. If the committee decides it is necessary to communicate with a faculty member concerning his or her candidacy, the communication should be done by the RTP Committee chair(s).

These Bylaws: (1) expand upon Faculty Handbook and CAS criteria for reappointment, tenure, and promotion of tenure-track faculty; (2) include criteria and a process for reappointment of non-tenure-track faculty; and (3) address the annual EDO review, which is required for all full-time faculty members, regardless of appointment classification.

A. Reappointment, Tenure, and Promotion of Tenure-Track Faculty

1. Standard Format for RTP Folder and Dossier for Tenure-Track Faculty

RTP Folder – The RTP folder consists of a folder that contains the “UTC Reappointment Folder Checklist” (for annual reappointment) or the “UTC Tenure/Promotion Folder Checklist” (for promotion and/or tenure) followed in order by the materials identified in the checklist.

Dossier – The dossier is a comprehensive collection of materials that document faculty activities and accomplishments in all areas of faculty responsibility. The UTC Faculty Handbook contains the following language concerning the dossier:

All tenure candidates must prepare and submit a tenure dossier, which will be reviewed and inform the recommendations made at each stage of the tenure review process. The dossier is standard to the extent that it describes the way in which the candidate has met each of the respective criteria for tenure as listed in this Handbook. The departmental bylaws shall contain a statement of the required contents of the tenure dossier that is consistent with the Faculty Handbook and with applicable college bylaws, unless the dean and the Provost have approved the department's application of tenure dossier requirements established in college bylaws.

The dossier should include a preface that must contain a Curriculum Vita (CV) describing the candidate's education and experience (both prior to coming to UTC and while at UTC) and a one-page executive summary of the same. In addition, the preface to the dossier may contain a summary of the candidate's EDO evaluations. The dossier should be divided into the three distinct components based on the three performance areas outlined in the EDO: (1) teaching and advising; (2) research, scholarship and creative activities; and (3) professional service to the University, profession, and community. The respective components of the dossier should include all documentation for and evidence of activities related to, respectively, the teaching, research, and service in which the candidate has engaged since the candidate's initial appointment at UTC. A teaching philosophy and a record of Student Ratings of Faculty for the candidate must be included in the dossier. Other materials should be included at the discretion of the candidate, and, if possible, on the advice of the departmental RTP Committee. The departmental bylaws shall set forth information pertaining to appropriate activities of faculty members in the academic department for each of the three areas of professional responsibility.

These Bylaws expands the minimum dossier requirements of tenure-track faculty under the UTC Faculty Handbook. First, all probationary tenure-track faculty applying for reappointment should submit both the RTP Folder and a dossier annually. Within the Department, these documents will be reviewed by the RTP Committee and the Department Head (discussed below under "Reappointment"). Second, the Department expands the required content of tenure-track faculty dossiers, which shall contain, at a minimum, the following elements/sections and be arranged in the following order:

- (1) Brief cover letter addressed to departmental RTP Committee;
- (2) Title page including faculty name, rank, and date of dossier submission;
- (3) Table of contents;
- (4) One-page narrative of accomplishments;
- (5) Updated CV;
- (6) Summary of EDO evaluations;
- (7) Teaching and Advising section including:
 - a. Summary of courses taught
 - b. Student teaching evaluations
 - c. Candidate commentary on student evaluations
 - d. Peer-teaching evaluations (for tenure and promotion to Associate Professor)
 - e. Candidate commentary on peer-teaching evaluations

- f. Discussion of student advising activities
 - g. Discussion of student research mentoring;
- (8) Research, Scholarship, and Creative Activities section including (listings of most recent to oldest works):
- a. Peer-reviewed publications
 - b. Book chapter or book publications
 - c. Non-peer-reviewed publications
 - d. Technical reports submitted (e.g., final reports for research grants)
 - e. Invited oral presentations at conferences, other universities, etc.
 - f. Oral/poster presentations at professional conferences
 - g. External and internal grants/contracts awarded
 - h. External and internal grants/contracts pending or declined;
- (9) Professional Service section including record of:
- a. Service to Department or University
 - b. Professional service to one's discipline
 - c. Public service to the community;
- (10) Collegiality statement and evidence demonstrating candidate's ability to relate effectively to students and professional colleagues.

2. Reappointment of Tenure-Track Faculty

The UTC Faculty Handbook contains the following language concerning the reappointment review process of probationary, tenure-track faculty:

In each year of the tenure-track faculty member's probationary period in which the faculty member is subject to consideration for reappointment, the department head is responsible for the careful evaluation of the faculty member in determining whether to recommend reappointment of the faculty member for the following year. Departments may elect to require that the departmental RTP Committee perform the initial evaluation and recommendation on reappointment in each year of the faculty member's probationary period and provide such recommendation to the department head. To the extent a department elects to do so, the department must include such a requirement in its departmental bylaws.

In order to provide probationary tenure-track faculty members with regular,

constructive feedback from the RTP Committee, the RTP Committee will perform the initial evaluation and recommendation regarding reappointment in each year of the faculty member's probationary period. As such, tenure-track faculty applying for reappointment should submit both the RTP Folder and a dossier annually. Within the Department, these documents will be reviewed by the RTP Committee and the Department head. Specifically, the RTP Committee will review and evaluate the faculty member's progress towards tenure and provide the Department Head with a written evaluation of the faculty member's progress toward tenure and include a recommendation for or against reappointment. Upon receipt of the RTP Committee's evaluation, the Department Head will conduct an independent review of the reappointment documents and submit his or her written recommendation for or against reappointment to the CAS Dean along with the RTP Committee's evaluation and recommendation. The reappointment review otherwise follows the process at the CAS Dean and Provost levels described under Section 3.7.1. of the UTC Faculty Handbook.

In a tenure-track faculty member's mid-probationary review year (i.e., typically the third year of the probationary period), the RTP Committee shall conduct a full review and evaluation (Enhanced Tenure-Track Review or ETTR) of the faculty member's progress towards tenure. The RTP Committee shall provide to the Department Head a written report that will contain a list of the participating tenured faculty members; suggestions for enhancing the faculty member's progress toward tenure; the majority and minority report, if applicable; the summary anonymous vote on whether the faculty member is progressing satisfactorily toward the grant of tenure; and a recommendation for or against reappointment. Upon receipt of the RTP Committee's report, the Department Head will present and discuss with the faculty member the RTP Committee's report, as well as the Department Head's own written assessment, and develop a plan to address suggested enhancement from the RTP Committee. Copies of the ETTR documents will be given to the faculty member.

After meeting with the faculty member, the Department Head shall submit his or her written recommendation for or against reappointment to the CAS Dean along with the RTP Committee's report and recommendation. The reappointment review for the faculty member's mid-probationary review year otherwise follows the process at the CAS Dean and Provost levels described under Section 3.7.1. of the UTC Faculty Handbook.

3. Tenure and Promotion of Tenure-Track Faculty

The UTC Faculty Handbook provides the following guidelines regarding tenure:

The criteria for appointment and reappointment reflect the basic elements for tenure consideration; however, a positive recommendation for tenure requires demonstrated excellence in performance. Expectations necessarily vary within the respective disciplines of faculty members and in light of the

differing ranks of faculty members. The natures of disciplines are such that they emphasize differing levels of performance and differing mixes and types of research and service. Consequently, the tenured faculty members in the disciplines in which tenure-track faculty members work will recommend the standards, degrees of emphasis, and the appropriate types of research and service required for tenure. The individual standards and criteria for tenure for each academic department must be explicitly laid out in the bylaws of the academic department.

A faculty member, at a minimum, must meet the following criteria necessary for the rank of Associate Professor in order to be granted tenure:

- (1) have a doctorate degree or other terminal degree in his or her discipline or present equivalent training and experience;
- (2) have achieved a reputation as an accomplished teacher;
- (3) have achieved a good record in research, scholarly, or creative activities;
- (4) have an established record of effective participation in professional activities other than teaching and research;
- (5) have demonstrated ability to relate appropriately to students and professional colleagues; and
- (6) have demonstrated excellence in at least one of the three areas of responsibility (i.e., teaching, service, and research) required for full-time faculty status.

An academic department may also establish more specific criteria for tenure in that academic department, subject to the approval of the dean and Provost. After approval by the dean and Provost, the specific criteria for tenure of an academic department shall be published in the bylaws of the academic department. The specific tenure criteria for an academic department shall include and be consistent with the criteria stated in Board policy and the Faculty Handbook as well as any criteria established by the college within which the academic department resides.

The UTC Faculty Handbook provides the following guidelines regarding promotion:

Promotion is recognition of promise and a sign of confidence that a faculty member is capable of greater accomplishments and of assuming greater

responsibilities within UTC. The policy of UTC is to make promotion decisions objectively, equitably, impartially and strictly on the basis of merit.

At UTC, promotion is usually tied to tenure for tenure-track faculty members, as application for tenure is usually linked to application for promotion from the rank of Assistant Professor to the rank of Associate Professor. A tenure-track faculty member at the rank of Assistant Professor must be granted tenure in order to be promoted to the rank of Associate Professor. A tenure-track faculty member initially appointed at the rank of Associate Professor or higher may be granted tenure without receiving a promotion.

Faculty members who wish to be promoted should meet the expectations of the new rank as outlined in the criteria for appointment to rank.

Regarding the rank of Professor, the UTC Faculty Handbook notes the following:

A Professor is expected to:

- (1) have a doctorate degree or other terminal degree in his or her discipline or present equivalent training and experience;
- (2) have achieved and maintained a reputation as an accomplished teacher;
- (3) have achieved and maintained a significant record in research, scholarly or creative activities;
- (4) have achieved and maintained a significant record of effective participation in professional activities other than teaching and research;
- (5) have demonstrated an ongoing ability to relate appropriately to students and professional colleagues; and
- (6) have demonstrated excellence in at least two of the three areas of responsibility (i.e., teaching, service, and research) required for full-time faculty status.

In BGE, we value the diverse strengths of our faculty and the varied needs of our programs. We therefore recognize that faculty in BGE will differ in their work assignments and the relative amount of professional effort devoted to teaching, research, and service. Thus, when evaluating faculty for tenure and/or promotion, the RTP Committee and Department Head shall consider a faculty member's teaching, research, and service assignments. Faculty members should document or describe their relative teaching, research, and service

assignments in their dossier and in their annual EDO reports. For example, BGE faculty who teach more than three (3) preparations, more than ten (10) contact hours, and/or at least double the Delaware norm for student credit hours in a given semester (fall or spring), would be considered as having a higher than average teaching load. Faculty who have higher than average teaching or service assignments should describe their allocation of effort to teaching, research, and service in relation to their work assignments. Likewise, faculty who have lower than average teaching or service assignments (e.g., due to release or reassignment related to grant or publication preparation, managing grants, administrative appointments, teaching and learning fellowships, leaves) should also describe their allocation of effort to teaching, research, and service in relation to their work assignments.

In order to align Departmental and UTC policy, BGE focuses its tenure and promotion evaluations on the following areas: (1) teaching, advising, and mentoring; (2) research/scholarly; (3) service; and (4) collegiality. The tenure and promotion criteria are defined below. As mentioned in the UTC Faculty handbook, a faculty member applying for tenure and promotion to Associate Professor, at a minimum, must have demonstrated excellence in at least one of the three areas of responsibility (i.e., teaching, service, research). A faculty member applying for promotion to Professor, at a minimum, must have demonstrated excellence in at least two of the three areas of responsibility (i.e., teaching, service, research). All faculty applying for tenure or promotion are also expected to have demonstrated collegiality while at UTC. In BGE, faculty are eligible to be promoted to Professor after serving as an Associate Professor for a minimum of five (5) years; that is, faculty in BGE can apply for promotion to Professor while in their fifth year as an Associate Professor in order to be promoted to Professor six years following promotion to Associate Professor.

- a. Teaching, Advising, and Mentoring** – In BGE, evidence of having “achieved a reputation as an accomplished teacher” means the candidate must become an effective teacher at UTC. In BGE, having “achieved and maintained a reputation as an accomplished teacher” means that the candidate has an established and respected reputation as an effective teacher at UTC. BGE considers faculty performance in the classroom, student advising, and research mentoring in the evaluation of teaching performance.

Teaching – A faculty member, at a minimum, must meet the following teaching requirements to be considered for tenure and/or promotion:

- (i) Student evaluation results with median scores of 5.0 or greater for all Course Content and Delivery and Course Instruction questions (scale of 0-7 with 7 being best) on average during the three (3) years prior to tenure consideration.
- (ii) A majority of peer-evaluation ratings of “very good” or “excellent” during the

last two semesters of peer evaluations.

- (iii) Evidence of responding positively to reasonable criticisms offered through student and peer evaluations, by showing a willingness to change and improve.

To demonstrate excellence in teaching, a candidate for tenure and/or promotion must also provide additional evidence of teaching commitment and success. Evidence of excellence in teaching can be demonstrated by some combination of the following: regular student teaching evaluations with median scores greater than six (6); nomination and/or receipt of teaching awards; high quality teaching materials; evidence of updating and developing new courses; unsolicited positive feedback from former students; use or development of innovative teaching methods (e.g., flipped classrooms; experiential learning; recitation section); participation in teaching development workshops or fellowships; authorship on lab manuals; authorship on a textbook; other comparable activities.

Candidates applying for promotion to Professor must also provide evidence demonstrating that they have maintained an established and respected reputation as a teacher.

Advising – A faculty member, at a minimum, must meet the following advising requirements to be considered for tenure and/or promotion:

- (i) Offering sufficient opportunities for student advising, based on CAS and Departmental expectations for availability.
- (ii) A record of maintaining regular, posted office hours.

To demonstrate excellence in advising, a candidate for tenure and/or promotion must also provide additional evidence of advising commitment and success. Evidence of excellence in advising can be demonstrated by some combination of the following: service on advising-related committees; nomination or receipt of CAS, University, or external advising award(s); other comparable activities.

Research Mentoring – A faculty member, at a minimum, must meet the following research mentoring requirements to be considered for tenure and/or promotion:

- (i) Meaningful involvement of an average of one (1) undergraduate or graduate student in research per semester after the first year of employment at UTC. This may include any student participating in an independent study/research course (BIOL/ESC/GEOL 4995, 4997, 4998; GEOL 4800, 4900; ESC 5997, 5998, 5999) and/or involved in the experimental design, collection of data, analysis or manuscript preparation, or curatorial/data archiving work.
- (ii) Complete at least three (3) of the following activities: serving as committee chair for an undergraduate honors student or a graduate student; serving as a committee member for an undergraduate honors student or a graduate student; sponsoring student presentations at meetings; sponsoring grant proposal

submissions by students; awards for faculty sponsored student presentations at meetings; student publications in student or in regional, national or international peer reviewed journals; supervising additional students in meaningful research activities beyond the minimum listed above; other comparable activities.

To demonstrate excellence in research mentoring, a candidate for tenure and/or promotion must also provide additional evidence of research mentoring commitment and success. Evidence of excellence in research mentoring can be demonstrated by some combination of the following: meaningful involvement of an average of more than one undergraduate or graduate student in research per semester; completing more than the minimum number of activities listed above; other activities that reflect excellence in research mentoring.

b. Research and Scholarly Competence -- In BGE, evidence of having “achieved a good record in research, scholarly, or creative activities” means the tenure and promotion candidate must establish an independent and externally recognized research program that involves students at UTC. In BGE, having “achieved and maintained a good record in research, scholarly, or creative activities” means the promotion candidate has established an independent and nationally or internationally recognized research program that involves students at UTC. To be considered for tenure and/or promotion, at a minimum, the following criteria must be met:

- (i) Ongoing research activity: A candidate for tenure and/or promotion must provide evidence of ongoing and productive research activity. The Department values and encourages collaboration. However, all candidates for tenure and/or promotion must develop and successfully lead their own research program, regardless of whether their research program involves collaboration.
- (ii) Three (3) full-length peer-reviewed original research papers published in discipline-appropriate journals (i.e., journals related to the candidate’s area of expertise) and/or maps published by a government agency. One paper or map may be in press at the time of the candidate’s review. For papers, at least one (1) must be published in a national or international journal. A peer-reviewed book chapter may be substituted for one of the three required papers or maps.
- (iii) Externally-funded research grant submissions. A candidate for tenure and/or promotion should be lead PI or co-PI on at least two externally submitted grant pre-proposals or full proposals. If co-PI, a substantial portion of the grant activities and budget must focus on the candidate’s research program. Note: funding of these grants is not a minimum requirement for tenure or promotion consideration.
- (iv) Three (3) presentations given by the tenure or promotion candidate at professional meetings or institutions other than UTC, one of which must be national or international, if funding is available.

To demonstrate excellence in research, a candidate for tenure and/or promotion must also provide additional evidence of research commitment and success. Evidence of

excellence in research can be demonstrated by some combination of the following: presentations at a conference or academic institution other than UTC beyond the minimum requirement stated above; peer-reviewed full-length publications in discipline-appropriate journals, peer-reviewed maps published by a government agency, and/or book chapters in a research book or volume beyond the minimum requirement stated above; editor or co-editor of a scholarly book (not professional editing for service) or an invited special feature or proceedings in a peer-reviewed journal; author or co-author of a research-based book (does not include lab manuals); book review in a peer-reviewed journal; PI on a funded grant from an in-house (intramural) competition (e.g. Faculty Development Grant); author of short publication in a regional, national or international journal (e.g., research note, short commentary, or species list); plenary presentations at scientific conferences; PI or co-PI on a funded research grant; peer-reviewed conference proceedings; other examples of scholarly productivity (e.g. technical report of a finished research project submitted to a granting agency).

When demonstrating excellence in research, it is the candidate's responsibility to provide evidence of the level of quality, effort, peer review, and potential impact of the activities listed above to the RTP Committee and Department Head. Candidates applying for promotion to Professor must additionally describe and provide evidence that they have achieved a national or international reputation as a scholar in their field.

The Department recognizes that some faculty members may have relatively large teaching or service assignments that affect their ability to be research active. Thus, it is important that the Department allow for some flexibility in tenure and promotion expectations for research. The Department will consider the following alternatives to the stated minimum requirements for research above:

- (i) Tenure-track faculty members with higher than average teaching or service loads (e.g., >10 contact hours, >3 preps per semester, and/or more than double the Delaware norm for student credit hours or large administrative assignments) will not be deemed ineligible for tenure or promotion if they fail to meet the minimum requirements outlined above.
 - (ii) A tenure-track faculty member who does not seek external funding to sustain a research program can substitute a grant submission with one (1) additional full-length research publication in a peer-reviewed journal or one (1) additional peer-reviewed map published by a government agency (resulting in an expectation of 4 papers or maps).
- c. **Service** – In BGE, having “achieved a significant record of effective participation in professional activities other than teaching and research” or “achieved and maintained a significant record of effective participation in professional activities other than teaching and research” involves providing service that supports the University mission as an engaged metropolitan university and the research mission of the Department. Candidates for tenure and promotion are expected to actively participate in Departmental committees as assigned by the Department Head as well as provide

service to the University, community, and their profession. At a minimum, candidates for tenure and/or promotion should meet the following requirements:

- (i) Departmental service: Tenure-track faculty members are expected to actively serve on the Departmental committees that they are assigned to each year; the actual number of committee assignments will depend on Departmental needs and number of faculty in the Department.
- (ii) University and Discipline-Appropriate Community Service: Each faculty member will provide service to UTC and the community/region as appropriate given their professional expertise. Candidates for tenure or promotion are expected to participate in a minimum of two (2) University or discipline-appropriate community service activities on average per year. Examples of potential University and community serve include, but are not limited to, the following: active participation in university committees; participation in university events; workshops for UTC students; participation in outreach or volunteer programs with community organizations; mentoring of K-12 students, or discipline relevant presentations at local K-12 schools; submission of grants for community/university service activities; serving as a judge for school, local and regional science fairs; participation in outreach or volunteer programs associated with local schools; other comparable activities.
- (iii) Professional Service: Candidates for tenure or promotion are expected to participate in a minimum of two (2) professional activities on average per year. Examples of professional activities include, but are not limited to the following: participation in professional organizations; membership on a committee or leadership for a professional organization; leadership position in a student (e.g., EDGE) or campus-based scientific organization (e.g., adviser for UTC chapter of Sigma Xi); participation in a professional development activity at a scientific meeting or a regionally or nationally recognized program (e.g., mentoring activity at a professional meeting, attending workshops sponsored by professional organizations, NSF or various regional and national laboratories); reviewer for an academic journal; reviewer for a granting agency; editorial position for an academic journal; host or co-host of a professional meeting or workshop; other comparable examples.

To demonstrate excellence in service, a candidate for tenure and/or promotion must provide additional evidence of service that substantially exceeds the minimum requirements listed above. Additionally, candidates for promotion to Professor are expected to demonstrate leadership in relation to service (e.g., effectively serving as the chair of committees, leading outreach activities, serving on editorial boards, successfully holding an administrative appointment) to demonstrate excellence in service.

- d. Collegiality** -- This criterion expands upon the UTC Handbook criterion requiring “demonstrated ability to relate appropriately to students and professional colleagues”.

In BGE, collegiality consists of a shared decision making process and a set of values which regards members of the Department and other University constituencies as essential for the success of the Department, CAS and University. Central to collegiality is the foundation of academic freedom – the respect for differing opinions and points of view – which welcomes diversity and actively sponsors its opinions. Collegiality between faculty and staff, regardless of rank or status, incorporates mutual respect for similarities and for differences in background, expertise, judgments, assignment responsibilities and visions for the department. Collegiality also consists of an ability to relate with students and a respect for similar and different opinions of students.

In BGE, the candidate for tenure and promotion must be a good citizen of the Department, CAS and University, must interact in a collegial and professional manner with colleagues, staff and students, and must serve as a good role model for students and a good representative of UTC. In turn, members of the RTP Committee are expected to be collegial to candidates for tenure and promotion and promote an environment in which different forms of collegiality can be expressed freely. The department supports a vision that differing viewpoints are valuable and essential to promoting academic freedom.

BGE policy conforms with the CAS vision that collegiality (or the lack thereof) impacts the assessment of performance. For this reason, the departmental faculty is mindful of the statement on collegiality in the CAS Bylaws.

The Department will assess collegiality based on:

- (i) Evaluation of the candidate's Statement of Collegiality in tenure/promotion documents.
- (ii) Evidence that a candidate receiving criticisms regarding collegiality during an annual review has appropriately responded to those criticisms. In the event that concerns are expressed about a candidate's collegiality, the RTP Committee chair must submit these concerns in writing to the candidate and Department Head as part of the candidate's annual review for reappointment. The candidate should arrange a meeting with the Department Head and/or chair of the RTP Committee to discuss the concerns. The candidate is also encouraged to write a response to written criticisms regarding a perceived lack or absence of collegiality, to be submitted to the RTP Committee chair and Department Head. The candidate should also address how s/he addressed these perceived concerns in his/her subsequent annual review or as part of Statement of Collegiality in a tenure or promotion application.

In BGE, the absence or lack of collegiality is defined as substantial evidence of sustained, intentional actions and statements that are detrimental to or interfere with the teaching, scholarly, and service goals of the Department, CAS, or University as well as the physical or mental well-being of students, faculty, and staff. The absence or lack of collegiality shall not be based on civil disagreements over academic issues or personality conflicts that do not result in disruptions to departmental, college, or

university activities or are not detrimental to the physical or mental well-being of students, faculty, and staff.

4. External Review Process for Promotion and Tenure

The Department adheres to University and CAS external review process for promotion/tenure. Details of these policies and procedures are available on the CAS webpage and in the CAS Bylaws and UTC Faculty Handbook.

5. Departmental Tenure Recommendations

The tenure review process set forth in the UTC Faculty Handbook will be followed.

After receiving and reviewing dossiers from each tenure-track faculty member under consideration for tenure, the RTP Committee will hold a preliminary review at which it has an opportunity to request clarifying information from each candidate prior to final consideration and forwarding of recommendations to the Department Head. The RTP Committee's recommendation will be decided upon majority vote (yes or no) of those committee members present and voting. Votes will be cast anonymously. Abstentions are permitted. A quorum of two-thirds (2/3) of the members of the RTP Committee is required for actions to take place. A simple majority ($>1/2$) votes in favor of tenure is necessary to constitute a positive recommendation. The RTP Committee will forward a written recommendation to the Department Head, together with records of the committee membership, attendance at final discussions, and voting results.

After making an independent judgment on the tenure candidacy, the Department Head shall submit a recommendation to the CAS Dean with a written summary explanation of his or her judgment, with a copy provided to the candidate at the same time. If the Department Head's recommendation differs from the recommendation of the RTP Committee, the summary must explain the reasons for the differing judgment, and the Department Head must provide a copy of the summary to the RTP Committee. The RTP Committee may forward a dissenting report to the CAS Dean, with a copy provided to the candidate at the same time.

B. Evaluation and Development by Objectives (EDO)

Evaluation and development by objectives (EDO) occurs annually for all full-time faculty, regardless of appointment classification. EDO requires that each faculty member develop annual Individual Objectives with the advice of the Department Head. At the end of the review period, the faculty member submits an Individual Performance Report Form to the Department Head. The Department Head reviews the Individual Objectives and Individual Performance Report Form and completes an Individual Evaluation Form which includes a determination that the faculty member's performance 1) Meets Expectations for Rank, 2) Needs Improvement for Rank, or is 3) Unsatisfactory for Rank. After reviewing all faculty in the Department, the Department Head then considers recommending faculty for Exceeds Expectations for Rank ratings.

The annual EDO evaluation process and criteria are linked to the long-term efforts toward promotion and/or tenure. While a positive annual reappointment or EDO evaluation for a tenure-track faculty member is usually a reflection of the faculty member's progression toward tenure and promotion and meeting of annual expectations, it is no guarantee that those ultimate decisions will be positive unless the cumulative work over the appropriate period of years meets the expected criteria for tenure/promotion.

An additional review process, called Enhanced Post-Tenure Performance Review (EPPR) Process, is triggered for tenured faculty whose annual review is “Unsatisfactory for Rank” or for faculty who have received two overall annual performance ratings of "Needs Improvement for Rank" during any four consecutive annual performance review cycles. Additional details of EPPR are provided in the UTC Faculty Handbook.

For non-tenure-track faculty, the UTC Faculty Handbook provides the following information regarding evaluation:

“All faculty holding non-tenure-track appointments will be evaluated annually as appropriate to the particular appointment. The department head will evaluate annually all non-tenure-track faculty members holding Teaching, Clinical, or Faculty of Practice appointments within the department. A non-tenure-track faculty member holding a Research appointment will be evaluated by the principal investigator(s) of the research grant or contract, or, if the principal investigator(s) are not able to perform the evaluation, by the department head. Each academic department will be responsible for establishing procedures in the departmental bylaws for the regular review of all non-tenure-track faculty members.

The scope of a non-tenure-track faculty member's evaluation will be determined by the assigned duties specified in the faculty member's appointment letter, and the standards for evaluation should be consistent with the relevant standards of performance for teaching, research, and service as defined at UTC”

The Department will follow the above guidelines regarding the evaluation of non-tenure-track faculty. In addition, when deemed appropriate by the Department Head and CAS Dean, Associate Department Heads in BGE may contribute to the evaluation of non-tenure-track faculty members.

VII. EVALUATIONS OF NON-TENURE-TRACK FACULTY

The UTC Faculty Handbook and CAS Bylaws address non-tenure-track faculty reappointment, promotion, and annual evaluation. Generally, non-tenure-track faculty performance is evaluated within the Department through (1) review by annual EDO by the faculty member, Associate Department Heads and Department Head; (2) reappointment review by the Department Head with optional review by the Non-Tenure-Track Reappointment and Promotion Committee; and (3)

promotion review by the Non-Tenure-Track Reappointment and Promotion Committee and Department Head.

Non-Tenure-Track Reappointment and Promotion Committee discussions and deliberations of departmental colleagues are confidential and should be treated as such. That is, NTTRP Committee discussions and deliberations of candidates must not be shared with anyone outside of the NTTRP Committee members who actively participated in the candidate's review, including sharing information with candidates. If the committee decides it is necessary to communicate with a faculty member concerning his or her candidacy, the communication should be done by the NTTRP Committee chair(s).

A. Reappointment and Promotion

1. Standard Format for Non-Tenure-Track Faculty Reappointment and Promotion Materials

For lecturers seeking optional reappointment evaluation from the NTTRP Committee, a Reappointment Folder should be assembled and provided to the NTTRP Committee at the same time that his/her Individual Performance Report is due. The Reappointment Folder for those on a one-year appointment should consist of the most recent reappointment letter, the EDO evaluation and all student and peer teaching evaluations from the previous academic year. The Reappointment Folder for lecturers on a multi-year appointment should include items from the time of the most recent appointment to the present. For those on a multi-year appointment, reappointment evaluation materials should include the most recent reappointment letter, EDO evaluations, and student and peer evaluations.

For lecturers seeking promotion, a promotion portfolio should be assembled and provided to the NTTRP Committee at the same time that his/her Individual Performance Report is due. The promotion portfolio should be divided into at least three distinct components: (1) teaching and advising; (2) service; (3) collegiality; and if applicable (4) research, scholarship and creative activities. Other materials should be included at the discretion of the candidate, and, if possible, on the advice of the NTTRP Committee. The promotion portfolio shall contain the following elements/sections and be arranged in the following order:

- (1) Title page including faculty name, rank, and date of portfolio submission;
- (2) Table of contents;
- (3) EDO evaluations;
- (4) Teaching and Advising section including:
 - a. Teaching philosophy
 - b. Summary of courses taught for each semester including enrollment
 - c. Student teaching evaluations

- d. Quantitative summary of student teaching evaluations: a tabulation of results of Student Ratings of Faculty
- e. Reflective commentary on student teaching evaluations: a considered response to trends in the student evaluations or legitimate student criticisms and suggestions
- f. Peer-teaching evaluations (if candidate was evaluated by peers within the past 4 years for those seeking promotion to Associate Lecturer and within the past 8 years for those seeking promotion to Senior Lecturer)
- g. Reflective Commentary on peer-teaching evaluations(if candidate was evaluated by peers within the past 4 years for those seeking promotion to Associate Lecturer and within the past 8 years for those seeking promotion to Senior Lecturer): a considered response to trends in the peer evaluations or peer criticisms and suggestions.
- h. Summary of student advising activities: a record of regular advising sessions, letters of recommendation, participation in advisor training, and any other relevant activities
- i. Optional indicators of quality: other evidence of quality teaching (e.g., learning outcome assessments, development of a new or online course, samples of student learning assessments, evidence of student learning, participation in pedagogy training or workshops, etc.) and explanations of how those materials demonstrate effective teaching
- j. Discussion of any other relevant activities, such as student research mentoring

(5) Service section including record of:

- a. Service to Department and University: a record of committee work at department, college, and university levels; participation in faculty senate; record of participation or contribution to the University's programs to enhance diversity, inclusion and/or student learning, and if applicable a description of lab coordination duties and efforts
- b. Professional and public service: a record of membership/participation in professional societies; a record of participation in community affairs as a representative of the University.
- c. Optional indicators of quality: other evidence of quality service

(6) Collegiality statement and evidence demonstrating candidate's ability to relate effectively to students and professional colleagues.

(7) Research, Scholarship, and Creative Activities. This section is not required, but is suggested if the candidate participates in research or other scholarly activities. This section could include (listings of most recent to oldest works):

- a. Peer-reviewed publications
- b. Book chapter or book publications

- c. Non-peer-reviewed publications
- d. Technical reports submitted (e.g., final reports for research grants)
- e. Invited oral presentations at conferences, other universities, etc.
- f. Oral/poster presentations at professional conferences
- g. External and internal grants/contracts awarded
- h. External and internal grants/contracts pending or declined

2. Reappointment of Non-Tenure-Track Faculty

The UTC Faculty Handbook contains the following language concerning the reappointment review process of non-tenure-track faculty:

A non-tenure-track appointment (whatever its duration) may be renewed for a new term pursuant to the reappointment review process described in this section. A non-tenure-track faculty member's reappointment review is combined with his or her annual performance review in the year in which reappointment is under consideration.

The department head is responsible for the careful evaluation of the faculty member in determining whether to recommend reappointment for a new term. Reappointment recommendations will include consideration of available funding and the faculty member's performance. A non-tenure-track appointment may be, by its nature, funding-limited; the compensation amounts for the position may be funded through a grant, contract, or restricted donation, and it may automatically expire when funding lapses.

The department head will make a recommendation regarding reappointment to the dean. The dean will consider the department head's recommendation and make a recommendation regarding reappointment to the Provost. The Provost will consider the recommendation of the dean and make a final decision regarding reappointment.

The Provost shall provide the faculty member notice of his or her decision in writing. If the Provost decides not to reappoint a non-tenure-track faculty member, the Provost, whenever feasible, should give the faculty member at least (a) one month's written notice of termination of the faculty member's employment or (b) salary equivalent to that which would be paid in the event of one month's notice of the termination of the faculty member's employment.

The Department will follow the reappointment review process described above for non-tenure-track faculty members. However, in any year that a non-tenure-track faculty member is applying for reappointment, they may request for the NTTRP Committee to provide the initial evaluation for reappointment. Upon such a request, the NTTRP

Committee will review and evaluate the faculty member's performance during the previous appointment period and provide the Department Head with a written evaluation of the faculty member's performance and include a recommendation for or against reappointment. Upon receipt of the NTTRP Committee's evaluation, the Department head will conduct an independent review of the reappointment documents and submit his or her written recommendation for or against reappointment to the CAS Dean along with the NTTRP Committee's evaluation and recommendation.

The evaluation and recommendation regarding reappointment of non-tenure-track faculty members will focus on the annual review materials for that faculty member. Non-tenure-track faculty members applying for reappointment are also welcome to provide additional evidence of excellence in teaching, research and service at their discretion. If additional materials are provided, the NTTRP Committee, when applicable, and the Department Head will consider these additional materials in the evaluation and recommendation regarding reappointment.

3. Promotion of Non-Tenure-Track Faculty

The UTC Faculty Handbook contains the following language concerning the promotion of non-tenure-track faculty:

Each academic department shall establish the criteria and process for evaluating applications for promotion of departmental faculty members holding Teaching appointments, subject to the approval of the dean and Provost. The departmental criteria and process for evaluating promotion decisions shall be consistent with this Faculty Handbook and any criteria established by the college within which the department resides and shall be published in the departmental bylaws.

The CAS Bylaws contain the following criteria for promotion of NTT faculty:

A Lecturer, at a minimum, must meet the following criteria necessary for rank of Associate Lecturer in order for promotion to be granted:

1. have a graduate level degree in his or her discipline or present equivalent training and experience;
2. have achieved a reputation as an accomplished teacher (with a minimum of 4 years at rank of Lecturer or equivalent);
3. have an established record of effective participation in professional activities other than teaching
4. have demonstrated ability to relate appropriately to students and professional colleagues.

An Associate Lecturer, at a minimum, must meet the following criteria necessary for rank of Senior Lecturer in order for promotion to be granted:

1. have a graduate level degree in his or her discipline or present equivalent training and experience;
2. have achieved and maintained a reputation as an accomplished teacher (with a minimum of 8 years at rank of Associate Lecturer or equivalent);
3. have an established record of effective participation in professional activities other than teaching;
4. have demonstrated ability to relate appropriately to students and professional colleagues.

In BGE, we value the diverse strengths of our faculty and the varied needs of our programs. We therefore recognize that non-tenure-track faculty in BGE will differ in their work assignments and the relative amount of professional effort devoted to teaching and service. Thus, when evaluating non-tenure-track faculty for promotion, the NTTRP Committee and Department Head shall consider a non-tenure-track faculty member's teaching and advising and service assignments and other optional indicators of quality provided by the lecturer. Faculty members should document or describe their relative teaching and advising, service, and research (if applicable) assignments in their promotion portfolio and in their annual EDO reports. Non-tenure-track faculty who have higher than average teaching or service assignments should describe their allocation of effort to teaching, research, and service in relation to their work assignments.

BGE focuses its non-tenure-track faculty promotion criteria on the following areas: (1) teaching and advising; (2) service; (3) collegiality; and if applicable (4) research and scholarly competence. The non-tenure-track promotion criteria are defined below.

a. Teaching and Advising – In order to align Departmental and UTC policy, BGE considers faculty performance in the classroom and student advising in the evaluation of lecturer teaching performance. In BGE, evidence of having “achieved a reputation as an accomplished teacher” means the candidate must become an effective teacher at UTC. In BGE, having “achieved and maintained a reputation as an accomplished teacher” means that the candidate has an established a respected reputation as an effective teacher at UTC. BGE considers faculty performance in the classroom and student advising in the evaluation of teaching performance.

Teaching – A lecturer, at a minimum, must meet the following teaching requirements to be considered for promotion:

- (i) Evidence of effective teaching through: a. Student evaluation results with median scores of 5.0 or greater for all Course Content and Delivery and Course Instruction questions (scale of 0-7 with 7 being best) on average during the three (3) years prior to promotion consideration; and, or b. Multiple indicators of

effective teaching. These indicators of teaching quality may include but are not limited to: student assessments, in-class activities, syllabi, learning outcome assessments, evidence of student learning, evidence of efforts to enhance teaching quality, and additional peer observations of teaching approved by the NTTRP Committee. The candidate should provide commentary explaining how these materials demonstrate effective teaching. The NTTRP Committee will determine if the commentary and evidence provided by the candidate demonstrate the ability and commitment to teach effectively.

- (ii) A majority of peer-evaluation ratings of “very good” or “excellent” during the last two semesters of peer evaluations.
- (iii) Evidence of responding positively to reasonable criticisms, offered through any of the following: student evaluations, peer evaluations, the NTTRP Committee, and the EDO process, by showing a willingness to change and improve.

Candidates applying for promotion to Senior Lecturer must also provide additional evidence demonstrating that they have maintained an established and respected reputation as a teacher.

Advising – A faculty member, at a minimum, must meet the following advising requirements to be considered for promotion:

- (i) Offering sufficient opportunities for student advising, based on CAS and Departmental expectations for availability.
- (ii) A record of maintaining regular, posted office hours.

Candidates applying for promotion to Senior Lecturer must also provide additional evidence demonstrating that they have maintained an established record of advising commitment and success.

b. Service – In In BGE, having “achieved a significant record of effective participation in professional activities other than teaching” or “achieved and maintained a significant record of effective participation in professional activities other than teaching” involves providing service that supports the University’s mission as an engaged metropolitan university and the mission of the Department. Candidates for promotion are expected to actively participate in Departmental committees as assigned by the Department Head as well as provide service to the University and their profession. At a minimum, candidates for promotion should meet the following requirements:

- (i) Departmental Service: Non-tenure-track faculty members are expected to actively serve on the Departmental committees that they are assigned to each year; the actual number of committee assignments will depend on Departmental

needs and number of faculty in the Department.

Some lecturers have lab coordination duties. These lab coordination duties are varied and diverse, requiring substantial time dedicated to activities other than teaching and advising. As such, lab coordination duties are recognized as service to the department. Lab coordinators must provide a description of his/her lab coordination duties and evidence of effective execution of those duties.

- (ii) **University and Discipline-Appropriate Community Service:** Each faculty member will provide service to UTC and the community/region as appropriate given their professional expertise. Candidates for promotion are expected to participate in a minimum of two (2) University or discipline-appropriate community service activities on average per year. Examples of potential University and community service include, but are not limited to, the following: active participation in university committees; participation in university events; workshops for UTC students; participation in outreach or volunteer programs with community organizations; mentoring of K-12 students, or discipline relevant presentations at local K-12 schools; submission of grants for community/university service activities; serving as a judge for school, local and regional science fairs; participation in outreach or volunteer programs associated with local schools; other comparable activities.
- (iii) **Professional Service:** Candidates for promotion are expected to participate in professional activities annually. Examples of professional activities include, but are not limited to the following: participation in professional organizations; membership on a committee or leadership for a professional organization; leadership position in a student (e.g., EDGE) or campus-based scientific organization (e.g., adviser for UTC chapter of Sigma Xi); participation in a professional development activity at a scientific meeting or a regionally or nationally recognized program (e.g., mentoring activity at a professional meeting; attending workshops sponsored by professional organizations).

Candidates applying for promotion to Senior Lecturer must also provide additional evidence demonstrating that they have maintained an established record of effective participation in service activities.

c. Collegiality -- This criterion expands upon the UTC Handbook criterion requiring “demonstrated ability to relate appropriately to students and professional colleagues”.

In BGE, collegiality consists of a shared decision-making process and a set of values which regards members of the Department and other University constituencies as essential for the success of the Department, CAS and University. Central to collegiality is the foundation of academic freedom – the respect for differing opinions and points of view – which welcomes diversity and actively sponsors its opinions. Collegiality between faculty and staff, regardless of rank or status, incorporates mutual respect for similarities and for differences in background, expertise, judgments, assignment

responsibilities and visions for the department. Collegiality also consists of an ability to relate with students and a respect for similar and different opinions of students.

In BGE, the candidate for promotion must be a good citizen of the Department, CAS and University, must interact in a collegial and professional manner with colleagues, staff and students, and must serve as a good role model for students and a good representative of UTC. In turn, members of the Non-Tenure-Track Reappointment and Promotion Committee are expected to be collegial to candidates for promotion and promote an environment in which different forms of collegiality can be expressed freely. The Department supports a vision that differing viewpoints are valuable and essential to promoting academic freedom.

BGE policy conforms with the CAS vision that collegiality (or the lack thereof) impacts the assessment of performance. For this reason, the departmental faculty is mindful of the statement on collegiality in the CAS Bylaws.

The Department will assess collegiality based on:

- (i) Evaluation of the candidate's Statement of Collegiality in reappointment/promotion documents.
- (ii) Evidence that a candidate receiving criticisms regarding collegiality during an annual review has appropriately responded to those criticisms. In the event that concerns are expressed about a candidate's collegiality, the Non-Tenure-Track Reappointment and Promotion Committee chair must submit these concerns in writing to the candidate and Department Head as part of the candidate's review for reappointment. The candidate should arrange a meeting with the Department Head and/or chair of the Non-Tenure-Track Reappointment and Promotion Committee to discuss the concerns. The candidate is also encouraged to write a response to written criticisms regarding a perceived lack or absence of collegiality, to be submitted to the Non-Tenure-Track Reappointment and Promotion Committee chair and Department Head. The candidate should also address how s/he addressed these perceived concerns in his/her subsequent annual review.

In BGE, the absence or lack of collegiality is defined as substantial evidence of sustained, intentional actions and statements that are detrimental to or interfere with the teaching, scholarly, and service goals of the Department, CAS, or University as well as the physical or mental well-being of students, faculty, and staff. The absence or lack of collegiality shall not be based on civil disagreements over academic issues or personality conflicts that do not result in disruptions to departmental, college, or university activities or are not detrimental to the physical or mental well-being of students, faculty, and staff.

d. Research and Scholarly Competence -- In BGE, lecturers have no formal research expectations. Even so, some lecturers do engage in research and regularly demonstrate scholarly competence, meaning that they have achieved success and/or a

good record in research, scholarly, or creative activities. These endeavors will be considered “going above and beyond” and are encouraged, as long as the lecturer is also satisfactorily meeting his or her responsibilities in the areas of teaching, advising, and service.

Achieving “success and/or a good record in research, scholarly, or creative activities” means that candidates demonstrate activities, including but not limited to, some combination of the following:

- (i) Participation in ongoing and productive research activity, published original research in discipline-appropriate peer-reviewed journals
- (ii) Presentation of research at professional meetings or respected institutions (either at UTC or at some other location)
- (iii) Submission of one or more external or internal grant proposals.

Any lecturer/candidate exhibiting evidence of having “achieved a good record in research, scholarly, or creative activities” will have done one or more of the preceding in any given semester. **Again, it must be stressed that there is no formal expectation that lecturers must establish an independent and externally recognized research program that involves students at UTC, nor is there any expectation that lecturers must engage in any of the aforementioned activities to be considered for promotion.**

In short, success in research, scholarly activities and/or creative activities will only help the candidate, but will in no way count against the candidate should he or she not participate in such activities. When demonstrating excellence in these areas, however, it is the candidate’s responsibility to describe and provide evidence of the level of quality, effort, peer review, and potential impact of the activities listed above to the NTTRP Committee.

4. Departmental Non-Tenure-Track Faculty Recommendations

After receiving and reviewing portfolios from non-tenure-track faculty members requesting consideration for reappointment, the Non-Tenure-Track Reappointment and Promotion Committee will hold a preliminary review at which it has an opportunity to request clarifying information from each candidate prior to final consideration and forwarding of recommendations to the Department Head. The Non-Tenure-Track Reappointment and Promotion Committee's recommendation will be decided upon simple majority vote (yes or no) of those committee members present and voting. Votes will be cast anonymously. Abstentions are permitted. A quorum of two-thirds (2/3) of the members of the Non-Tenure-Track Reappointment and Promotion Committee is required for actions to take place. A simple majority (>1/2) in favor of reappointment is necessary to constitute a positive recommendation. The Non-Tenure-Track Reappointment and Promotion

Committee will forward a written recommendation to the Department Head, together with records of the committee membership, attendance at final discussions, and voting results.

After receiving and reviewing portfolios from each non-tenure-track faculty member under consideration for promotion, the Non-Tenure-Track Reappointment and Promotion Committee will hold a preliminary review at which it has an opportunity to request clarifying information from each candidate prior to final consideration and forwarding of recommendations to the Department Head. The Non-Tenure-Track Reappointment and Promotion Committee's recommendation will be decided upon majority vote (yes or no) of those committee members present and voting. Votes will be cast anonymously. Abstentions are permitted. A quorum of two-thirds (2/3) of the members of the Non-Tenure-Track Reappointment and Promotion Committee is required for actions to take place. A simple majority in favor of promotion is necessary to constitute a positive recommendation. The Non-Tenure-Track Reappointment and Promotion Committee will forward a written recommendation to the Department Head, together with records of the committee membership, attendance at final discussions, and voting results.

In years that a non-tenure-track faculty member requests to be evaluated for reappointment and promotion, the NTTRP Committee will use the aforementioned process to make two separate recommendations: one recommendation for reappointment and one recommendation for promotion. Failure to obtain a recommendation for promotion does not exclude a candidate from potentially receiving a recommendation for reappointment.

After making an independent judgment on the reappointment or promotion candidacy, the Department Head shall submit a recommendation to the CAS Dean with a written summary explanation of his or her judgment, with a copy provided to the candidate at the same time. If the Department Head's recommendation for reappointment or promotion differs from the recommendation of the Non-Tenure-Track Reappointment and Promotion Committee, the summary must explain the reasons for the differing judgment, and the Department Head must provide a copy of the summary to the Non-Tenure-Track Reappointment and Promotion Committee. The Non-Tenure-Track Reappointment and Promotion Committee may forward a dissenting report to the CAS Dean, with a copy provided to the candidate at the same time. After the CAS Dean receives the departmental recommendations, the non-tenure-track faculty promotion procedure set forth in the Faculty Handbook will be followed.

VIII. EVALUATION OF ADJUNCT FACULTY

Adjunct faculty will be evaluated each year. Evaluation will consist primarily of review of student evaluations of faculty by the Department Head. Should concern arise about the quality of an adjunct instructor, the Department Head, Associate Department Head, or a tenured faculty member may observe the adjunct instructor teaching. When this occurs, the Department Head, Associate Department Head, or tenured faculty member will provide the adjunct faculty with a completed Peer Evaluation of Instruction Form that includes a general rating (excellent, very good,

satisfactory, or unsatisfactory), discussion of strengths and weaknesses, and suggestions to strengthen teaching. Each year, the Department Head will return student evaluations to adjunct faculty and discuss any significant concerns with adjunct faculty at that time. The Department will not rehire adjunct faculty whose performance is determined to be unsatisfactory by the Department Head.

Appendix 4-D Current Full-time Faculty

Dr. David Aborn, Professor

Graduate Faculty: Yes

Education: B.S. in Zoology, Clemson University, 1985; M.S. in Zoology, Clemson University, 1989; Ph.D in Biological Sciences, University of Southern Mississippi, 1996

Years Active for Self- Study: 2018-present

Expertise: Dr. Aborn is interested in many aspects of avian ecology, but particularly bird migration and the effects of urbanization on bird populations. His current research focuses on the suitability of urban greenspaces for birds during migration, but also has projects looking at the wintering ecology of Sandhill Cranes and the breeding biology of Tree Swallows. His research has been funded by various local, state, and Federal agencies, and he has published in regional, national, and international peer-reviewed journals. He has mentored 25 Master's thesis students. He has served on the board of the Association of Field Ornithologists, North American Crane Working Group, Tennessee Ornithological Society, and Chattanooga Audubon Society

Professor Callie Adams, Senior Lecturer, Introductory Biology Coordinator

Graduate Faculty: No

Education: B.S. in Environmental Science, University of Tennessee at Chattanooga, 2006; M.S. in Environmental Science, University of Tennessee at Chattanooga, 2009 - plant conservation genetics

Years Active for Self- Study: 2018-present

Expertise: In her role as Biology Lecture Coordinator, Callie Adams engages with faculty to ensure consistency across all Principles of Biology courses and works with the Biology Laboratory Coordinator to manage General Education recertification efforts for BIOL 1110 and BIOL 1120. She is interested in using innovative teaching practices to enhance student learning and retention. Her teaching focus is introductory biology and environmental science courses and efforts to support student learning (e.g., How to Learn Biology course and Biology Summer Prep Program).

Dr. Jose Barbosa, Professor

Graduate Faculty: Yes

Education: Licentiate in Agronomy, Universidade Cental de Las Villas, Villa Clara, Cuba, 1988; M.Sc. Plant Physiology, Auburn University, Auburn, Alabama; Ph.D. Plant Molecular Biology Auburn University, Auburn, Alabama, 2002

Years Active for Self- Study: 2018-present

Expertise: Dr. Barbosa is a Plant Physiologist and Molecular Biologist with interest in understanding plants responses to a myriad of environmental insults. His research focuses on identification and characterization of genes involved in stress responses and their regulations in plants and yeast systems. His current research explores how different metabolic pathways in yeast and Arabidopsis are disturbed by extreme environmental conditions. Furthermore, he is interested in urban agriculture and food security, which has opened collaboration opportunities with many schools in Hamilton County while trying to improve the involvement of underrepresented groups in STEM fields. These efforts have been supported with external funding from the USDA. Dr. Barbosa teaches Plant Physiology, Genetics, Cell Biology, Soil Resources, and Urban Gardening.

Professor Nominanda Barbosa, Senior Lecturer, Microbiology and Health and Microbiology Prep Lab Coordinator

Graduate Faculty: No

Education: B.S. in Biology, University of Coimbra, Portugal, 1989; M.S. in Soil Fertility, Auburn University Auburn AL, 2000; M.S. in Microbiology, Auburn University, Auburn, AL, 2005.

Years Active for Self- Study: 2018-present

Expertise: As the Microbiology Laboratory Prep Coordinator, Nominanda Barbosa reports to the Biology, Geology and Environmental Science (BGES) Department Head and oversees the day-to-day operations of the Microbiology Preparation Laboratory. This includes responsibility for the supervision, training and evaluation of student laboratory assistants. As Microbiology Laboratory Coordinator, she is responsible for supervising the microbiology science laboratories to ensure faculty access to the microbiological media, cultures and equipment necessary to meet the laboratory competencies of their courses in a safe, clean, and neat environment. She oversees the preparation of microbiology teaching laboratories, including BIOL 2100L, BIOL 4220L, BIOL 4430L, and BIOL 4530L. She assures that all labs meet applicable safety regulations, ensures that the faculty have the materials and equipment needed to properly teach their courses, interacts with the faculty to develop and update laboratory work orders, supervises the ordering of all laboratory supplies, maintains the inventory files and ensures that all prep room chemicals are properly stored and documented; maintains stock cultures for microbiological samples, ensures that all biological specimens, equipment, and other materials are properly stored, ensures that all chemical and biological waste is properly collected, stored, and removed for disposal and ensures that all laboratory equipment and instruments are properly maintained.

Dr. DeAnna Beasley, UC Foundation Associate Professor

Graduate Faculty: Yes

Education: B.S. in Biology, Wofford College, 2002; PhD in Biological Sciences, University of South Carolina at Columbia, 2013

Years Active for Self- Study: 2018-present

Expertise: DeAnna Beasley's research broadly explores the impacts of environmental change on development, behavior and physiology in insect populations and subsequent changes in communities. Human-driven change is of particular interest due to the large scale in which humans have modified the environment and the potential effects on populations' evolutionary trajectory. Her current research explores the implications of urbanization on insect development and biodiversity. Additionally, she is interested in the integration of social and ecological processes to understand urban biodiversity and the development of resilient cities.

Dr. Jennifer Boyd, Guerry Professor

Graduate Faculty: Yes

Education: B.S. in Environmental Science and English (double major), Allegheny College, 1997; M. A. in Earth and Environmental Sciences, Columbia University, 2001; Ph.D. in Earth and Environmental Sciences, Columbia University, 2003. – Plant Ecology

Years Active for Self- Study: 2018-present

Expertise: Jennifer Boyd's research aims to advance understanding of why some species are rare while others are common – an enduring and fundamental question in ecology with important applications for the conservation of biodiversity. Her research interests extend to the process of translating ecological research into effective practices. She leads a multi-institutional research collaboration to assess the ability of rare plant species of the southeastern U.S. to adapt and acclimate to environmental change. Her work has been supported by significant external funding, leverages conservation partnerships with botanical gardens and government agencies, and provides mentored research and experiential learning opportunities for undergraduate and graduate students.

Professor Jeremy Bramblett, Senior Lecturer, Associate Department Head for Student Success

Graduate Faculty: No

Education: B.S. in Geology, The University of Tennessee at Chattanooga, 2000; B.S. in Biology: Organismal Biology with Departmental Honors, The University of Tennessee at Chattanooga, 2010; M.Ed. in Secondary Education: Science and Environmental Studies, The University of Tennessee at Chattanooga, 2005

Years Active for Self- Study: 2018-present

Expertise:

Dr. Amy Brock-Hon, Robert Lake Wilson Professor, Associate Department Head for Geology

Graduate Faculty: Yes

Education: B.S. in Geology, Oklahoma State University; M.S. and Ph.D. (2007) Geoscience, University of Nevada, Las Vegas

Years Active for Self- Study: 2018-present

Expertise: Dr. Brock-Hon's research interests are in the development of late-stage petrocalcic horizons in arid and semi-arid regions, the linkage of geomorphic, tectonic, and paleoclimatic changes to pedogenesis in rare, ancient soils, and the mode and timing of pedogenic silicate clay and barite formation in these soils. She is also interested in large circular depressions atop the Cumberland Plateau. Her recent research includes geomorphic mapping and geophysical surveys to determine their genesis and morphological change over time.

Dr. Jodi Caskey, Senior Lecturer

Graduate Faculty: No

Education: B.S. in Resource Biology and Biodiversity, 1999, University of Louisiana at Lafayette; M.S. in Biology, 2003, University of Louisiana at Lafayette; Ph.D. in Environmental and Evolutionary Biology, 2009, University of Louisiana at Lafayette

Years Active for Self- Study: 2018-present

Expertise: Dr. Caskey's graduate research focused on chemical communication of decapod crustaceans, specifically related to mate recognition. Her background allows her to identify as a marine crustacean biologist. However, she is no longer active in her field and focuses solely on teaching. Her current teaching is focused on Human Anatomy and Physiology, Introductory Biology, Ecology, and Marine Ecology. She is interested in supporting student retention and success by implementing high impact teaching practices.

Dr. Elise Chapman, Associate Lecturer

Graduate Faculty: Yes

Education: B.S. Biology, University of Tennessee, Chattanooga, 2003; M.S. Biology focus in Ecosystems Ecology 2006; Ph.D. in Fluvial Biogeochemistry 2014

Years Active for Self- Study: 2018-present

Expertise: Dr. Chapman's research interests are in aquatic biogeochemistry, catchment hydrology, and water quality assessment. She is specifically interested in understanding the spatial and temporal variability of carbon quantity and quality, nutrient dynamics, and ecological status across diverse aquatic ecosystems and identifying the relevant environmental drivers.

Dr. Stelios Chatzimanolis, UC Foundation Professor

Graduate Faculty: Yes

Education: B.S. in Biology. University of Crete, Greece, 1999; Ph.D in Entomology, University of Kansas, 2004

Years Active for Self- Study: 2018-present

Expertise: Dr. Chatzimanolis is an evolutionary biologist and entomologist interested in documenting earth's biodiversity. He is studying the evolution and systematics of rove beetles, a hyper-diverse group with more than 64,000 described species. He has an active, collections-based research program in species discovery and description of rove beetles, and he combines molecular techniques with morphology and fossils to study their evolutionary relationships. In the past he has used phylogenies to ask questions about the evolution of aposematic coloration and sexual structures and he is currently studying the evolution of myrmecophily in xanthopygine rove beetles. A second area of research focus includes beetle faunistics studies on the Tennessee Valley area.

Dr. Hill Craddock, UC Foundation Robert M. Davenport Professor

Graduate Faculty: Yes

Education: B.A. in Fine Arts and Biology, Indiana University, 1983; M.S. in Horticulture, Oregon State University, 1987; Dottorato di Ricerca (PhD) in Colture Arboree (Pomology), University of Torino, Turin, Italy, 1992.

Years Active for Self- Study: 2018-present

Expertise: The major focus of the Dr. Craddock's research is the restoration of *Castanea dentata* to its former position as a component of the southern Appalachian hardwood forest ecosystem. Since 1996, the project has been actively engaged in all aspects of this major restoration attempt, including research on biological control of the chestnut blight disease and the study of restoration ecology. The objective of the UTC chestnut breeding program, in affiliation with The American Chestnut Foundation and other partners, is to select locally adapted, genetically diverse blight-resistant chestnut trees. We plan to reintroduce the trees into the forest in an ecologically acceptable manner. Recent advances in plant pathology and molecular biology, especially new recombinant DNA technologies, allow us to confidently predict a successful outcome for our endeavor. We maintain an archive of folklore, historical, artistic and scientific material on American chestnut that is open to scholars and researchers. We strive to educate the general public and hope to contribute to scientific knowledge by conducting research, fostering science-based learning and sharing among disciplines. The project currently supports graduate research assistants and provides opportunities for undergraduate research as well.

Professor Sarah Farnsley, Associate Lecturer

Graduate Faculty: No

Education: B.S. in Communications, University of Tennessee, Knoxville, 2004; B.S. in Ecology and Evolutionary Biology, University of Tennessee, Knoxville, 2010; M.S. in Environmental Science, University of Tennessee, Chattanooga, 2014

Years Active for Self- Study: 2018-present

Expertise: Sarah Farnsley serves as the Coordinator for the online Life on Earth (BIOL 1050) lecture and lab courses, which provide a General Education Natural Science course with a lab to students that are non-majors. Her teaching includes courses such as World Resources, Conservation of Biodiversity, First Year Experience, and introductory Biology and Environmental Science courses. Sarah also serves as one of the Faculty Advisors for the departmental Residential Learning Community: Sustainable Mocs.

Professor Mary Feely, Visiting Lecturer

Graduate Faculty: No

Education: B.S. Biology, Chemistry Minor Maryville College, 2015. MSc in Environmental Science, University of Tennessee, Chattanooga 2019

Years Active for Self- Study: 2022-present

Expertise: Mary Feely is a visiting Lecturer for Introductory Biology courses. Mary's focus is avian ecology and evolutionary biology but her research experience also includes coral reef surveys and small mammal sampling. Outside of teaching, Mary has worked as an editor including serving as the Managing Editor for Applied Environmental Education and Communication.

Dr. Jannatul Ferdoush, Assistant Professor

Graduate Faculty: Yes

Education: B.S in Genetic Engineering and Biotechnology, University of Chittagong, Bangladesh. 2011; M.S in Genetic Engineering and Biotechnology, University of Chittagong, Bangladesh. 2013; Ph.D in Molecular Biology, Microbiology and Biochemistry, School of Medicine, Southern Illinois University Carbondale, IL, USA. December, 2019.

Years Active for Self- Study: 2022-present

Expertise: Dr. Jannatul Ferdoush joined BGE department as an Assistant Professor of Genetics in Fall 2022. Dr. Ferdoush is a molecular biologist . Her research is focused on understanding the regulation of eukaryotic gene expression. She has published nine research articles in peer-reviewed journals. She teaches classes in Genetics ,Virology and Molecular Genetics.

Dr. Tim Gaudin, UC Foundation Professor

Graduate Faculty: Yes

Education: B.S. in Zoology, The University of Georgia, 1987. Ph.D. in Organismal Biology & Anatomy, The University of Chicago, 1993.

Years Active for Self- Study: 2018-present

Expertise: Dr Gaudin is a UC Foundation Professor who teaches courses in the areas of Vertebrate Zoology, Mammalogy, Evolution, and Human Anatomy. He has been actively involved in sponsoring student research at UTC, including over 140 undergraduates, 9 Honors students, and 9 graduate students. His research expertise lies in the area of mammalian systematics, paleontology, and evolution. More specifically, he is an expert on edentate mammals, i.e., armadillos, anteaters, sloths and pangolins. He has authored or co-authored over 150 scientific publications, including 70 peer-reviewed research articles in professional journals, and co-edited one book. He has been a reviewer for more than 50 different scientific journals, granting agencies, and textbooks, and is an Associate Editor for the Journal of Mammalian Evolution, and current president of the Society for the Study of Mammalian Evolution.

Dr. David Giles, Associate Professor

Graduate Faculty: Yes

Education: B.S. in Biology, Maryville College, 2001. Ph.D. in Biomedical Sciences: Microbiology, East Tennessee State University, 2008

Years Active for Self- Study: 2018-present

Expertise: Dr. Giles is a microbiologist with expertise in microbial pathogenesis, employing biochemistry, molecular biology, bioinformatics, and microbiological techniques to investigate how bacteria sense and respond to environmental fatty acids. With over 80 undergraduate research trainees, 28 students have been co-authors on peer-reviewed publications and 9 have completed departmental honors theses. Dr. Giles teaches Microbiology, Cellular Biology, Human Infectious Diseases, and a course on the epidemiology of disease.

Dr. Loren Hayes, Professor, Associate Department Head for Biology and Environmental Science

Graduate Faculty: Yes

Education: B.S. in Biology, Bates College, 1996. M.S. in Zoology, Michigan State University, 1999, Ph.D. in Zoology, Miami University (Ohio), 2004.

Years Active for Self- Study: 2018-present

Expertise: Dr. Hayes is a behavioral ecologist with interests in the evolutionary significance of group-living and diversity of social systems across mammals. His student-focused research program involves projects in Chile and France and is supported by the National Science Foundation. He co-hosts an international seminar series with >700 followers and integrates research into his primary courses, Animal Physiology and Behavioral Ecology.

Dr. A.K.M. Azad Hossain, Associate Professor

Graduate Faculty: Yes

Education: B.Sc. in Geology, University of Dhaka, 1995. M.Sc. in Geology, University of Dhaka, 1998. M.S. in Engineering Science (Geological Engineering), University of Mississippi, 2004. Ph.D. in Engineering Science (Geological Engineering), University of Mississippi, 2008.

Years Active for Self- Study: 2018-present

Expertise: Dr. Hossain is an environmental geoscientist with expertise in geospatial technology. The general focus of his research interests is in the geological and environmental applications of GIS, remote sensing (optical and microwave), and spatial analysis coupled with numerical modeling. Dr. Hossain developed his research laboratory 'Geological and Environmental Remote Sensing Laboratory (GERSLab)' at the University of Tennessee at Chattanooga (UTC). His current research is focused on developing remote sensing (satellite observations) and GIS-based models to estimate surface water quality, mapping and monitoring urban growth, understanding urban heat island (UHI) impacts, and predicting landslides. Dr. Hossain taught a variety of courses including Geographic Information Systems (GIS), Remote Sensing, Spatial Analysis, Spatial Decision Support Systems, Remote Sensing of the Environments, Radar Remote Sensing, Oceanography, Physical Geology, Historical Geology, Environmental Geology, and Engineering Analysis. Dr. Hossain published 17 peer reviewed articles, 7 invited book chapters, and 21 conference proceedings articles. He delivered 56 oral presentations and 48 poster presentations at different international, national, regional, and local conferences. He served as a PI and a Co-PI on several internal and externally funded research projects. Dr. Hossain received 14 internal grants totaling \$350,182 as PI and Co-PIs, and 6 external grants totaling \$2,040,836 as PI, Co-PI, Co-I, and senior personnel.

Professor Caitlin Jarvis, Visiting Lab Coordinator (Lecturer)

Graduate Faculty: No

Education: B.S. in Wildlife and Fisheries Science, The University of Tennessee, 2014. M.S. in Environmetnal Science, The University of Tennessee, 2023.

Years Active for Self- Study: 2023-present

Expertise: Coordinator of Introductory Biology Labs-30 sections/semester on average (BIOL 1110L and BIOL 1120L): Responsible for purchasing supplies and equipment for all sections; updating lab manuals; coordinating/overseeing laboratory instructors, which includes 10 graduate teaching assistants per semester, as well as adjunct faculty and lecturers; maintaining labs to be able to accommodate 30 sections of labs per semester. Responsible for teaching three lab sections in fall and spring semesters.

Professor Katherine E. Kinnear, Senior Lecturer, Anatomy and Physiology Lab Coordinator

Graduate Faculty: No

Education: B.S. in Molecular Biology, B.A. English Literature, Virginia Tech, 2002; M.S. in Animal & Veterinary Science, Developmental Physiology, Clemson University, 2009. – Teaches Human Physiology and Functional Human Anatomy and coordinates the labs for those courses.

Years Active for Self- Study: 2018-present

Expertise: Katherine Kinnear is a physiologist whose graduate research characterized the effects of estrogen on the histological changes in mammary development in prepubertal Holstein calves. As Lab Coordinator for Anatomy labs and Physiology labs, Katherine Kinnear oversees the day-to-day operation of the BIO2060L and BIO2080L labs, which includes supervising the undergraduate teaching assistants. She teaches Functional Human Anatomy lecture and Human Physiology lecture, as well as Wildlife Rehabilitation and Education. She is interested in pre-professional student development and education, as well as human dimensions of wildlife conservation. Katherine is licensed with the TWRA as a volunteer Class II wildlife rehabilitator and volunteers with a local non-profit Marshall Creek Wildlife Rehabilitation and Conservancy. She has been a guest speaker for several student organizations and community groups.

Dr. Hope Klug, Guerry Professor

Graduate Faculty: Yes

Education: Ph.D in Zoology, University of Florida, 2007; B.S. in Zoology, University of Florida, 2011

Years Active for Self- Study: 2018-present

Expertise: Dr. Klug is an evolutionary ecologist who aims to understand diversity in animal behavior from an ultimate perspective. She uses a combination of theoretical, computational, and empirical tools to advance and test theory. Much of her empirical research involves fish species, and she also regularly develops and analyzes mathematical models of evolution. Dr. Klug's research program is highly collaborative, and she involves undergraduate students in all aspects of her research. Dr. Klug was Interim Department Head of BGE from August 2018 through December 2019.

Dr. Francesca Leasi, UC Foundation Assistant Professor

Graduate Faculty: Yes

Education: M.S. in 2002 at Ph.D. in 2007 at the University of Modena and Reggio Emilia (Italy)

Years Active for Self- Study: 2018-present

Expertise: Dr. Leasi is an evolutionary ecologist with a primary research focus on investigating patterns of diversity and distribution of populations, species, and communities across diverse ecological and spatial scales. Dr. Leasi adopts an integrative approach, such as molecular, morphological, and computational tools to enhance our understanding of taxonomic, genetic, phylogenetic, and functional biodiversity, with a particular emphasis on small-sized invertebrates (meiofauna). Among different research projects, Dr. Leasi is currently working on the biodiversity of freshwater habitats in the Southeastern United States, with a specific focus on anthropogenic stressors. A great portion of Dr. Leasi's research is focused on the meiofauna of marine environments.

Professor Katherine Ludwig, Geology Lab Teaching Specialist

Graduate Faculty: No

Education: B.A. in Geology from Augustana College, Rock Island, IL; M.S. in Geology from University of Missouri - Columbia

Years Active for Self- Study: 2022-present

Expertise: Katherine Ludwig's scientific interests include the development of mountain ranges and fault systems, particularly focusing on the application of geochronologic and thermochronologic methods to answer research questions. Her current research focuses on the interactions of faults and timing of deformation in southeastern California. She teaches lab courses of Physical Geology (1110L) and Earth and the Environment (1105L).

Dr. Ashley Manning-Berg, Assistant Professor

Graduate Faculty: Yes

Education: B.S. in Geology, University of West Georgia; M.S. in Geology, The University of Tennessee at Knoxville; PhD in Geology, The University of Tennessee at Knoxville

Years Active for Self- Study: 2019-present

Expertise: Dr. Manning-Berg is a sedimentologist, interested in studying ecosystems in tidal environments on early Earth. Her research goals include understanding the effect of organisms on their chemical environment, and the extent to which those organisms are preserved in chemical matrices, such as evaporite, carbonate, and silica mineral phases. Much of her research involves field work, acutalistic taphonomy experiments, geochemical tests to determine what is preserved (i.e., ESEM-EDS, XRD, XRF, FTIR, EA-iRMS, and GC-MS-MS), as well as some geochemical modeling. The results of her research are used to constrain the environmental conditions of tidal environments, inform major transitions in the chemistry of the marine environment, and to determine whether such environments are analagous to potentially habitable (or previously habitable) extraterrestrial environments on Mars. She has recently started to investigate the transport and deposition of microplastic particles in local rivers and to explore the concentrations and possible sources of microplastic pollution in Racoon Mountian Caverns. Dr. Manning-Berg teaches Paleontology, Sedimentology and Stratigraphy, Astrobiology, Oceanography, Global Climate Change: Past. Present, and Future, Physical Geology, and rotates to teach the Geology Seminar and Research Capstone courses. She is also the coordinator for the College of Arts and Sciences (CAS) Residential Learning Community (RLC) called CAS General (soon to be CAS Explorers).

Professor Monica Miles, Associate Lecturer

Graduate Faculty: No

Education: B.S. in Biology: Organismal, University of Tennessee at Chattanooga, 2016; M.S. in Environmental Science, University of Tennessee at Chattanooga, 2018 - mammalian social evolution

Years Active for Self- Study: 2018-present

Expertise: Monica Miles teaches a rotating schedule of Principles of Biology I and III, Conservation of Biodiversity, Ecology, Evolution, and Ecology Laboratory. She is interested in supporting student success and retention through the implication of dynamic and innovative teaching. Her graduate research focused on the evolution of social organization in artiodactyls.

Dr. Brad Reynolds, Senior Lecturer, BS ESC Coordinator

Graduate Faculty: Yes

Education: Ed.D. Learning and Leadership, UT Chattanooga , December 2013; M.S. Environmental Science, UT Chattanooga, August 2003; B.S. Chemistry, Tennessee Wesleyan College, May 1996.

Years Active for Self- Study: 2018-present

Expertise: Dr. Reynolds earned a B.S. in Chemistry from Tennessee Wesleyan College in 1996. He then taught chemistry laboratory for five years at Chattanooga State Technical Community College. While working at Chattanooga State, he pursued an M.S. in Environmental Science at the University of Tennessee at Chattanooga (UTC). He completed his M.S. degree in 2003. His project, a mixture of law and policy and toxicology, focused on Chattanooga Creek and on the contamination of surrounding residential areas. In 2004, he joined the UTC Department of Biology, Geology and Environmental Sciences as a faculty member (he is now a Senior Lecturer of ESC and the Undergraduate ESC Coordinator). Dr. Reynolds went on to pursue and complete (in 2013) a Doctorate of Education in Learning and Leadership. His dissertation research revolved around reptiles and amphibians, and investigated the impact of transformational leadership, experiential learning, and reflective journaling on the conservation ethic of non-science majors. His interests include conservation, herpetology, environmental ethics, environmental education, environmental leadership, and transformational leadership. Currently, Dr. Reynolds teaches Conservation of Biodiversity (Bio/ESC 1100), Introduction to Environmental Science I Lecture and Lab (ESC 1500), and Introduction to Environmental Science II Lecture and Lab (ESC 1510). Dr. Reynolds also co-teaches Tropical Ecology (ESC/Bio 4999) with Dr. David Aborn. Dr. Reynolds teaches Values and the Environment (ESC 4840) every Spring. He likewise has experience teaching ESC 4070 Environmental Conservation.

Dr. Sean Richards, UC Foundation Professor

Graduate Faculty: Yes

Education: 2000, Ph.D., Environmental Toxicology, Texas Tech University; 1995, M.S., Occupational and Environmental Health, The University of Arkansas for Medical Sciences; 1992, B.Sc., Biology, Arkansas Tech University

Years Active for Self- Study: 2018-present

Expertise: Over the last 25 years Dr. Richards has conducted research on the exposure and effects of multiple toxicants on organisms ranging from bacteria to humans. These toxicants include herbicides, insecticides, pharmaceuticals, Bisphenol A, Poly Aromatic Hydrocarbons, Per- and Polyfluoroalkyl Substances, metals, and Poly Chlorinated Biphenyls. Dr. Richards also has experience with the laws and regulations which govern exposure to toxicants through air, soil, and water. Most recently, Dr.

Richards has focused on metabolomics. Specifically, the alterations of metabolomes in response to toxicants or in populations of humans affected by endometrial cancer, congenital malformations, endometriosis, polycystic ovarian syndrome, and fetal central nervous system anomalies. The goal of his research is to determine specific biochemical pathways associated with the affected populations. Ultimately, understanding the changes in the metabolome as a result of disease or intoxication can lead to early detection and personalized treatments. Dr. Richards' overall efforts and collaborations have resulted in >60 peer-reviewed publications and >100 international presentations involving dozens of students.

Dr. Ritu Sharma, Visiting Assistant Professor

Graduate Faculty: No

Education: B.Sc. Biochemistry 2000, Government Medical College, India

M.Sc. Biochemistry 2002, Government Medical College, India

Ph.D. Molecular Biology and Biochemistry 2007, Guru Nanak Dev university, India

Postdoc Biological Sciences 2013-2014, University of Delaware, USA

Years Active for Self- Study: 2023-present

Expertise: Dr. Sharma is a Visiting Assistant professor in Biology having extensive experience of teaching diverse topics of life sciences to both undergraduate and graduate students. She has been professionally active throughout his career serving as Mentor to postgraduate students for their research work, published 23 research papers with 3 best paper awards and several paper presentations at scientific conferences. Her research interests include conducting studies on the potential risk factors for cardiovascular diseases and elucidating the signaling mechanisms.

Dr. Joey Shaw, UC Foundation Professor

Graduate Faculty: Yes

Education: Ph.D. Botany. 2005. University of Tennessee, Knoxville

M.S. Botany. 2001. University of Tennessee, Knoxville

B.S. Biology. 1998. The University of Tennessee at Chattanooga

Years Active for Self- Study: 2018-present

Expertise: Dr. Shaw's research interestes have focused on the vascular flora of Tennessee and plant conservation in the Southern Appalachians. His 33 published articles have included 28 UTC student authors. His published artilces have been cited >5870 times from workers in over 130 countries. He has crafted 28 technical reports for federal or state agencies or private consulting companies and most

included UTC students as collaborators or coauthors. His lab has presented 181 professional presentations with 171 UTC student authors at state, regional or national/international meetings and almost all have been oral (19 were invited). Dr. Shaw has been PI or Co-PI on \$2.75 million in funding to UTC. He is currently editing and authoring the Second Edition of the Guide to the Vascular Plants of Tennessee, and he is the editor for the Tennessee-Kentucky Plant Atlas, which serves plant data on ~5000 species. He curates the UTC herbarium of >50,000 specimens. Dr. Shaw is the Director of the Spring Wildflower Pilgrimage in the Great Smoky Mountains National Park, which invites >120 professional biologists, ecologists, naturalists, conservation workers and other specialists to lead outreach and education opportunities on >200 different educational programs over 5 days in April/May each spring. Each year this event attracts ~1000 attendees from a few countries and 35-40 US states.

Dr. Tahmina Shirmeen, Lecturer

Graduate Faculty: No

Education: B. Sc. in Geological Sciences, Jahangirnagar University, 1997; M. Sc. In Geological Sciences, Jahangirnagar University, 2000; M.S. in Geology, University of Mississippi, 2010; M.S. in Engineering Science, Computational Hydrosience and Engineering, University of Mississippi, 2016.

Years Active for Self- Study: 2022-present

Expertise: Tahmina Shirmeen's research interests include flood inundation analysis, hydrologic and hydrodynamic surface water modeling, rainfall-runoff numerical modeling at watershed scales. Her research also focuses on the applications of Remote Sensing (RS), Geographic Information Systems (GIS) and spatial analysis to study the land use land cover change and the impacts of climate change on it. She teaches Geology of the National Parks (GEOL 1025), Physical Geology (GEOL 1110), Earth's Resources and the Environment (GEOL 1040), Oceanography Lecture and Lab (GEOL 2250).

Dr. Rardy Spratt, Professor

Graduate Faculty: Yes

Education: B.S. in Applied Biology, Georgia Institute of Technology, 1977; M.S. in Applied Biology, Georgia Institute of Technology, 1980; Ph.D in Microbiology, University of Georgia, 1985

Years Active for Self- Study: 2018-present

Expertise: Henry G. "Rardy" Spratt, PhD in Microbiology is a Professor of Biology, Geology, and Environmental Sciences at the University of Tennessee at Chattanooga, where he has been since 1994. Dr. Spratt teaches senior- and graduate-level microbiology, immunology, and microbial ecology courses, incorporating laboratory experiences in most. Research interests have ranged from soil microbial processes in wetlands to current projects in clinical microbiology, conducting studies of microbial contamination of surfaces in healthcare clinics. He has mentored over 40 undergraduate or graduate student, helping them earn Departmental Honors of their M.S. in ESC degrees. He has been professionally active throughout his career, serving as a reviewer for various journals and federal programs, serving on three federal panels. He is the author or editor of 3 books, has published over 25

peer-reviewed scientific articles, and given (with his students) over 120 presentations at scientific conferences.

Dr. Jennifer Taylor, Assistant Professor

Graduate Faculty: No

Education: B.S. in Geosciences, Penn State University, 2017; B.A. in English, Penn State University, 2017; Ph.D in Earth & Environmental Science, University of Minnesota, 2023

Years Active for Self- Study: 2023-present

Expertise: Dr. Taylor is a geologist who combines methods from structural geology, petrology, and thermochronology to investigate questions related to tectonics. Her ongoing research includes studies of quartz deformation, characterizing exhumation related to metamorphic core complex formation and tectonic influences of the Yellowstone hotspot in central Idaho, and investigating glacial incision of West Antarctica. Dr. Taylor is passionate about geoscience communication and outreach, and is excited to engage students in both research and science communication activities.

Dr. John Tucker, Professor

Graduate Faculty: Yes

Education: B.S. Biology, Stetson University; J.D., University of Florida; LL.M. Environmental and Natural Resources Law, Northwestern School of Law, Lewis and Clark College

Years Active for Self- Study: 2018-present

Expertise: John Tucker returned to the faculty ranks in fall 2021 after serving in full time administrative roles for 14 consecutive years (12 years as BGE Department Head, 2 years as Interim Associate Dean of College of Arts and Sciences). His research interests are broad and over the years have included projects, publications and reports relating to riparian habitat protection, environmentally sensitive lands protection, pesticide regulation, land use planning and regulation, air pollution, hazardous wastes, environmental justice, and citizen participation in environmental decisionmaking at local, state, and international levels (Poland and Brazil). He is currently working with students on research projects involving involving law and policy analysis of the Econlockhatchee River Basin Management and Protection Plan, the Tennessee Interbasin Water Transfer Act permit program, and the 2023 Supreme Court decision in Sackett v. EPA limiting federal authority under § 404 of the Clean Water Act to regulate wetland activities in certain types of wetlands.

Dr. Thomas Wilson, UC Foundation Professor and Director of Environmental Science Graduate Programs

Graduate Faculty: Yes

Education: A.S. in Biological Sciences, College of Lake County, 1990; B.S. in Zoology, Eastern Illinois University, 1992; M.S. in Zoology, Eastern Illinois University, 1994; Ph.D in Environmental Science and

Public Policy, George Mason University, 2002; GISP in Geospatial Sciences, GIS Certification Institute, 2009

Years Active for Self- Study: 2018-present

Expertise: Dr. Wilson is passionate about working with students so they can become independent scientists and forward thinkers. In short, he is a seasoned field biologist who enjoys the outdoors and excels at solving problems in the field. He is comfortable working with a variety of aquatic and terrestrial taxa. Dr. Wilson began his career researching the effects of landscape level changes on free-ranging populations of vertebrates. During this time, he worked with several endangered and threatened (E&T) species from a variety of habitats. Some of these E&T species include Spotted Turtle, Bog Turtle, Wood Turtle, Blanding's Turtle, Timber Rattlesnake, and Eastern Massasauga Rattlesnake. The main focus of this research was tied to demographics, spatial ecology and habitat selection; and, his general interests still lie there today. However, his current research focuses less on E&T species and is more in line with keeping the common species common. Since his arrival at UTC, he have established two long-term studies concerning amphibians and freshwater turtles, and much of this research focuses on population ecology, microhabitat assessment and disease surveillance. He has maintained an interest in solving field related problems, and his background in classical ecological analyses has allowed him to design new methods for measuring and monitoring biodiversity. To this end, he has collaborated with scientists in the public and private sectors in an effort to encourage decision makers to standardize ecological and environmental census techniques. The students working in Dr. Wilson's laboratory are using descriptive, comparative, and experimental studies to answer questions about the ecology of salamanders, frogs, and freshwater turtles at different geospatial scales.

Appendix 4-E Administrators with Tenure in BGE

Dr. Ethan Carver, Collins Professor, Associate Graduate Dean

Graduate Faculty: Yes

Education: B.S. Biology, University of Tennessee, Chattanooga, 1991; Ph.D. in Biomedical Sciences, University of Tennessee-Oak Ridge Graduate School of Biomedical Sciences, 1999

Years Active for Self- Study: 2018-present

Expertise: Dr. Carver is a developmental biologist and comparative molecular biologist interested in developmental pathways that may involve human disease. He has studied early developmental processes associates with germ layer differentiation, skeletal and muscular defects as well as cellular physiology. He has used mice and zebrafish as animal models for human disease as well as human and other mammal cell cultures.

Dr. Hong Qin, Professor, Head of Computer Science

Graduate Faculty: Yes

Education: Ph.D. Biochemistry and Molecular Biology, University of Chicago, December 2001

M.S. Computer Science, Loyola University of Chicago, May 2002

M.S. Biophysics, Tsinghua University, China, May 1994

B.S. Biological Sciences and Biotechnology, Tsinghua University, China, May 1991

Years Active for Self- Study: 2018-present

Expertise: Dr. Hong Qin is a Professor of Computer Science and Biology at the University of Tennessee Chattanooga. He has a Ph.D. from the University of Chicago, an M.S. from Loyola University of Chicago, an M.S. and a B.S. from Tsinghua University. Dr. Qin's research focuses on healthcare equity, computational biology, data science, and machine intelligence. He has organized 21 data science training workshops/bootcamps and successfully applied for 24 external grants, including an NSF CAREER award, totaling ~8.7M. Dr. Qin is a winner of 2022 Healthy Longevity Global Grand Challenge from the National Academy of Medicine recipient and the 2016 recipient of the William A. Hinton Research Training Award from the American Society for Microbiology.

Dr. Joanne Romagni, Associate Professor, Vice Chancellor for Research and Dean of the Graduate School

Graduate Faculty: Yes

Education: Purdue University, 1984 BA Biology; Indiana University of PA, 1994 BA Biology secondary education; Arizona State University, 1998 PhD Plant Physiology/biochemistry

Years Active for Self- Study: 2018-present

Expertise: Dr. Romagni is a plant physiologist and biochemist whose research studies molecular mechanisms of action for secondary plant metabolites. She also works with lichen and lichen secondary metabolites. Her current research is evolving to include the field of cone shell venomics working with a group at the University of Cadiz. Her work is highly collaborative including mathematics, organic and analytical chemistry and taxonomy. She has included undergraduates in all of her research.

Appendix 4-F Faculty Who Are No Longer Active

Dr. Fernando Alda, Assistant Professor

Graduate Faculty: Yes

Education: B.Sc in Biology, University of Navarra, 2002; M.Sc. in Biology Complutense University of Madrid-National Museum of Natural Science, 2005; Ph.D. in Biology, Complutense University of Madrid-National Museum of Natural Science, 2009

Years Active for Self- Study: 2019-2023

Expertise: Dr. Alda's research is varied in scope and uses a multidisciplinary approach that combines fieldwork and genomics to understand broad patterns in the diversification of freshwater fishes at different taxonomical and temporal scales. On one hand, his results serve as a basis for testing hypotheses related to the role of geography, ecological adaptation, and life history traits in generating genomic diversity, divergence, and eventually speciation. On the other hand, they allow him to assess the utility of different types of genomic markers for evolutionary studies at multiple scales, and to explore the best bioinformatic strategies for their analysis. Overall, his research program is exemplified by studies that seek to clarify the patterns and processes of fish diversity, while reciprocally addressing contemporary issues in population genomics, systematics, and evolution. In his most recently awarded project, he collaborated with a MS ESC graduate student and other UTC faculty to use metabarcoding technology to examine differences in the gut microbiome of native and nonnative freshwater fishes and investigate the role of the gut microbiome in the invasiveness potential of these species. Dr Alda resigned July 31, 2023 to return to Spain to work as a Tenured Scientist at the Spanish National Research Council.

Dr. Habte Giorgis Churnet, UC Foundation Professor

Graduate Faculty: No

Education: B.Sc. in Geology, Haile Selassie I University, Ethiopia, 1969; M.S. in Geophysics, Leeds University, United Kingdom, 1972; Ph.D. in Geology, University of Tennessee, 1975

Years Active for Self- Study: 2018-2019

Expertise: Dr. Churnet's research interest broadly lies in revealing the origins, formations, and deformation of rocks and economic mineral deposits with emphasis on southeastern USA. Dr. Churnet retired July 31, 2019.

Dr. Stephanie DeVries, Assistant Professor

Graduate Faculty: Yes

Education: B.A. in Art, Grinnell College, 1999; M.S. in Geology, City College of New York, 2010; Ph.D. The CUNY Graduate Center, 2017

Years Active for Self- Study: 2019-2023

Expertise: Dr. DeVries' primary research interest is in the occurrence, fate, and transport of microplastics in streams. In particular, she is interested in optimizing sampling and detection methods used to collect and quantify microplastics across heterogeneous stream sections. Currently, she has one project that is focusing on best practices for rapid quantification of microplastics using Nile Red dye and a second that will test a novel, dual sampling approach for aquatic sample collection and apply it to a stream cross section. The results will be used to determine an optimal sampling matrix based on channel morphology and stream velocity vectors. Recently, she was awarded a USGS 403b grant, administered by the University of Tennessee at Knoxville, to support this work, and she is a collaborating member of a microplastics work group that is organizationally housed at UTK. Dr. DeVries resigned July 31, 2023 to take a job for the State of North Carolina as a hydrogeologist for the Central Coastal Plain Capacity Use Area.

Dr. Ann E. Holmes, Mildred Routt Distinguished Teaching Professor

Graduate Faculty: No

Education: BA in Geology, University of Tennessee at Chattanooga, 1976, M.S. in Geology, University of Alabama, 1981, PhD in Geology, Columbia University, 1996.

Years Active for Self- Study: 2018-2019

Expertise: Dr. Holmes conducted stratigraphic and paleontological research with undergraduate Geology majors, University Honors students, and education majors locally, regionally and internationally (Bahamas). She also co-taught the Tropical Island Ecology and Geology class with Dr. Dawn Ford, developed and taught online Geology classes in Physical Geology & lab 1110 and Geology of National Parks 1025, and was responsible for the scheduling of classes for the Geology Program. Dr. Holmes retired July 31, 2019.

Dr. Margaret Kovach, UC Foundation Professor

Graduate Faculty: Yes

Education: B.A. in Microbiology, Southern Illinois University-Carbondale, 1986; Ph.D. in Microbiology, Colorado State University, 1995. – Molecular pathology of disease

Years Active for Self- Study: 2018-2022

Expertise: Dr. Kovach's primary research interest is in mammalian genomics: the identification and functional characterization of genes. In particular, she is interested in genome organization and chromatin structure and their influences on nuclear functions such as DNA replication, chromosome segregation and gene expression. Currently she has two projects that focus on gene regulatory effects

and mechanisms involved in the molecular pathology of cancer and hereditary deafness. She is also involved in a collaborative study with the University of Tennessee College of Medicine investigating the effectiveness of a nanofiber bone repair device for bone regeneration. Recently she has begun a collaboration with the UTC Departments of Biology, Geology & and Environmental Science and Chemistry & Physics to investigate the molecular effects of e-cigarettes on human lung tissue. Dr. Kovach retired July 21, 2022.

Dr. Jonathan W. Mies, Robert Lake Wilson Professor

Graduate Faculty: Yes

Education: B.S. in Geology, University of New Hampshire; M.S. in Geology, University of North Carolina at Chapel Hill; Ph.D. in Geology, University of North Carolina at Chapel Hill

Years Active for Self- Study: 2018-2023

Expertise: In the area of structural geology, Dr. Mies's research interests include shaped structures, e.g. folds, as post-orogenic stress guides in the upper crust, and modern methods of kinematic and stress and strain analysis; in the area of mineralogy, they include powder X-ray diffraction and forensic mineralogy; and in the area of regional geology, they include structure, tectonics, and terrain boundaries of the southern Appalachians. He also has a budding interest in seismology. Dr. Mies retired July 31, 2023.

Dr. Jason Muhlbauer, Lab Coordinator/Teaching Associate of Geology

Graduate Faculty: No

Education: BS.. in Geology, Bucknell University, 2013; M.S. in Geology, UT-Knoxville, 2015; Ph.D in Geology, UT-Knoxville, 2021

Years Active for Self- Study: 2021-2022

Expertise: Dr. Muhlbauer joined the department during the COVID-19 pandemic to manage the physical geology labs. He left the university May 16, 2022 after serving for 18 months in this position.

Dr. Cheryl Murphy, Faculty Associate/Lab Coordinator

Graduate Faculty: No

Education: B.S. Environmental Studies, Biology Emphasis, University of Nebraska-Lincoln, 1996; M.A. Ecology-plant/soil community ecology, University of Kansas, 2004; Ph.D. Ecology-plant/soil community ecology, University of Kansas, 2012.

Years Active for Self- Study: 2018-2023

Expertise: Executes all teaching and research related purchases for the department: Responsible for procurement card purchases and POs; coordinating the shipment and receiving of large equipment delivered and making sure it gets to the correct end location; monthly review of the procurement card

statement; consulting and coordinating with Department Accounting Specialist regarding purchases and accounts; Departmental Inventory/Equipment transfers: Responsible for tagging equipment that falls under the Fiscal Policy of Sensitive Minor Equipment (\$1500-4999) and equipment over \$5000; responsible for maintaining a current equipment inventory of tagged equipment; properly transferring equipment to surplus when items are not needed/functioning anymore. Coordinator for equipment and instrument maintenance and repair. Facilities Inventory: Responsible for maintaining a current space inventory/survey; Assigning account numbers (grants/internal grants/payroll), personnel and use to each room in the department. Departmental Safety and Chemical Officer: Responsible for ensuring our department is compliant with safety regulations and chemical hygiene guidelines; keeping Safety Data Sheets current for all substances in laboratories (teaching and research); properly disposing of hazardous and biohazard waste; maintaining a current chemical inventory list; maintaining current lab safety signs outside of laboratory doors; regularly training faculty and students about safety guidelines; emergency management. Coordinator of Key/Swipe Card Access/Punch Code Access: Responsible for submitting key requests for faculty/staff and for checking out keys to students (and keeping track) when needed. Some rooms require access from a card swipe (Area Access Manager) using their UTC ID – I grant access to those students. Some rooms have a punch code access: Responsible for changing the punch codes every semester and giving the punch code to students when needed. Coordinator of Introductory Biology Labs-30 sections/semester on average (BIOL 1110L and BIOL 1120L): Responsible for purchasing supplies and equipment for all sections; updating lab manuals; coordinating/overseeing laboratory instructors, which includes 10 graduate teaching assistants per semester, as well as adjunct faculty and lecturers; maintaining labs to be able to accommodate 30 sections of labs per semester. Serve on University IACUC Committee. Dr. Murphy resigned this position July 31, 2023 to become the UTC Director of Institutional Research.

Dr. Mark Schorr, Professor

Graduate Faculty: Yes

Education: B.S. in Zoology, Southeastern Louisiana University, 1985; M.S. in Zoology, Mississippi State University, 1988; Ph.D. in Fisheries Ecology/Management, Mississippi State University, 1994

Years Active for Self- Study: 2018-2022

Expertise: Dr. Schorr's primary research interest was stream fish ecology, with an emphasis on water pollution issues and population/community ecology. Graduate and undergraduate students have conducted research to address the following problems: 1) influence of coal mine drainage on stream water chemistry, habitat, and aquatic macrofauna (macroinvertebrates, fishes, salamanders) in the Cumberland Plateau; 2) landscape-stream relationships that involve watershed land use, riparian buffers, limnological parameters, and macrofaunal assemblages in Ridge and Valley catchments; 3) localized effects of road culverts on in stream habitat and fish assemblages in Blue Ridge catchments; 4) lotic macrofaunal responses to stream restoration projects (artificial pools/riffles, constructed channels); and 5) historical and contemporary patterns in the distribution and abundance of the introduced redbreast sunfish (*Lepomis auritus*) and native congeneric sunfishes (*Lepomis* spp.; Centrarchidae) in reservoirs in the Tennessee River drainage. Dr. Schorr passed away in August 2022.

Professor Wayne K. Williams, Lab Coordinator/Teaching Associate of Geology

Graduate Faculty: No

Education: B.S. in Geology, University of Tennessee at Chattanooga, 1979, M.S. in Geology, Memphis State University, 1980.

Years Active for Self- Study: 2018-2020

Expertise: Mr. Williams managed the physical geology labs and helped other faculty with lab coordination. He retired December 31, 2020.

Appendix 4-G

Part-Time Faculty Roster Form

Qualifications of Full-Time and Part-Time Faculty

September 1, 2018 – July 31, 2023

Name of Institution: The University of Tennessee at Chattanooga

Name of Primary Department, Academic Program, or Discipline: Biology, Geology & Environmental Science

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
Courtney Alley (P)	Fall 2020 BIOL 1110L, Principles of Biology I Laboratory, 0	MS, Environmental Science. University of Tennessee at Chattanooga, 2019.	Teaching Qualifications Degree in Discipline
Paul-Erik Bakland (P)	Spring 2019	MS, Environmental Science. University of Tennessee at Chattanooga, 2018.	Teaching Qualifications Degree in Discipline

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	BIOL 1120, Principles of Biology II, 4 BIOL 3060, Ecology, 3		
David Bechler (P)	Fall 2018 BIOL 4999, Human Biology: An Ecological/Evolutionary Perspect, 3 Spring 2019 BIOL 4999R, Human Biology: An Ecological/ Evolutionary Perspective, 3	PhD, Behavioral Ecology/Biology. Saint Louis University, 1981. MS, Biology. Northeast Louisiana University, 1974.	Teaching Qualifications Degree in Discipline
Meagan Bertoli (P)	Fall 2022 BIOL 1110L, Principles of Biology I Laboratory, 0	BA, Environmental Studies. Maryville College, 2021.	Teaching Qualifications 18 Graduate Credit Hours in Discipline Secondary instructor for BIOL 1110L - Principles of Biology I Laboratory
Gregory Brodie (P)	Fall 2018	MS, Engineering Geology. Purdue University Main Campus, 1979.	Teaching Qualifications Degree in Related Discipline

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	GEOL 1160, Current Geological Perspectives of Earth, 3 GEOL 1230, Environmental Geology, 4 GEOL 1230L, Environmental Geology Laboratory, 0 Spring 2019 GEOL 1025, Geology of the National Parks, 3 GEOL 1160, Current Geological Perspectives of Earth, 3 Fall 2019 GEOL 1025, Geology of the National Parks, 3 GEOL 1160, Current Geological Perspectives of Earth, 3		

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	Spring 2020 GEOL 1025, Geology of the National Parks, 3 GEOL 1160, Current Geological Perspectives of Earth, 3 Fall 2020 GEOL 1160, Current Geological Perspectives of Earth, 3 GEOL 1230, Environmental Geology, 4 GEOL 1230L, Environmental Geology Laboratory, 0 Spring 2021 GEOL 1160, Current Geological Perspectives of Earth, 3		

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	Fall 2021 GEOL 1025, Geology of the National Parks, 3 (UT) GEOL 1160, Current Geological Perspectives of Earth, 3 (UT) Spring 2022 GEOL 1025, Geology of the National Parks, 3 (UT) GEOL 1160, Current Geological Perspectives of Earth, 3 (UT) Fall 2022 GEOL 1160, Current Geological Perspectives of Earth, 3 GEOL 1230, Environmental Geology, 4		

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	Spring 2023 GEOL 1025, Geology of the National Parks, 3 GEOL 1160, Current Geological Perspectives of Earth, 3		
Kelly Daniels (P)	Spring 2019 BIOL 3350, Evolution, 3	MS, Environmental Science. University of Tennessee at Chattanooga, 2018.	Teaching Qualifications Degree in Related Discipline
Emily Davis (P)	Fall 2022 ESC 1500L, Introduction to Environmental Science I Laboratory, 0 Spring 2023 BIOL 1100, Conservation of Biodiversity, 3	MS, Environmental Science. University of Tennessee at Chattanooga, 2021.	Teaching Qualifications Degree in Discipline

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
Josh Ennen (P)	Spring 2019 ESC 5060, Advanced Ecology, 3 Spring 2020 ESC 5060, Advanced Ecology, 3 Spring 2021 BIOL 4999R, Advanced Ecology, 3 ESC 5010R, Advanced Ecology, 3	PhD, Biological Sciences. University of Southern Mississippi, 2009. MS, Biology. Austin Peay State University, 2005.	Teaching Qualifications Degree in Discipline Degree in Related Discipline
Christina Gibson (P)	Spring 2023 ESC 4999R, Regenerative Design Principles, Processes, and Methods, 3	MS, Landscape Design. The Conway School, 2012.	Teaching Qualifications Degree in Related Discipline Other Qualification

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
			Document Gibson Christina - CV202240-1.pdf
William Helenbrook (P)	Spring 2021 BIOL 3250, Genetics, 3 Spring 2022 BIOL 3250, Genetics, 3 (UT)	PhD, Conservation Biology. The State University of New York College of Environmental Science and Forestry, 2014. MA, Biological Sciences. The State University of New York College at Buffalo, 2006.	Teaching Qualifications Degree in Discipline
Dona Huggins (P)	Fall 2019 BIOL 3070, Ecology Laboratory, 1 Spring 2020 BIOL 3060, Ecology, 3 BIOL 3070, Ecology Laboratory, 1	PhD, Environmental Health Sciences, Toxicology. University of Michigan, 1982. MS, Biology. Florida State University, 1977.	Teaching Qualifications Degree in Discipline
			Teaching Qualifications

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
Melanie Krautstrunk (P)	Fall 2018 GEOL 1110, Physical Geology, 3 Spring 2019 GEOL 1110, Physical Geology, 3 Fall 2020 GEOL 2250, Oceanography, 3 GEOL 2250L, Oceanography Laboratory, 1 Spring 2021 GEOL 1110, Physical Geology, 3 Spring 2022	MS, Geoscience, Hydrogeology. University of Nevada, Las Vegas, 2012.	Degree in Discipline Document Krautstrunk M CV201740-1.pdf

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	GEOL 1110, Physical Geology, 3 (UT)		
Laura Marsh (P)	Fall 2019 ESC 1500L, Introduction to Environmental Science I Laboratory, 0	MS, Environmental Science. University of Tennessee at Chattanooga, 2015.	Teaching Qualifications Degree in Discipline
Joseph McCauley (P)	Fall 2018 BIOL 1100, Conservation of Biodiversity, 3 BIOL 1130, Principles of Biology III, 3 BIOL 1999, Special Projects, 1 Spring 2019 BIOL 1100, Conservation of Biodiversity, 3	MS, General Biology. Mississippi State University, 2012.	Teaching Qualifications Degree in Discipline

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	BIOL 1130, Principles of Biology III, 3 Summer 2019 BIOL 1100, Conservation of Biodiversity, 3 BIOL 1999R, Special Projects: Biology I Lab, 1 Fall 2019 BIOL 1100, Conservation of Biodiversity, 3 BIOL 1110, Principles of Biology I, 4 BIOL 1999R, Special Projects, 1 Spring 2020 BIOL 1100, Conservation of Biodiversity, 3		

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	BIOL 1120, Principles of Biology II, 4 BIOL 1999R, Special Projects, 1 Summer 2020 BIOL 1100, Conservation of Biodiversity, 3 BIOL 4998R, Individual Studies, 1 Fall 2020 BIOL 1100, Conservation of Biodiversity, 3 BIOL 1130, Principles of Biology III, 3 BIOL 1999R, Special Projects: Individual Studies, 1 Spring 2021		

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	BIOL 1100, Conservation of Biodiversity, 3 BIOL 1130, Principles of Biology III, 3 BIOL 1999R, Special Projects, 1 Summer 2021 BIOL 1100, Conservation of Biodiversity, 3 BIOL 4998R, Individual Studies, 1 Fall 2021 BIOL 1100, Conservation of Biodiversity, 3 (UT) Spring 2022 BIOL 1100, Conservation of Biodiversity, 3 (UT)		

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	BIOL 1999R, Special Projects, 1 (UT) Fall 2022 BIOL 1100, Conservation of Biodiversity, 3 BIOL 1999R, Special Projects, 1 BIOL 2060L, Functional Human Anatomy Laboratory, 0 Spring 2023 BIOL 1100, Conservation of Biodiversity, 3 ESC 1100, Conservation of Biodiversity, 3 ESC 4998R, Individual Studies, 1 Summer 2023		

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	BIOL 1100, Conservation of Biodiversity, 3		
Colleen Mikelson (P)	Fall 2018 BIOL 1100, Conservation of Biodiversity, 3 Fall 2019 ESC 1100, Conservation of Biodiversity, 3 Spring 2020 ESC 1100, Conservation of Biodiversity, 3 Spring 2021 ESC 1100, Conservation of Biodiversity, 3	MS, Environmental Science. University of Tennessee, 2011.	Teaching Qualifications Degree in Discipline Degree in Related Discipline

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
	Fall 2021 ESC 1100, Conservation of Biodiversity, 3 (UT) Spring 2022 ESC 1100, Conservation of Biodiversity, 3 (UT) Fall 2022 ESC 1100, Conservation of Biodiversity, 3 Spring 2023 ESC 1100, Conservation of Biodiversity, 3		
Sabrina Novak (P)	Fall 2018 ESC 1100, Conservation of Biodiversity, 3	MS, Environmental Science. University of Tennessee, 2004.	Teaching Qualifications Degree in Related Discipline

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
Matthew Perkins (P)	Fall 2021 BIOL 1110L, Principles of Biology I Laboratory, 0 (UT)	MS, Environmental Science, Biology. UTC, 2010. MS, MS Environmental Science. Univ of Tennessee-Chattanooga.	Teaching Qualifications Other Qualification
Hunter Smith (P)	Fall 2022 BIOL 1110L, Principles of Biology I Laboratory, 0	BS, Environmental Science. University of Mount Union, 2020.	Teaching Qualifications 18 Graduate Credit Hours in Discipline Document 2022 Fall Graduate Teaching Assistant Documentaiton Form - Hunter Smith SIGNED-1.pdf
Eric Tangumonkem (P)	Spring 2022 GEOL 1110L, Physical Geology Laboratory, 1 (UT)	PhD, Geosciences. University of Texas at Dallas, 2008. MS, Earth Sciences. University of Yaoundé I, 2001.	Teaching Qualifications Degree in Discipline
			Teaching Qualifications

Name (F, P)	COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (UN, UT, U, G)	ACADEMIC DEGREES & COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught
Erin Taylor (P)	Fall 2021 BIOL 1110L, Principles of Biology I Laboratory, 0 (UT)	BS, Environmental Sciences in Agricultural Systems. Mississippi State University, 2017.	18 Graduate Credit Hours in Discipline GTA - Must be co-listed as secondary.

UN, UT, U, G: Undergraduate Nontransferable, Undergraduate Transferable, Undergraduate, Graduate

Appendix 4-H

Department of Biology, Geology, and Environmental Science Peer Evaluation of Instruction Form

Instructor _____ Course _____

Bldg/Room# _____ Hour _____

Date _____ Evaluator _____

Was the presentation primarily:

- ☐ lecture
- ☐ discussion
- ☐ demonstration

- ☐ lecture/discussion
- ☐ lecture/demonstration
- ☐ other: _____

What were the objectives of this class?

Were the objectives addressed?

GENERAL RATING

In comparison with other university presentations in my experience and of a similar type, I would rate this presentation as:

☐ Excellent ☐ Very Good ☐ Satisfactory ☐ Unsatisfactory

Comments of the evaluated instructor:

Signature of Evaluator

Signature of Instructor

Evaluation Criteria	Yes	No	NA*	Comments
1. Instructor showed genuine concern for the learning of his/her students.	☐	☐	☐	
2. Instructor actively encouraged questions and provided ample time for these to occur.	☐	☐	☐	
3. Instructor encouraged class discussion and provided ample time for this to occur.	☐	☐	☐	
4. Instructor organized valuable classroom experiences.	☐	☐	☐	
5. Instructor showed visible respect for all students.	☐	☐	☐	
6. Instructor used instructional materials that promoted learning.	☐	☐	☐	
7. Instructor was tolerant and accepting of student holding different points of view.	☐	☐	☐	
8. Instructor presented course material at an appropriate level of difficulty.	☐	☐	☐	
9. Instructor was intellectually stimulating during presentation.	☐	☐	☐	
10. Instructor demonstrated a thorough knowledge of the course content.	☐	☐	☐	
11. Instructor was well prepared for this presentation.	☐	☐	☐	
12. Instructor described how topics related to each other, and the course as a whole.	☐	☐	☐	
13. Instructor was enthusiastic about helping students learn.	☐	☐	☐	
14. Instructor was an effective speaker during this presentation.	☐	☐	☐	
15. Instructor provided illustrative situations and examples that promoted learning.	☐	☐	☐	
16. Instructor used class time wisely and efficiently to maximize student learning.	☐	☐	☐	
17. Instructor was able to answer student questions effectively.	☐	☐	☐	
18. Instructor exhibited enthusiasm for the discipline.	☐	☐	☐	

*NA: not applicable

If the evaluator had the opportunity to observe the following please comment:

1. Instructor set high, but reasonable, standards for students.
2. Instructor helped students identify important objectives of the course.
3. Instructor was flexible about trying new approaches to help students learn.
4. Instructor provided opportunities for students to obtain assistance outside the classroom (office hours, appointments, etc.).
5. Instructor was appropriately responsive to feedback and/or constructive criticism from students.
6. Instructor described how topics related to other disciplines (if applicable).

Comments and Suggestions:

What characteristics of the instructor and the class did you find strong?

What characteristics of the instructor and the class do you think were weak?

What specific suggestions would you make to this instructor to strengthen his/her classroom performance?

Appendix I: Published Scholarship

1. David Aborn, 2018. Aborn, D. A. Late nesting Killdeer in Hamilton County. *The Migrant* 89:120-121
2. Jennifer Boyd, 2018. Russo L., Boyd J.N. 2018. Comparative development and growth of *Aedes albopictus* in response to native *Quercus rubra* and invasive *Lonicera maackii* leaf litter. *Ecological Entomology* 43: 850–853. DOI: 10.111/ee.12657
3. Stylianos Chatzimanolis, 2018. Chani-Posse, M. R., A. J. Brunke, S. Chatzimanolis, H. Schillhammer, A. Solodovnikov. 2018. Phylogeny of the hyper-diverse Philonthina rove beetles with implications for classification of the tribe Staphylinini (Coleoptera: Staphylinidae). *Cladistics* 38:1-40.
4. Stylianos Chatzimanolis, 2018. Brunke, A. and S. Chatzimanolis. 2018. A revision of *Haematodes* Laporte and Weiserianum Bernhauer (Coleoptera: Staphylinidae: Staphylininae: Xanthopygina). *Peerj* 6:e4582
5. Stylianos Chatzimanolis, 2018. Chatzimanolis, S. 2018. A review of the genera *Dysanellus* Bernhauer and *Torobus* Herman (Staphylinidae: Staphylininae: Staphylinini). *The Coleopterists Bulletin* 72(2): 279-291.
6. Timothy Gaudin, 2018. Gaudin, T.J., P. Hicks*, and Y. Di Blanco. 2018. *Myrmecophaga tridactyla* (Pilosa: Myrmecophagidae). *Mammalian Species* 50(956):1-13. *UTC undergrad
7. Timothy Gaudin, 2018. Gaudin, T.J., and J. A. Nyakatura. 2018. Epaxial musculature in armadillos, sloths, and opossums: functional significance and implications for the evolution of back muscles in the Xenarthra. *Journal of Mammalian Evolution*. 25(4):565-572. DOI 10.1007/s10914-017-9402-0
8. Timothy Gaudin, 2018. Boscaini, A., D.A. Iurino, G. Billet, L. Hautier, R. Sardella, G. Tirao, T. J. Gaudin, and F. Pujos. 2018. Phylogenetic and functional implications of the ear region anatomy of *Glossotherium robustum* (Xenarthra, Mylodontidae) from the late Pleistocene of Argentina. *The Science of Nature [Naturwissenschaften]* 105:28. <https://doi.org/10.1007/s00114-018-1548-y>
9. Timothy Gaudin, 2018. Boscaini, A., D. A. Iurino, R. Sardella, G. Tirao, T. J. Gaudin, and F. Pujos. 2018. Digital cranial endocasts of the extinct sloth *Glossotherium robustum* (Xenarthra, Mylodontidae) from the late Pleistocene of Argentina: description and comparison with the extant sloths. *Journal of Mammalian Evolution* (2020) 27(1):55-71. doi.org/10.1007/s10914-018-9441-1
10. Timothy Gaudin, 2018. Boscaini, A., T. J. Gaudin, B. Mamani-Quispe, P. Münch, P.-O. Antoine, and F. Pujos. 2018. New well-preserved craniodental remains of *Simomylodon uccasamamensis* (Xenarthra, Mylodontidae) from the Pliocene of the Bolivian Altiplano: phylogenetic, chronostratigraphic, and paleobiogeographical implications. *Zoological Journal of the Linnean Society* 185:459-486. <https://doi.org/10.1093/zoolinnean/zly075>
11. Timothy Gaudin, 2018. Abstract: Boscaini, A., T.J. Gaudin, B. Mamani-Quispe, P.-O. Antoine, and F. Pujos. 2018. New insights in the evolutionary history of the ground sloth *Simomylodon uccasamamensis* (Xenarthra, Mylodontidae) from the Pliocene of the Bolivian Altiplano. *International Paleontological Convention* 5, Abstract Volume:XX
12. Timothy Gaudin, 2018. Abstract: Gaudin, T.J. A. Boscaini, F. Pujos, B. Mamani-Quispe, and P.-O. Antoine. 2018. New material of the extinct sloth *Simomylodon uccasamamensis* (Xenarthra, Mylodontidae) from the Pliocene of the Bolivian Altiplano: systematic and paleobiological implications. *Society of Vertebrate Paleontology*, Abstract Volume:B162

13. Timothy Gaudin, 2018. Abstract: Boscaini, A., N. Toledo, B. Mamani-Quispe, T.J. Gaudin, y F. Pujos. 2018. Dimorfismo sexual en perezosos extintos: el caso de *Simomyiodon uccasamamensis* (Xenarthra, Mylodontidae) del Plioceno de Bolivia. XXXI Jornadas Argentinas de Mastozoología
14. David Giles, 2018. Turgeson, A., R. Boeger, D. K. Giles and B. Harris. 2018. Introducing biochemistry and cellular biology to chemical engineering students by cultivating a bacterial pathogen in a bioreactor. American Society for Engineering Education-Southeastern Section 2018 Conference Proceedings.
15. David Giles, 2018. Baker, L. Y., C. R. Hobby, A. W. Siv, W. C. Bible, M. S. Glennon, D. M. Anderson, S. J. Symes and D. K. Giles. 2018. *Pseudomonas aeruginosa* responds to exogenous polyunsaturated fatty acids (PUFAs) by modifying phospholipid composition, membrane permeability, and phenotypes associated with virulence. BMC Microbiology 18:117. doi: 10.1186/s12866-018-1259-13
16. Loren Hayes, 2018. Hayes, L.D., Correa, L.A., Abades, S., Gao, L., & Ebensperger, L.A. 2019. Male group members are costly to plurally breeding *Octodon degus* females. Behaviour. 156, 1-36.
17. Loren Hayes, 2018. Correa, L.A., Leon, C., Ramirez-Estrada, J., Ly-Prieto, A., Abades, S., Hayes, L.D., & Ebensperger, L.A. 2018. Highly masculinized and younger males attain higher reproductive success in a social rodent. Behavioral Ecology 29: 628-636.
18. Loren Hayes, 2018. Agnani, P.*, Kauffmann, C., Hayes, L.D., & Schradin, C. 2018. Intra-specific variation in social organization of *Strepsirrhines*. American Journal of Primatology 80: e22758.
19. Loren Hayes, 2018. Schradin, C., Hayes, L.D., Pillay, N., & Bertelsmeier, C. 2018 (invited). The evolution of intraspecific variation in social organization. Ethology 124: 527-536.
20. Hope Klug, 2018. Klug, H. & Stone, L.*. 2021. More than just noise: Chance, mating success, and sexual selection. Ecology & Evolution. 00:1–15. <https://doi.org/10.1002/ece3.7484>
21. Hope Klug, 2018. Klug, H. 2018. Why Monogamy? A Review of Potential Ultimate Drivers. Frontiers in Ecology and Evolution, 6:30-36.
22. Francesca Leasi, 2018. Leasi F, Seigniny JL, Laflamme EM, Artois T, Curini-Galletti M, de Jesus Navarrete A, Di Domenico M, Goetz F, Hall JA, Hochberg R, Jorger KM, Jondelius U, Todaro MA, Wirshing HH, Norenburg JL, Thomas WK (2018) Biodiversity estimates and ecological interpretations of meiofaunal communities are biased by the taxonomic approach. Communications Biology, 1:112.
23. Jonathan Mies, 2018. Mies, J. W., 2018, A Letter from the Chair. Saprolite, Newsletter of the Southeastern Section of the Geological Society of America, Winter 2017-2018.
24. Jonathan Mies, 2018. Beitel, H. R. (student), Churnet, H. G., Hossain, A. A. K., and Mies, J. W., 2018, Characterization of metamorphic zones in the Tennessee Blue Ridge using GIS and digital image processing, Geological Society of America Abstracts with Programs, v. 50, n. 3, doi: 10.1130/abs/2018SE-312476.
25. Bradley Reynolds, 2018. Reynolds, B.R., Team Salamander, & Wilson, T. (2018). A Walk in the Woods: Changing Student Attitudes toward Amphibians and Reptiles. Creative Education. 09. 182-191. 10.4236/ce.2018.92014.
26. Bradley Reynolds, 2018. Reynolds, B.R., & Wilson, T.P. (2018). Factors Leading to the Selection of an Undergraduate Environmental Science Major. Journal of the Tennessee Academy of Science, 93 (3-4), 76-80.
27. Joanne Romagni, 2018. Mottl, T., Igartuburu-Chinchilla, J. M., de los Rios, A., Galindo, J.C.G., Romagni, J.G. (2018 – in preparation). Fatty acid profiles of two phenotypes of the antarctic lichen *Turgidusculum complicatulum*. (New Phytologist)
28. Henry Spratt, 2018. Spratt, H. G., Jr., D. Levine, J. Bage, D. K. Giles, and A. G. Collier. 2018. Topical lotions utilized in outpatient rehabilitation clinics as a potential source of bacterial contamination. Physiotherapy Theory and Practice. 26:1-8. DOI: 10.1080/09593985.2018.1441935.

29. DeAnna Beasley, 2018. Beasley, D.E., Penick, C.A., Boateng, N.S.*, Menninger, H.L. and Dunn, R.R. (2018). Urbanization disrupts latitude-size rule in 17-year cicadas. *Ecol. Evol.* 00: 1 – 8 <https://doi.org/10.1002/ece3.3879>.
30. Joey Shaw, 2018. Morris, A. and J. Shaw. 2018. Markers in time and space: a review of the last decade of plant phylogeographic methods. *Molecular Ecology* 27, 2317-2333.
31. Thomas Wilson, 2018. Reynolds, B.R., Team Salamander, & Wilson, T. (2018). A Walk in the Woods: Changing Student Attitudes toward Amphibians and Reptiles. *Creative Education*. 09. 182-191. 10.4236/ce.2018.92014.
32. Thomas Wilson, 2018. Reynolds, B.R., & Wilson, T.P. (2018). Factors Leading to the Selection of an Undergraduate Environmental Science Major. *Journal of the Tennessee Academy of Science*, 93 (3-4), 76-80.
33. Thomas Wilson, 2018. Hunt*, N., Carroll, A., and T.P. Wilson. 2018. Spatiotemporal Analysis and Predictive Modeling of Rabies in Tennessee. *Journal of Geographic Information System*: 10:89-110. <https://doi.org/10.4236/jgis.2018.101004>
34. Thomas Wilson, 2018. Smith*, W.H., Hamed, M.K., Burkart, D.A., Hopp, S.L., Wilson, T.P., B.S. Stegenga. 2018. *Aneides aeneus* (Green Salamander)- Habitat. *Herpetological Review* 49(4): 723-724.
35. Sean Richards, 2018. Troisi, J.; Landolfi, A.; Sarno, L.; Richards, S.; Symes, S.; Adair, D.; Ciccone, C.; Scala, G.; Martinelli, P.; Guida, M., A metabolomics-based approach for non-invasive screening of fetal central nervous system anomalies. *Metabolomics*, 2018, 14, (6), 77.
36. Sean Richards, 2018. R. Chianese*#, J. Troisi*#, S. Richards#, M. Scafuro, S. Fasano1, M. Guida, R. Pierantoni, R. Meccariello. 2018. Bisphenol A in reproduction: epigenetic effects. *Current Medicinal Chemistry*. 25: 1-23
37. Sean Richards, 2018. Jacopo Troisi, Steven Symes, David Adair, Angelo Colucci, Sonia Elisa Prisco, Carmen Imma Aquino, Immacolata Vivone, Maurizio Guida & Sean Richards. 2018. Placental tissue metabolome analysis by GC-MS: oven-drying is a viable sample preparation method, *Preparative Biochemistry and Biotechnology*, Volume 48, Pages 474-482. DOI: 10.1080/10826068.2018.1466151
38. Callie Adams, 2018. Adams, C., Bell, R., Collins, L., Klug, H., Murphy, C., Shaw, J. 2018. *Investigations in Biology Laboratory Manual - BIOL 1110*. Plymouth, MI: Hayden-McNeil. Fifth Edition.
39. Stylianos Chatzimanolis, 2018. Chatzimanolis S., and A. Brunke. 2018. Book Review of: *Handbook of Zoology. Arthropoda: Insecta. Coleoptera, Beetles. Volume 1. Second Edition. Morphology and Systematics (Archostemata, Adephaga, Myxophaga, Polyphaga partim)*. The *Coleopterist Bulletin* 72(1): 138-139.
40. Stylianos Chatzimanolis, 2018. Chatzimanolis, S. 2018. A review of the fossil history of Staphylinoidea. In Betz, O., Irmeler U. and Klimaszewski J. (eds.) *Biology of rove beetles (Staphylinidae)*. Springer, pp 27-45.
41. Tahmina Shirmeen, 2018. Jia Y., Shirmeen T., Locke M. A. Lizotte R., and Shields F.D., 2018, *Simulation of Surface Runoff and Channel Flows Using a 2D Numerical Model*, Book chapter: *Soil Erosion*, IntechOpen, ISBN 978-953-51-6769-3.
42. David Aborn, 2019. Aborn, D. A. An extreme case of hatching asynchrony in a pair of Tree Swallows. *The Migrant* 90:8-9
43. Fernando Alda, 2019. Moody EK, Alda F, Capps KA, Puebla O, Turner BL. 2019. Trophic trait evolution explains variation in nutrient excretion stoichiometry among Panamanian armored catfishes (Loricariidae). *Diversity* 11:88.
44. Fernando Alda, 2019. Alda F, Tagliacollo V, Bernt M, Waltz B, Ludt WB, Faircloth BC, Alfaro ME, Albert JS, Chakrabarty P. 2019. Resolving deep nodes in an ancient radiation of Neotropical fishes in the presence of conflicting signals from incomplete lineage sorting. *Systematic Biology* 68: 573-593

45. Amy Brock-Hon, 2019. Brock-Hon, A.L., Morgenthaler, S., 2019. Investigation of limestone and dolomite clast alteration in petrocalcic horizons, southern Nevada, USA: *Geoderma*, v. 342, p. 42-54.
46. Amy Brock-Hon, 2019. Brock-Hon, A.L., Hon, K.D., McCarragher, S., 2019. Geomorphic and geophysical evidence of a collapse origin for large sandstone depressions atop the Cumberland Plateau in Tennessee: *Geomorphology*, v. 343, p. 168-182.
47. Stylianos Chatzimanolis, 2019. Chatzimanolis, S. and A. J. Brunke. 2019. A phylogeny of Xanthopygina (Insecta: Coleoptera) reveals major lineages and the origin of myrmecophily. *Zoologica Scripta* 48: 494-506.
48. Stylianos Chatzimanolis, 2019. Chatzimanolis, S and H. J. Hightower. 2019. *Peripus*, a new genus of Xanthopygina (Coleoptera: Staphylinidae) from South America. *Zootaxa*: 4648(2): 371-383
49. Stylianos Chatzimanolis, 2019. Chatzimanolis, S. 2019. *Lendatus*, a new genus of Xanthopygina (Coleoptera: Staphylinidae: Staphylininae) with description of three new species. *PeerJ* 7:e7947.
50. Stephanie DeVries, 2019. Bradbury, K.R. and DeVries, S. (2019). How Does the Residential Development of Farmland Affect Nitrate in Groundwater?". Nelson Issue Brief, Nelson Institute for Environmental Studies, 1(1), 3-4.
51. Timothy Gaudin, 2019. C.T. Heck, D. Varricchio, T. Gaudin, H. Woodward, and J. Horner. 2019. Ontogenetic changes in the long bone microstructure in the nine-banded armadillo (*Dasypus novemcinctus*). *PLOS One* 14(4): e0215655. doi: <http://dx.doi.org/10.7934/P2750>
52. Timothy Gaudin, 2019. Boscaini, A., T. J. Gaudin, B. Mamani-Quispe, N. Toledo, P.-O. Antoine, and F. Pujos. 2019. The earliest well-documented occurrence of sexual dimorphism in extinct sloths: evolutionary and paleoecological insights. *Zoological Journal of the Linnean Society*. 187:229-239.
53. Timothy Gaudin, 2019. Boscaini, A., F. Pujos, and T. J. Gaudin. 2019. A reappraisal of the phylogeny of Mylodontidae (Mammalia, Xenarthra), and the divergence of mylodontine and lestodontine sloths. *Zoologica Scripta* 48:691-710. DOI: 10.1111/zsc.12376
54. Timothy Gaudin, 2019. Gaudin, T.J., P. Gaubert, G. Billet, L. Hautier, S. Ferreira-Cardoso, and J. R. Wible. 2019. Chapter 1: Evolution & Morphology. Pp. 5-23 In: DWS Challender, HC Nash, and C Waterman (eds.), *Pangolins: Science, Society and Conservation*. Academic Press, New York., 630 pp.
55. Timothy Gaudin, 2019. Gaubert, P., J. R. Wible, S. Heighton, and T.J. Gaudin. 2019. Chapter 2: Phylogeny and Systematics. Pp. 25 – 39 In: DWS Challender, HC Nash, and C Waterman (eds.), *Pangolins: Science, Society and Conservation*. Academic Press, New York, 630 pp.
56. Timothy Gaudin, 2019. Gaudin, T. J., Wible, J. R., Rose, K. D., Emry, R. J., and Spaulding, M. 2019. Skeletal anatomy of the basicranium and auditory region in the metacheiromyid palaeonodont *Metacheiromys* (Mammalia, Pholidotamorpha) based on high-resolution CT scans. *Fossil Imprint*, 75(3-4): 484-503, Praha. ISSN 2533–4050 (print), ISSN 2533–4069 (on-line).
57. Timothy Gaudin, 2019. Abstract: Bramblett, J.L. and T.J. Gaudin. 2019. Using polymer clays to make molds and casts of fossils for teaching and outreach. Abstracts of the Annual Meeting of the Association of Southeastern Biologists, Memphis, TN.
58. Timothy Gaudin, 2019. Abstract: Boscaini, A., N. Toledo, B. Mamani-Quispe, P.-O. Antoine, T.J. Gaudin, y F. Pujos. 2019. Dimorfismo sexual en *Simomyodon uccasamamensis* (Xenarthra, Folivora) y otros perezosos extintos: implicaciones evolutivas. III Reunión Argentina de Biología Evolutiva (Agosto 5-7, 2019), Universidad de Buenos Aires, Buenos Aires, Argentina.
59. Timothy Gaudin, 2019. Abstract: Buchholtz, E. Yozgyur, Weaver, and T.J. Gaudin. 2019. Homology and modularity in the mammalian sternum. 12th International Congress on Vertebrate Morphology, Prague, Czech Republic. [July 2019] *Journal of Morphology* 280(S1):S47.
60. Timothy Gaudin, 2019. Abstract: Boscaini, A., N. Toledo, I.M. Soto, T.J. Gaudin, y F. Pujos. 2019. Filogenia y evolución del tamaño corporal en perezosos mildóntidos (Mammalia,

Xenarthra, Folivora). Reunión de Comunicaciones de la Asociación Paleontológica Argentina (Noviembre 27-29), La Plata, Argentina, p. 91.

61. David Giles, 2019. Spratt, H. G., D. Levine, J. Bage, D. K. Giles and A.G. Collier. 2019. Topical lotions utilized in outpatient rehabilitation clinics as a potential source of bacterial contamination. *Physiotherapy Theory and Practice*. 35:163-170.
62. David Giles, 2019. Hobby, C. R., J. L. Herndon, C. A. Morrow, S. J. K. Symes and D. K. Giles. 2019. Exogenous fatty acids alter phospholipid composition, membrane permeability, capacity for biofilm formation and antimicrobial peptide susceptibility in *Klebsiella pneumoniae*. *MicrobiologyOpen*: e00635.
63. Loren Hayes, 2019. Ebensperger, L.A., Correa, L.A., Ly-Prieto, A., Perez de Arce, F., Abades, S., & Hayes, L.D. 2019. Multiple mating is linked to social setting, and benefits the males in a communally rearing mammal. *Behavioral Ecology*.
64. Loren Hayes, 2019. Foerder, P., Farnsley, S., Hayes, L.D., & Klug, H. 2019. Enrichment for students and animals: Using environmental enrichment programs for undergraduate STEM learning. *Journal of College Science Teaching*. 48: 14-27
65. Hope Klug, 2019. Klug, H. & Bonsall, M.B.B. 2019. Co-evolution Influences the Evolution of Filial Cannibalism, Offspring Abandonment, and Parental Care. *Proceedings of the Royal Society B*. 286: 20191419. <http://dx.doi.org/10.1098/rspb.2019.1419>
66. Hope Klug, 2019. Cronnon, C.T.*, Harris, M., Kuhajda, B., and Klug, H. 2019. Breeding season behavior of *Chrosomus saylori* (Laurel Dace). *Southeastern Naturalist*. 18(3): 373-380.
67. Hope Klug, 2019. Davenport, M.E.*, Bonsall, M.B., & Klug, H. 2019. Unconventional care: Offspring abandonment and filial cannibalism can function as forms of parental care. *Frontiers in Ecology & Evolution*. 7:1-11.
68. Hope Klug, 2019. Foerder, P., Farnsley, S., Hayes, L. & Klug, H. 2019. Enrichment for students and animals: Using environmental enrichment programs for undergraduate STEM learning. *Journal of College Science Teaching*. 48: 14-19.
69. Francesca Leasi, 2019. Martinez A, Di Domenico M, Leasi F, Curini-Galletti M, Todaro MA, Dal Zotto M, Gobert S, Artois T, Norenburg J, Jorger KM, Nunez J, Fontaneto D, Worsaae K (2019) Patterns of diversity and endemism of soft-bodied meiofauna in an oceanic island, Lanzarote, Canary Islands. *Marine Biodiversity*, 49(5), 2033-2055.
70. Jonathan Mies, 2019. Hays, J. A. (student) and Mies, J. W., 2019, A tale of two hurricanes: the peculiar microseisms of Matthew and Florence in Onslow Bay, North Carolina, *Geological Society of America Abstracts with Programs*, v. 51, n. 3
71. Henry Spratt, 2019. Epps, Mathew T., Sarah Langsdon, Taylor K. Pels, Victoria Noyes, David Levine, Todd E. Thurston, Henry G. Spratt, and Mark A. Brzezienski. 2019. Pocket irrigation and technique during reconstructive surgery. *Annals of Plastic Surgery*, 82(6S):S427-S432. DOI: 10.1097/SAP.0000000000001790.
72. Henry Spratt, 2019. Spratt, Henry G., Jr., David Levine, Susan McDonald, Sarah Drake, Katherine Duke, Casey Kluttz, and Kate Noonan. 2019. Survival of *Staphylococcus aureus* on therapeutic ultrasound heads. *American Journal of Infection Control*. 47:1157-1159. <https://doi.org/10.1016/j.ajic.2019.02.019>
73. DeAnna Beasley, 2019. Beasley, D.E., Fitzgerald, J.L*, Fowler, A.*, Keheler, K.**, Uribe-Lopez, M.M. and Dunn, R.R. (2019). Do bee wings adapt for flight in urban environments? *Southeastern Naturalist*. 18 (2): 183-191.
74. Joey Shaw, 2019. *Powell, C., **J Motley, H. Qin, and J. Shaw. 2019. Born digital: a field-to-database solution for collections-based research using collNotes and collBook. *Applications in Plant Sciences*. 7: e11284.
75. Joey Shaw, 2019. **Krakowiak, A. and J. Shaw. 2019. Vascular plant flora of Orchard Knob Reservation, Hamilton County, Tennessee. *Castanea* 84: 161-178.

76. Joey Shaw, 2019. *Konrade, L., J. Shaw, and J. Beck. 2019. A rangewide herbarium-derived dataset indicates high levels of gene flow in black cherry (*Prunus serotina*). *Ecology and Evolution* 9: 975-985.
77. Joey Shaw, 2019. **Krakowiak, A., *J. Shelton, and J. Shaw. 2019 Noteworthy Collections: An update on the status of *Clematis fremontii* populations in Tennessee. *Castanea* 84:1-3.
78. Hill Craddock, 2019. Hein, K. M., Perkins, M. T., Westbrook, J. W. and Craddock, J.H. (2019). Early Screening to Detect Resistance to *Phytophthora cinnamomi* in Backcross Chinese-American Chestnut Hybrids. *Journal of the American Chestnut Foundation* 33(1), 27-29.
79. Hill Craddock, 2019. Perkins, M.T., Robinson, A.C., Cipollini, M, and Craddock, J.H.. (2019) Identifying host resistance to *Phytophthora cinnamomi* in hybrid progeny of *Castanea dentata* and *Castanea mollissima*. *HortScience* 54(2): 221-225. <https://doi.org/10.21273/HORTSCI13657-18>
80. Sean Richards, 2019. Antonietta Santoro, Rosanna Chianese , Jacopo Troisi, Sean Richards, Stefania Nori, Silvia Fasano, Maurizio Guida, *Elizabeth Plunk, Andrea Viggiano, Riccardo Pierantoni, Rosaria Meccariello, Neuro-toxic and reproductive effects of BPA. *Current Neuropharmacology*. 2019. 17:1109-1132
81. Sean Richards, 2019. Jacopo Troisi, Olga De Castro, Sean Richards, Steven Symes, Viviana Ferretti, Antonietta Di Maio, Angela Amoresano, Bruno Daniele, Francesco Aliberti, Marco Guida, Marco Trifuoggi. 2019. A comparative assessment of metals and phthalates in commercial tea infusions: a starting point to evaluate their tolerance limits. *Food Chemistry*. Volume 288, 2019, Pages 193-200.
82. Sean Richards, 2019. Mikelson C*., J. Troisi , Symes S., Gao, L., DiRe, L.M., Adair D. , Miller, R.K., Richards, S. 2019. Placental concentrations of essential, toxic, and understudied metals and relationships with birth outcomes in Chattanooga, TN. *Environmental Research* Volume 168, January 2019, Pages 118-129.
83. Sean Richards, 2019. J. Troisi, L. Giugliano, L. Sarno, A. Landolfi, S. Richards, S. Symes, A. Colucci, G. Maruotti, D. Adair, M. Guida, P. Martinelli & M. Guida. Serum metabolome in pregnant women and the relationship with congenital malformations of the central nervous system: a case-control study. *BMC Pregnancy Childbirth* 19, 471 (2019). <https://doi.org/10.1186/s12884-019-2636-5>
84. Sean Richards, 2019. J. Troisi, C. Cinque, L. Giugliano, S. Symes, S. Richards, D. Adair, P. Cavallo, L. Sarno, G. Scala, M. Caiazza & M. Guida. Metabolomic change due to combined treatment with myo-inositol, D-chiro-inositol and glucomannan in polycystic ovarian syndrome patients: a pilot study. *J Ovarian Res* 12, 25 (2019). <https://doi.org/10.1186/s13048-019-0500-x>
85. Stylianos Chatzimanolis, 2019. Chatzimanolis, S. 2019. Book Review of: Beetles: The natural history and diversity of Coleoptera. *The Coleopterists Bulletin* 73(2): 380-381.
86. Stylianos Chatzimanolis, 2019. Chatzimanolis, S. 2019. Book Review of: Biodiversity and Evolution. *The Quarterly Review of Biology* 94: 448.
87. Hill Craddock, 2019. Craddock, J.H. and Perkins, M.T. (2019) Chapter 5: Chestnut *Castanea* spp. Miller) Breeding. Pp. 105-156 in: Al-Khayri, J.M., Jain, S.M., and Johnson, D.V. (Eds.). *Advances in Plant Breeding Strategies: Nut and Beverage Crops*. Volume 4. Springer. ISBN 978-3-030-23111-8. DOI: https://doi.org/10.1007/978-3-030-23112-5_5
88. David Aborn, 2020. Aborn, D. A. Double brooding of Tree Swallows in southeast Tennessee. *Wilson Journal of Ornithology* 132:1023-1027
89. David Aborn, 2020. Zimmer, C., C. C. Taff, D. R. Ardia, A. P. Rose, D. A. Aborn, S. L. Johnson and M. N. Vitousek. Environmental unpredictability shapes glucocorticoid regulation across populations of tree swallows. *Nature* <https://doi.org/10.1038/s41598-020-70161-4>
90. David Aborn, 2020. Hudson, A. B.(student), and D. A. Aborn. Seasonal Correlations Between Kudzu and Avian Species Diversity and Abundance in Southeast Tennessee. *Southeastern Naturalist* 19: 161-178
91. Fernando Alda, 2020. Rossi NA, Menchaca-Rodriguez A, Antelo R, Wilson B, McLaren K, Mazzotti F, Crespo R, Wasilewski J, Alda F, Doadrio I, Barros TR, Hekkala E, Alonso-Tabet M,

- Alonso-Giménez Y, Lopez M, Espinosa-Lopez Georgina, Burgess Joe, Thorbjarnarson JB, Ginsberg JR, Vliet KA, Amato G. 2020. High levels of population genetic differentiation in the American crocodile (*Crocodylus acutus*). PLoS ONE15(7): e0235288.
92. Fernando Alda, 2020. García JT, Domínguez-Villaseñor J, Alda F, Calero-Riestra M, Pérez Olea P, Fargallo JA, Martínez-Padilla J, Herranz J, Oñate JJ, Santamaría A, Motro Y, Attie C, Bretagnolle V, Delibes J, Javier Viñuela J. 2020. A complex scenario of glacial survival in Mediterranean and continental refugia of a temperate continental vole species (*Microtus arvalis*) in Europe. Journal of Zoological Systematics and Evolutionary Research25: 459-474
 93. Fernando Alda, 2020. Faircloth BC, Alda F, Hoekzema K, Burns MD, Oliveira C, Albert JS, Melo BF, Ochoa LE, Roxo FF, Chakrabarty P, Sidlauskas BL, Alfaro ME. 2020. A target enrichment bait set for studying relationships among ostariophysan fishes. Copeia108: 47-60.
 94. Jennifer Boyd, 2020. Wiegand T.P., Gentry B., McCoy Z., Tannis C., Klug H., Bonsall M.B., Boyd J.N. 2020. Visualizing connectivity of ecological and evolutionary concepts – an exploration of research on plant species rarity. Ecology and Evolution 10: 9037-90447. DOI: 10.1002/ece3.6633
 95. Jennifer Boyd, 2020. Wooten S., Call G., Dattilo A., Cruse-Sanders J., Boyd J.N. 2020. Impact of forest thinning and white- tailed deer herbivory on translocation of the rare terrestrial orchid *Platanthera integrilabia*. Diversity 12: 412. DOI: 10.3390/d12110412
 96. Amy Brock-Hon, 2020. House, P.K., Crow, R.S., Pearthree, P.A., Brock-Hon, A., Schwing, J., Thacker, J., Gootee, B.E., 2020, Surficial Geologic Map of the Spirit Mountain SE and part of the Spirit Mountain NW 7.5' Quadrangles, Nevada and Arizona. USGS Scientific Investigations Map 3448, pamphlet 30p., scale 1:24,000, <https://doi.org/10.3133/sim3448>.
 97. Stylianos Chatzimanolis, 2020. Chatzimanolis, S. 2020. Even more new species, additional records, and a revised key for *Philothalpus* Kraatz (Coleoptera: Staphylinidae: Staphylininae). Zootaxa 4742(1): 129-138
 98. Stylianos Chatzimanolis, 2020. Chatzimanolis, S, W. G. Cofer, H. J. Hightower, M. K. Roy and J. L. Sanders. 2020. New records of beetles (Coleoptera) from the Tennessee Valley of Southeastern USA. The Coleopterists Bulletin 74(3): 605-618.
 99. Stylianos Chatzimanolis, 2020. Chatzimanolis, S. 2020. On the identify of *Gastrisus modestus* (Bernhauer), with an updated diagnosis and a key for *Dysanellus* Bernhauer (Staphylinidae: Staphylininae: Staphylinini). The Coleopterists Bulletin 74(3): 598-600.
 100. Stephanie DeVries, 2020. Gomez, A. M., McDonald, K. C., Shein, K., DeVries, S.L., Armstrong, R. A., Hernandez, W. J., & Carlo, M. (2020). Comparison of Satellite-Based Sea Surface Temperature to In Situ Observations Surrounding Coral Reefs in La Parguera, Puerto Rico. Journal of Marine Science and Engineering, 8(6), 453.
 101. Stephanie DeVries, 2020. DeVries, S. L., Block, K. A., *Loving, M., *Logozzo, L., & Zhang, P. (2020). The effects of trace narasin on the biogeochemical N-cycle in a cultivated sandy loam. Science of The Total Environment, 716, 137031.
 102. Timothy Gaudin, 2020. Boscaini, A., D. A. Iurino, B. Mamani Quispe, R. Andrade Flores, R. Sardella, F. Pujos, and T. J. Gaudin. 2020. Cranial anatomy and paleoneurology of the extinct sloth *Catonyx tarijensis* (Xenarthra, Mylodontidae) from the late Pleistocene of Oruro, Southwestern Bolivia. Frontiers in Ecology and Evolution 8(69):1-16. doi: 10.3389/fevo.2020.00069
 103. Timothy Gaudin, 2020. Buchholtz, E.A., Z.M. Yozgyur, A. Feldman, A.A. Weaver, and T.J. Gaudin. 2020. The therian sternum at the lateral somitic frontier: Evolution of a composite structure. Journal of Zoology. 315(1):19-28. doi:10.1111/jzo.12809
 104. Timothy Gaudin, 2020. Terhune, C. E., S. Curran, R. Croitor, V. Dragusin, T. Gaudin, A. Petculescu, C. Robinson, M. Robu, and L. Werdelin. 2020. Early Pleistocene fauna of the Olteț River Valley of Romania: Biochronological and biogeographic implications. Quaternary International 553:14–33. Doi:10.1016/j.quaint.2020.06.020

105. Timothy Gaudin, 2020. Gaudin, T.J., S. Tuckniss*, A. Boscaini, F. Pujos, and G. De Iuliis. 2020. Cranial osteology and taxonomy of *Pronothrotherium* (Xenarthra, Folivora, Nothrotheriidae) from the late Miocene – early Pliocene of Catamarca Province (Argentina). *Publicación Electrónica de la Asociación Paleontológica Argentina*. 20(2): 55–82. doi:10.5710/PEAPA.04.09.2020.320 *UTC undergrad
106. Timothy Gaudin, 2020. Abstract: Allen, J. N.**, T.P. Wilson and T.J. Gaudin. 2020, Habitat suitability modeling for *Lontra canadensis* in southeastern Tennessee. Abstracts of 30th Colloquium on the Conservation of Mammals in the Eastern United States, Athens, GA. **UTC grad student
107. Timothy Gaudin, 2020. Abstract: Gaudin, T.J., K. Smith*, and J.R. Wible. 2020. Osteological anomalies in the narial anatomy of the extant two-toed sloth *Choloepus* and the homology of the internarial bar in some fossil sloths. *Society of Vertebrate Paleontology, Abstract Volume*. *UTC undergrad
108. David Giles, 2020. Herndon J. L., R. E. Peters, R. N. Hofer, T. B. Simmons, S. J. K. Symes and D. K. Giles. 2020. Exogenous polyunsaturated fatty acids (PUFAs) promote changes in growth, phospholipid composition, membrane permeability and virulence phenotypes in *Escherichia coli*. *BMC Microbiol.* 20:305. doi: 10.1186/s12866-020- 01988-3
109. Loren Hayes, 2020. Jaeggi, A., Miles, M.*, Festa-Bianchet, M., Schradin, C., & Hayes, L.D. 2020. Variable social organisation is ubiquitous in *Artiodactyla* and readily evolved from pair-living ancestors. *Proceeding of the Royal Society B*.
110. Azad Hossain, 2020. Blanton, R. and Hossain, A., 2020, Mapping the Recovery Process of Vegetation Growth in the Copper Basin, Tennessee Using Remote Sensing Technology. *GeoHazards*, 1, 31-43. <https://doi.org/10.3390/geohazards1010004>.
111. Azad Hossain, 2020. Hall, J. and Hossain, A., 2020, Mapping Urbanization and Evaluating Its Possible Impacts on Stream Water Quality in Chattanooga, Tennessee, Using GIS and Remote Sensing. *Sustainability*, 12 (5), 1980, 1-46. <https://doi.org/10.3390/su12051980>.
112. Francesca Leasi, 2020. Martinez-Arce A, De Jesus-Navarrete A, Leasi F (2020) DNA barcoding for delimitation of putative Mexican marine nematodes species. *Diversity*, 12, 107
113. Francesca Leasi, 2020. Curini-Galletti M, Artois T, Di Domenico M, Fontaneto D, Jondelius U, Jorger KM, Leasi F, Martinez A, Norenburg JL, Sterrer W, Todaro MA (2020). Contribution of soft-bodied meiofaunal taxa to Italian marine biodiversity. *The European Zoological Journal*, 87 (1), 369-384
114. Francesca Leasi, 2020. Leasi F, De SmetWH (2020) Thalassic rotifers from the United States: descriptions of two new species and notes on the effect of salinity and ecosystem on biodiversity. *Diversity*, 12(1), 28
115. Francesca Leasi, 2020. Curini-Galletti M, Carcupino M, Stocchino GA, Leasi F, Norenburg JL (2020) New species of *Duplominona* Karling, 1966 (Platyhelminthes, Proseriata) from the Pacific coast of Panama. *Zootaxa*, 4881(3):3.
116. Jonathan Mies, 2020. Mies, J. W., 2020, Preliminary analysis of hurricane Dorian's microseisms from the Little Bahama Bank through Onslow Bay, North Carolina, with comparisons to hurricanes Matthew and Florence, *Geological Society of America Abstracts with Programs*, v. 52, n. 2, doi: 10.1130/abs/2020SE-345358.
117. Monica Miles, 2020. Jaeggi, A. V., Miles, M. I., Festa-Bianchet, M., Schradin, C., & Hayes, L. D. (2020). Variable social organisation is ubiquitous in *Artiodactyla* and readily evolved from pair-living ancestors. *Proceedings of the Royal Society B*, 287(1926)
118. DeAnna Beasley, 2020. Sealey, B.A., Beasley, D.E., Halsey, S.J., Schell, C.J., Leggett, Z., Yitbarek, S., and Harris, N.C. (2020). Human Dimensions: Raising black excellence by elevating Black ecologists through collaboration, celebration, and promotion. *Bulletin of the Ecological Society of America*. 101 (4): 1 – 6.

119. Joey Shaw, 2020. **Ledesma, D., *Powell, C., J. Shaw, and H. Chin. 2020. Enabling automated herbarium sheet image post-processing through neural network models for color reference chart detection. *Applications in Plant Sciences*. 8: e11331.
120. Joey Shaw, 2020. *Alley, C., *E. Rylander, *J. Dawson, *M. Feely, **D. Ledesma, *N. Parrish, *C. Powell, *J. Shelton, W. Barger, P. Davison, and J. Shaw. 2020. *Saxifraga tridactylites* (Saxifragaceae) naturalized in the Southeastern and Northwestern United States. *Castanea* 85: 1-13.
121. Hill Craddock, 2020. Crawford, H. and J.H. Craddock. (2020) Silviculture of the American chestnut in the Cumberland Uplands of Tennessee. Southeastern Partners in Plant Conservation 2020 Conference Abstracts. <https://atlantabg.org/conservation-research/outreach-education-and-training/southeastern-partners-in-plant-conservation/southeastern-partners-in-plant-conservation-conference/southeastern-partners-in-plant-conservation-conference-2020-abstracts/>
122. Hill Craddock, 2020. Deason, T, and J.H. Craddock (2020) Accelerated, graft-based conservation of under-sampled American chestnut populations in the South (Poster). TACF Annual Meeting. Gettysburg, PA. October 19, 2020. https://acf.org/wp-content/uploads/2019/11/393596_TACF_2019-Poster-Abstracts-Booklet.pdf
123. Thomas Wilson, 2020. Prah* J., Wilson, T. P., Giles, D., & Craddock, J. H. 2020. An overview of research regarding reservoirs, vectors and predators of the chytrid fungus *Batrachochytrium dendrobatidis*. *Acta Herpetologica*, 15(1), 39-45. https://doi.org/10.13128/a_h-8744
124. Sean Richards, 2020. Troisi, Jacopo, Pierpaolo Cavallo, Angelo Colucci, Luca Pierri, Giovanni Scala, Steven Symes, Carter Jones, and Sean Richards. Metabolomics in genetic testing. *Advances in Clinical Chemistry* 94 (2020): 85-153.
125. Sean Richards, 2020. Plunk EC*, Richards SM. Endocrine-Disrupting Air Pollutants and Their Effects on the Hypothalamus-Pituitary-Gonadal Axis. *International Journal of Molecular Sciences*. 2020; 21(23):9191. <https://doi.org/10.3390/ijms21239191>
126. Sean Richards, 2020. Thomas R. Rainwater, Jane Griess, Thomas M. Murphy, Shane M. Boylan, Benjamin B. Parrott, Satomi Kohno, Katherine A.E. Rainwater, Sean M. Richards, Matthew Guillette, Tony Mills, Steven G. Platt, Philip M. Wilkinson, and Louis J. Guillette Jr. "Leucistic American Alligator Hatchlings in Coastal South Carolina," *Southeastern Naturalist* 19(4), N62-N72, (4 November 2020).<https://doi.org/10.1656/058.019.0405>
127. Sean Richards, 2020. Jacopo Troisi, Antonio Raffone, Antonio Travaglino, Gaetano Belli, Carmen Belli, PhD, Santosh Anand, Luigi Giugliano, Pierpaolo Cavallo, Giovanni Scala, Steven Symes, Sean Richards, David Adair, Alessio Fasano, Vincenzo Bottigliero, Maurizio Guida. Development and Validation of a Serum Metabolomic Signature for Endometrial Cancer Screening in Postmenopausal Women. *JAMA Netw Open*. 2020;3(9):e2018327. doi:10.1001/jamanetworkopen.2020.18327
128. Stylianos Chatzimanolis, 2020. Chatzimanolis, S. 2020. Book review of: Klimaszewski, J., R. P. Webster, D. W. Langor, A. Brunke, A. Davies, C. Bourdon, M. Labrecque, A. F. Newton, J.-A. Dorval and J. H. Frank. 2018. *Aleocharinae Rove Beetles of Eastern Canada* (Coleoptera, Staphylinidae, Aleocharinae): A Glimpse of Megadiversity. *The Coleopterists Bulletin* 74(1): 60–61.
129. Francesca Leasi, 2020. Seigny JL, Norenburg JL, Leasi F (2020) A Bioinformatics Tutorial for Comparative Development Genomics in Diverse Meiofauna. In: *Developmental Biology of the Sea Urchin and Other Marine Invertebrates*. Springer Nature, Cham, Switzerland. ISBN: 978-1-0716-0973-6.
130. Bradley Reynolds, 2020. Ford, D.M., & Reynolds, B.R. (2020). *A Laboratory Manual for Introduction to Environmental Science*. Dubuque, Iowa: Kendall Hunt Publishing. Second Edition.

131. David Aborn, 2021. Aborn, D. A. Summary of window casualties on the University of Tennessee-Chattanooga campus. *The Migrant* 92:1-12.
132. Fernando Alda, 2021. Alda F, Ludt WB, Elías DJ, McMahan CD, Chakrabarty P. 2021. Comparing ultraconserved elements and exons for the Comparing ultraconserved elements and exons for phylogenomic analyses of Middle American cichlids: when data agree to disagree. *Genome Biology and Evolution* 13: evab161.
133. Fernando Alda, 2021. García J, Morán-Ordóñez A, García JT, Calero-Riestra M, Alda F, Sanz M, Suárez-Seoane S. 2021. Current landscape attributes and landscape stability in breeding grounds explain genetic differentiation in a long-distance migratory bird. *Animal Conservation* 24: 120-134
134. Stylianos Chatzimanolis, 2021. Chatzimanolis, S. and A. J. Brunke. 2021. A new apterous rove beetle genus (Coleoptera: Staphylinidae) from the Northern Andes with an assessment of its phylogenetic position. *European Journal of Taxonomy* 744: 67–82.
135. Stylianos Chatzimanolis, 2021. Engel, M. S., L. M. P. Ceriaco, G. D. Daniel et al. (94 coauthors including S. Chatzimanolis). 2021. The taxonomic impediment: a shortage of taxonomists, not the lack of technical approaches. *Zoological Journal of the Linnean Society* 193(2): 381-387.
136. Stylianos Chatzimanolis, 2021. Chatzimanolis, S. 2021. Out of Xanthopygus (Coleoptera: Staphylinidae): escape from polyphyly. *Zookeys* 1071: 83-107.
137. Timothy Gaudin, 2021. Boscaini, A., N. Toledo, B. Mamani-Quispe, R. Andrade Flores, M. Fernández-Monescillo, L. Marivaux, P.-O. Antoine, P. Münch, T. J. Gaudin and F. Pujos. 2021. Postcranial anatomy of the extinct terrestrial sloth *Simomyiodon uccasamamensis* (Xenarthra: Mylodontidae) from the Pliocene of the Bolivian Altiplano and its evolutionary implications. *Papers in Palaeontology* 7(3):1557–1583 doi: 10.1002/spp2.1353
138. Timothy Gaudin, 2021. Gaudin, T.J., K.M. Smith* and J.R. Wible. 2021. Osteological anomalies in the extant two-toed sloth *Choloepus*, and the cranial anatomy of extinct and extant sloths. *Journal of Mammalian Evolution*. 28(4):1181-1192. doi:10.1007/s10914-021-09562-9. *UTC undergrad
139. Timothy Gaudin, 2021. Terhune, C.E., T.J. Gaudin, S. Curran and A. Petculescu. 2021. The youngest pangolin (Mammalia, Pholidota) from Europe: Pangolin remains from the early Pleistocene locality of Grăunceanu, Romania. *Journal of Vertebrate Paleontology* e1990075 (10 pages). DOI:10.1080/02724634.2021.1990075
140. Timothy Gaudin, 2021. Gaudin, T.J. and J. Broome*. 2021. Isolated petrosal of the extinct sloth *Glossotherium tropicorum* (Xenarthra, Folivora, Mylodontidae) from the island of Trinidad. *Bulletin of the Florida Museum of Natural History* 58(3):51-64. *UTC undergrad
141. Timothy Gaudin, 2021. Gaudin, T.J. 2021. Xenarthra and Pholidota (Armadillos, Anteaters, Sloths and Pangolins). In: *Encyclopedia of Life Sciences (ELS)*. John Wiley & Sons, Ltd: Chichester. DOI: 10.1002/9780470015902.a0029246
142. Timothy Gaudin, 2021. Edited volume: Rougier, G.W., T. J. Gaudin, and D. A. Croft. 2021. Head of the class: papers on cranial anatomy & evolution in mammals and their kin in honor of John R. Wible. *Journal of Mammalian Evolution*.
143. Timothy Gaudin, 2021. Rougier, G.W., T.J. Gaudin, and D.A. Croft. 2021. Head of the class: John R. Wible's transformative insights into mammalian craniodental anatomy. *Journal of Mammalian Evolution*. 5 pp. doi:10.1007/s10914-021-09587-0
144. Timothy Gaudin, 2021. Abstract: Curran, S.C., Terhune, C.E., Croitor, R., Dragusin, V., Fox, D.L., Garrett, N., Gaudin, T., Ironside, L.B., Petculescu, A., Pobiner, B., Robinson, C., Robu, M., Tantau, I., Ungar, P. and Werdelin, L. 2021. Paleoecology and biochronology of early Pleistocene sites in southern Romania. *American Association of Physical Anthropologists Annual Meeting (virtual)*, April 7-8, 2021.
145. Timothy Gaudin, 2021. Abstract: Boscaini, A., M. Fernández-Monescillo, M.E. Pérez, B. Mamani Quispe, R. Andrade Flores, T.J. Gaudin, L. Marivaux, P.-O. Antoine, P. Münch,, and Y. F.

- Pujos. 2021. El yacimiento de Ayo Ayo-Viscachani (Plioceno-Pleistoceno, Departamento de La Paz, Bolivia): 50 años desde su descubrimiento. Reunión de Comunicaciones de la Asociación Paleontológica Argentina
146. Timothy Gaudin, 2021. Abstract: Pujos, F., T. J. Gaudin, A. Boscaini, M. Alejandra Abello, R.A. Flores, M. Fernández-Monescillo, B. Mamani Quispe, L. Marivaux, M. B. Prámparo, P.-O. Antoine, y P. Münch. 2021. The megatherioid sloth “*Xyophorus*” villarroeli from the late Miocene of Achiri (Bolivia). Reunión de Comunicaciones de la Asociación Paleontológica Argentina.
 147. Timothy Gaudin, 2021. Abstract: Pujos, F., L. R. González Ruiz, T. J. Gaudin, A. Boscaini, M. Alejandra Abello, R. A. Flores, M. Fernández-Monescillo, B. Mamani Quispe, L. Marivaux, M. B. Prámparo, P.-O. Antoine, y P. Münch. 2021. New data on the glyptodontid *Trachycalyptoides* from the late Miocene Bolivian locality of Achiri. Reunión de Comunicaciones de la Asociación Paleontológica Argentina.
 148. Timothy Gaudin, 2021. Abstract: Boscaini, A., D.A. Iurino, R. Sardella, R.D.E. MacPhee, T.J. Gaudin, I.M. Soto, and F. Pujos. 2021. Endocranial structures of a juvenile *Glossotherium robustum* (Xenarthra, Mylodontidae) and preliminary considerations on their ontogeny. Congreso de la Asociación Paleontológica Argentina.
 149. David Giles, 2021. Smith D. S., C. Houck, A. Lee, T. B. Simmons, O. N. Chester, A. Esdaile, S. J. K. Symes and D. K. Giles. 2021. Polyunsaturated fatty acids cause physiological and behavioral changes in *Vibrio alginolyticus* and *Vibrio fischeri*. *Microbiologyopen* 10:e1237. doi: 10.1002/mbo3.1237.
 150. David Giles, 2021. Abstract: Rooney M., Y. Xiong, S. Paredes, J. Hill, M. Horewitz, D. Giles, E. Mihailescu and M. Cotten. 2021. How the Structure and Membrane Activity of the Host Defense Peptide Piscidin are Impacted by Metallation, Oxidized Lipids, and Polyunsaturated Fatty Acids. *The FASEB Journal*, 35.
 151. Loren Hayes, 2021. Olivier, C., Jaeggi, A.V., Hayes, L.D., & Schradin, C. 2022. Revisiting the components of *Macroscelidea* social systems: Evidence for variable social organization, including pair-living, but not for a monogamous mating system. *Ethology* 128: 383-394.
 152. Loren Hayes, 2021. Correa, L.A., Leon, C., Ramirez-Estrada, J., Ly-Prieto, A., Abades, S., Hayes, L.D., Soto-Gamboa, M., & Ebensperger, L.A. 2021. One for all and all for one: phenotype assortment and direct fitness in masculinized females. *Behavioral Ecology*. 32(6), 1266-1275.
 153. Loren Hayes, 2021. Hayes, L.D., Aviles, L., Fernandez-Duque, E., Huck, M., Lacey, E.A., Maldonado-Chaparro, A., Matchinske, M.*, Pillay, N., Solomon, N.G. & Schradin, C. 2021. Using remote seminars to teach animal behavior. *Ethology*. 127: 935-942.
 154. Loren Hayes, 2021. Ebensperger, L. A., Gómez, C., Aspillaga-Cid, A., León, C., Ramírez-Estrada, J., Correa, L. A., ... & Hayes, L. D. (2021). Socially unstable conditions experienced during development prime female *Octodon degus* to shape the phenotype of their own offspring. *Hormones and Behavior*, 134, 105011.
 155. Loren Hayes, 2021. Ebensperger, L. A., Abades, S., Riquelme, J., Correa, L. A., & Hayes, L. D. (2021). Socioecological conditions predict degu social instability and provide limited cues to forecast subsequent breeding conditions. *Behavioral Ecology and Sociobiology*, 75(5), 1-15.
 156. Loren Hayes, 2021. Ebensperger, L.A., Quirici, V., Bunster, V., Leon, C., Ramirez, J., & Hayes, L.D. 2021. Effects of radio-collars are not contingent on socioecological conditions in a social rodent. *Journal of Wildlife Management*.
 157. Azad Hossain, 2021. Hossain, A. Mathias, C. and Blanton, R., 2021, Remote Sensing of Turbidity in the Tennessee River Using Landsat 8 Satellite, *Remote Sensing*, 2021, 13, 3785. <https://doi.org/10.3390/rs13183785>.
 158. Azad Hossain, 2021. Chao, X., Jia, Y., Hossain, A., and Zhang, Y., 2021, Numerical Simulation of Sediment Transport, Phytoplankton Biomass and Salinity Recovery Processes in

- Lake Pontchartrain due to Bonnet Carré Spillway Flood Release, *Ecological Engineering*, 160, 2021, 106151, <https://doi.org/10.1016/j.ecoleng.2021.106151>.
159. Azad Hossain, 2021. Dey,P., Roy, S., Bathi, J., Mishra, A., Leasi, F., and Hossain, A., 2021, Parameter Sensitivity Analysis of the HSPF Model on a Pervious Landcover Dominated Watershed, *Proceedings of EWRI Congress 2021*, 561-574, <https://ascelibrary.org/doi/abs/10.1061/9780784483466.051>.
 160. Hope Klug, 2021. Klug, H. & Stone, L.*. 2021. More than just noise: Chance, mating success, and sexual selection. *Ecology & Evolution*. 00:1–15. <https://doi.org/10.1002/ece3.7484>
 161. Hope Klug, 2021. Wiegand, T.P.*, Gentry, G.*, McCoy, Z.□, Tanis, C., Klug, H., Bonsall, M.B., Boyd, J.N. 2020. Visualizing connectivity of ecological and evolutionary concepts –an exploration of research on plant species rarity. *Ecology & Evolution*. 10 (17): 9037-3047.
 162. Francesca Leasi, 2021. Dey P, Roy S, Bathi JL, Mishra A, Leasi F, Hossain A (2021) Parameter Sensitivity Analysis of the HSPF Model on a Pervious Landcover Dominated Watershed. *Peer-reviewed Conference Paper in World Environmental and Water Resources Congress 2021: Planning a Resilient Future along America's Freshwaters*.
 163. Francesca Leasi, 2021. Sevigny JL, Leasi F, Simpson S, Di Domenico M, Jorger KM, Norenburg JL, Thomas WK (2021) Target Enrichment of Metazoan Mitochondrial DNA with Hybridization Capture Probes. *Ecological Indicators*, 121: 106973.
 164. Francesca Leasi, 2021. Leasi F, Sevigny JL, Hassett BT (2021) Meiofauna as a valuable bioindicator of climate change in the polar regions. *Ecological Indicators*, 121, 107133
 165. Ashley Manning-Berg, 2021. Nabhan, S., Mishra, B., Kah, L.C., Manning-Berg, A.R., van Zuilen, M.A., 2021. Structural and chemical heterogeneity of Proterozoic organic microfossils of the ca. 1 Ga old Angmaat Formation, Baffin Island, Canada. *Geobiology*. <https://doi.org/10.1111/gbi.12463>
 166. Jonathan Mies, 2021. Hossain, A., Stuart, W., Mies, J., and Brock-Hon, A., 2021, Investigating Urban Heat Island (UHI) Impact for the City of Chattanooga, Tennessee Using GIS and Remote Sensing in Lackner, M., Sajjadi, B., and Chen, W-Y., eds., *Handbook of Climate Change Mitigation and Adaptation*, 3rd Edition, Springer.
 167. Jonathan Mies, 2021. Mies, J. W. and White, Jessica (student), 2021, The arcuate geometry of Onslow Bay, North Carolina, its influence on hurricane-induced microseisms, and potential relations to coastal processes, *Geological Society of America Abstracts with Programs*, v. 53, n. 6, doi: 10.1130/abs/2021AM-365017.
 168. Bradley Reynolds, 2021. Davis, E. A., Wilson, T.P., & Reynolds, B. R. (2021). Self-Interest, Compassion, and Consistency in an Environmental Ethics Class: Would Students Give Up Their Retirement to Stop the Coronavirus? *International Journal of Ethics Education*. DOI 10.1007/s40889-021-00126-2
 169. Bradley Reynolds, 2021. Wilson, T. P., Reynolds, B.R., Nyok P., Chauhun, R., Wilson, P. J., Wilson, T. M., and Team Salamander. (2021). Turtles All the Way Down: An Update on the Asian Turtle Crisis with New Directions. *Education about Asia*.
 170. Henry Spratt, 2021. Keilman, R., S. Harding, M. Rowin, E. Reade., P. Klingborg. D. Levine, and H. Spratt, Jr. 2021. Investigations of Staphylococcal contamination on environmental surfaces of a neonatal intensive care unit of a children's hospital. *American Journal of Infection Control*, 49:1450-1453. doi: 10.1016/j.ajic.2021.05.007.
 171. Joey Shaw, 2021. *Powell, C. and J. Shaw. 2021. Performant barcode decoding for herbarium specimen images using vector assisted region proposals (VARP). *Applications in Plant Science* (9) e11436.
 172. Joey Shaw, 2021. *Powell, C., **A. Krakowiak, *R. Fuller, **E. Rylander, E. Gillespie, S. Krosnick, B. Ruhfel, A. Morris, and J. Shaw. 2021. Estimating herbarium specimen digitization rates: accounting for human experience. *Applications in Plant Science*. (9) e11415
 173. Hill Craddock, 2021. Perkins, M.T., Zhebentyayeva, T., Sisco, P.H., and Craddock, J.H. (2021). Genome-wide sequence-based genotyping supports a nonhybrid origin of *Castanea*

- alabamensis. *Systematic Botany* 46(4): 973-984. DOI: <https://doi.org/10.1600/036364421X16370109698524>
174. Thomas Wilson, 2021. Davis, E. A., Wilson, T.P., & Reynolds, B. R. (2021). Self-Interest, Compassion, and Consistency in an Environmental Ethics Class: Would Students Give Up Their Retirement to Stop the Coronavirus? *International Journal of Ethics Education*. DOI 10.1007/s40889-021-00126-2
 175. Thomas Wilson, 2021. Wilson, T. P., Reynolds, B.R., Nyok P., Chauhun, R., Wilson, P. J., Wilson, T. M., and Team Salamander. (2021). Turtles All the Way Down: An Update on the Asian Turtle Crisis with New Directions. *Education about Asia*.
 176. Thomas Wilson, 2021. Davis*, E. A., Wilson, T. P., & B.R. Reynolds. 2021. Self-interest, compassion, and consistency in an environmental ethics class: would students give up their retirement to stop the coronavirus? *International Journal of Ethics Education*. July, 12th (1–11). Advance online publication. <https://doi.org/10.1007/s40889-021-00126-2>
 177. Thomas Wilson, 2021. Edmonds* D., Dreslik M.J., Lovich J.E., Wilson T.P., Ernst C.H. 2021. Growing as slow as a turtle: Unexpected maturational differences in a small, long-lived species. *PLoS One*. 2021 Nov 18;16(11): e0259978. doi: 10.1371/journal.pone.0259978. PMID: 34793528; PMCID: PMC8601529.
 178. Thomas Wilson, 2021. Wilson, T. P., Reynolds, B.R., Nyok P., Chauhun, R., Wilson, P. J., Wilson*, T. M., and Team Salamander*. 2021. Turtles All the Way Down: An Update on the Asian Turtle Crisis with New Directions. *Education about Asia*. *Education About Asia* 26(1):28-33.
 179. Sean Richards, 2021. *Chambers, Weston S., Jaida G. Hopkins*, and Sean M. Richards. 2021. A Review of Per-and Polyfluorinated Alkyl Substance (PFAS) Impairment of Reproduction. *Frontiers in Toxicology: Vol 3*. <https://doi.org/10.3389/ftox.2021.732436>
 180. Sean Richards, 2021. Ledesma D*, Symes S, Richards S. Advancements within modern machine learning methodology: Impacts and prospects for biomarker discovery. *Current Medicinal Chemistry*. 2021 Feb. DOI: 10.2174/0929867328666210208111821.
 181. Sean Richards, 2021. Troisi, Jacopo, Pierpaolo Cavallo, Sean Richards, Steven Symes, Angelo Colucci, Laura Sarno, Annamaria Landolfi et al. "Noninvasive screening for congenital heart defects using a serum metabolomics approach." *Prenatal Diagnosis* 41, no. 6 (2021): 743-753.
 182. Sean Richards, 2021. Troisi, Jacopo, Angelo Colucci, Pierpaolo Cavallo, Sean Richards, Steven Symes, Annamaria Landolfi, Giovanni Scala et al. "A Serum Metabolomic Signature for the Detection and Grading of Bladder Cancer." *Applied Sciences* 11, no. 6 (2021): 2835.
 183. Callie Adams, 2021. Adams, C., Bell, R., Boyd, J., Collins, L., Klug, H., Murphy, C., Nelson, C. 2021. *Investigations in Biology Laboratory Manual - BIOL 1120*. Plymouth, MI: Hayden-McNeil. Fifth Edition.
 184. Amy Brock-Hon, 2021. Hossain, A.K.M.A., Stewart, W., Mies, J., Brock-Hon, A., 2021. Investigating urban heat island impact for the city of Chattanooga, Tennessee, Using GIS and Remote Sensing. *Handbook of Climate Change Mitigation and Adaptation*, M. Lackner et al., (eds). https://doi.org/10.1007/978-1-4614-6431-0_136-1#DOI
 185. Azad Hossain, 2021. Hossain, A., Stuart, W., Mies, J., and Brock-Hon, A., 2021, Investigating Urban Heat Island (UHI) Impact for the City of Chattanooga, Tennessee Using GIS and Remote Sensing, in "Handbook of Climate Change Mitigation and Adaptation", Maximilian Lackner MBA. (editor), Springer International Publishing. https://doi.org/10.1007/978-1-4614-6431-0_136-1.
 186. Richards Sean, 2021. *Hopkins, Jaida, Sweck, Samantha*, Richards, Sean. "The Diagnosis, Clinical Course, Treatment, and Prevention of the Rabies Virus" In *Rabies Virus at the Beginning of 21st Century*, edited by Sergey Tkachev. London: IntechOpen, 2021. 10.5772/intechopen.97691. Available from: <https://www.intechopen.com/online-first/76642>

187. David Aborn, 2022. Taff, C. C. C. Zimmer, T. A. Ryan, D., C. van Oordt, D. A. Aborn, D. R. Ardia, L., S. Johnson, A. P. Rose, and M. N. Vitousek. Individual variation in natural or manipulated corticosterone does not covary with circulating glucose in a wild bird. *Journal of Experimental Biology* <https://doi.org/10.1242/jeb.243262>
188. Fernando Alda, 2022. Snead A, Alda F. 2022. Time-series sequences for evolutionary inferences. *Integrative and Comparative Biology*: icac146
189. Fernando Alda, 2022. Hart PB, Arnold RJ, Alda F, Pietsch TW, Kenaley CP, Hutchinson D, Chakrabarty P. 2022. The evolutionary relationships of anglerfishes (Lophiiformes) reconstructed using ultraconserved elements. *Molecular Phylogenetics and Evolution* 171: 107459
190. Jennifer Boyd, 2022. Boyd J.N., Odell J., Rogers W., Cruse-Sanders J., Anderson J.T., Baskauf C., Brzyski J. 2022. Phenotypic plasticity and genetic diversity elucidate rarity and vulnerability of an endangered riparian plant. *Ecosphere* e996. DOI: 10.1002/ecs2.3996
191. Jennifer Boyd, 2022. Boyd J.N., Anderson J.T., Brzyski J., Baskauf C., Cruse-Sanders J. 2022. Ecological causes and consequences of rarity: a meta-analysis. *New Phytologist* 235: 1272-1286. DOI: 10.1111/nph.18172
192. Stylianos Chatzimanolis, 2022. Chatzimanolis, S. 2022. A revision of the genus *Xanthopygus* Kraatz (Staphylinidae: Xanthopygina). *Zootaxa* 5099(2): 151–178.
193. Stephanie DeVries, 2022. DeVries, S., Bradbury, K., and Cardiff, M. (2022). “A Groundwater Flow Model for Waupaca, WI.” Wisconsin Geological Survey and Natural History Survey Technical Report. 007, 88 p., <https://doi.org/10.54915/xdis1726>.
194. Stephanie DeVries, 2022. †Pineda, Y.S., DeVries, S.L., Steiner, N.S., and Block-Cora, K. A. Bioleaching of refractory gold in mine tailings by *Alcaligenes faecalis*. Submitted to *Minerals* on 11/8/2022. In Review
195. Stephanie DeVries, 2022. Brown, M.G., McDonald, K.C., Zimmermann, R., Steiner, N., DeVries, S., Bourgeau-Chavez, Laura. (2022). “Characterization of Site-Specific Vegetation Activity in Alaskan Wet and Dry Tundra as Related to Climate and Soil State.” *Ecosphere* 13(2): e3939.
196. Stephanie DeVries, 2022. DeVries, S.L., *Hooten, W.G., Block-Cora, K.A., *White, M.D., and *Mollica, M.J. Nitrate Calculator GUI 1.2.1: A software modelling tool for estimating well water nitrate in shallow sand and gravel aquifers. Submitted to *Journal of Environmental Modeling and Software* on 12/30/2022. In Review.
197. Timothy Gaudin, 2022. Casali, D.M., A. Boscaini, T.J. Gaudin, and F.A. Perini. 2022. Reassessing the phylogeny and divergence times of sloths (Mammalia: Pilosa: Folivora), exploring alternative morphological partitioning and dating models. *Zoological Journal of the Linnean Society* 196:1505–1551.
198. Timothy Gaudin, 2022. Gaudin, T.J., A. Boscaini, B. Mamani Quispe, R. Andrade Flores, M. Fernández-Monescillo, L. Marivaux, P.-O. Antoine, P. Münch, and F. Pujos. 2022. Recognition of a new nothrotheriid genus (Mammalia, Folivora) from the early late Miocene of Achiri (Bolivia) and the taxonomic status of the genus *Xyophorus*. *Historical Biology* 35(6):1041-1051. DOI:10.1080/08912963.2022.2075744
199. Timothy Gaudin, 2022. Gaudin, T.J. and T. Scaife*. 2022. Cranial osteology of a juvenile specimen of *Acratocnus* ye (Mammalia, Xenarthra, Folivora) and its ontogenetic and phylogenetic implications. *The Anatomical Record*, 1-31. doi:10.1002/ar.25062. *UTC undergrad
200. Timothy Gaudin, 2022. Abstract: Turner, C.M.***, T.P. Wilson, W.J. Loughry, and T.J. Gaudin. 2022. Distributional and disease surveys of nine-banded armadillo in Tennessee using roadkill and community science data. Abstracts of 32nd Colloquium on the Conservation of Mammals in the Eastern United States, Virtual meeting. **UTC grad student
201. Timothy Gaudin, 2022. Abstract: Turner, C.M.***, T.P. Wilson, W.J. Loughry, and T.J. Gaudin. 2022. Distributional and disease surveys of nine-banded armadillo in Tennessee using roadkill and community science data. Tennessee chapter, The Wildlife Society, Virtual meeting. **UTC grad student

202. Timothy Gaudin, 2022. Abstract: Turner, C.M.***, T.P. Wilson, W.J. Loughry, and T.J. Gaudin. 2022. Distributional and disease surveys of nine-banded armadillo in Tennessee using roadkill and community science data. American Society of Mammalogists, Annual meeting.
***UTC grad student
203. Timothy Gaudin, 2022. Abstract: Gaudin, T.J. and T. Scaife*. 2022. Cranial osteology of a juvenile specimen of *Acratocnus* ye (Mammalia, Xenarthra, Folivora) and its ontogenetic and phylogenetic implications. Society of Vertebrate Paleontology, Annual Meeting. *UTC undergrad
204. Timothy Gaudin, 2022. Abstract: Gaudin, T.J. and C. Turner***. 2022. The spread of nine-banded armadillos (*Dasypos novemcinctus*) in Tennessee: Determining habitat preferences of and assessing prevalence of Hansen's disease in Tennessee with assistance from community science data. 2022 Innovations in Invasive Species Management Conference. ***UTC grad student
205. David Giles, 2022. Turgeson A., L. Morley, D. Giles and B. Harris. 2022. Simulated docking predicts putative channels for the transport of long-chain fatty acids in *Vibrio cholerae*. *Biomolecules* 12(9):1269. doi: 10.3390/biom12091269
206. Loren Hayes, 2022. Blumstein, D., Hayes, L.D., Pinter-Wollman, N. Social consequences of rapid climate change. *Trends in Ecology and Evolution*:<https://doi.org/10.1016/j.tree.2022.11.005>.
207. Azad Hossain, 2022. Chao, X., A. Hossain, A., Al-Hamdan, M. Z., Jia, Y., and Cizdziel, J. V., 2022, Three-Dimensional Numerical Modeling of Flow Hydrodynamics and Cohesive Sediment Transport in Enid Lake, Mississippi, *Geosciences* 12, no. 4: 160.
<https://doi.org/10.3390/geosciences12040160>.
208. Azad Hossain, 2022. Jones, S. M. and Hossain, A., 2022, Application of Remote Sensing to Study the Potential Impacts of 2020 Wildfire Events on the Glaciers of Mount Baker, Washington, The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLVI-M-2-2022, pp 131-134, ASPRS 2022 Annual Conference, 6–8 February & 21–25 March 2022, Denver, Colorado, USA & virtual.
209. Azad Hossain, 2022. Campbell, S. and Hossain, A., 2022, Studying the Potential Impact of Groundwater Depletion on Surface Vegetation in the Mississippi Delta Using Remote Sensing, The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLVI-M-2-2022, pp 53-57, Proceeding of ASPRS 2022 Annual Conference, 6–8 February & 21–25 March 2022, Denver, Colorado, USA & virtual.
210. Hope Klug, 2022. Klug, H., Langley, C. *, & Reyes, E. □ 2022. Resource acquisition and pre-copulatory sexual selection. *Ecology and Evolution* 12: e9137.
211. Hope Klug, 2022. Udu, I.N. *, Bonsall, M.B.B., & Klug, H. 2022. Life history and the evolutionary loss of parental care. *Proceedings of the Royal Society B* 289: 20220658.
212. Hope Klug, 2022. Klug, H., Langley, C. *, & Reyes, E. □ 2022. Cascading effects of pre-adult survival on sexual selection. *Royal Society Open Science* 9: 211973.
213. Hope Klug, 2022. Azad, T.**, Alonzo, S.H., Bonsall, M.B.B., & Klug, H. 2022. Life history, mating dynamics, and the origin of parental care. *Journal of Evolutionary Biology* 35: 379– 390.
214. Francesca Leasi, 2022. Cesaretti A, Leasi F, Todaro MA (2022). Confocal Laser Scanning Microscopy helps understand the functioning of the reproductive apparatus in stylet-bearing Urodasy (Gastrotricha: Macrotrichida). *Water* 15 (6), 1106.
215. Francesca Leasi, 2022. Leasi F & Cline JL (2022) DNA metabarcoding reveals impacts of anthropogenic stressors on freshwater meiofauna. *Limnologia*, 96: 126005
216. Katherine Ludwig, 2022. Abstract: Ludwig, K., Bidgoli, T., Stockli, D.F., Gomez, F., and Polun, S., 2022, Constraints on the southern extent of the Southern Death Valley fault from detrital zircon U-Pb geochronology and bedrock (U-Th)/He thermochronology: *GSA Abstracts with Programs*, v. 54, no. 5.

217. Ashley Manning-Berg, 2022. Manning-Berg, A.R., Selly, T., Bartley, J.K. 2022. Decomposition patterns as a tool for understanding taphonomic history in microfossil assemblages. *Geobiology*. <https://doi.org/10.1111/gbi.12475>
218. Jonathan Mies, 2022. Bramblett, J., Gossett, L.(student), and Mies, J.W., 2022, Using portable document cameras and portable digital microscopes in both virtual and in-class Historical Geology and Petrology labs, Geological Society of America Abstracts with Programs, v. 54, n. 4, doi: 10.1130/abs/2022NC-374974
219. Henry Spratt, 2022. Spratt, H. G., D. Levine, S. Weiss-Reed, A. Sinha. 2022. Infection prevention in a Neonatal Intensive Care Unit. *Infection Control Today*. 26,7. <https://www.infectioncontrolday.com/view/infection-prevention-is-key-in-a-neonatal-intensive-care-unit>.
220. John Tucker, 2022. Abstract: John C. Tucker, Preliminary Assessment of Environmental Review Pursuant to the Tennessee Inter-Basin Water Transfer Act. Tennessee Water Resources Symposium (April 20-21, 2022).
221. John Tucker, 2022. Abstract: N. Alston, C. Coles, C. Diaz, A. Earp, G. Greer, J. Hopson, L. Hurley, C. Melton, J. Skyles, A. Smith, A. V. Smith, T. Stewart, J. Tucker, Assessment of UTC Sustainability Initiatives. UTC Research Dialogues (April 12, 2022).
222. DeAnna Beasley, 2022. Beasley, D.E., Monsur, M., Hu, J., Dunn, R.R., and Madden, A.A. (2022). The bacterial community of childcare centers: Potential implications for microbial dispersal and child exposure. *Environmental Microbiome*. 17 (8): <https://doi.org/10.1186/s40793-022-00404-6>
223. Hill Craddock, 2022. Laport, R.G., Brookover, Z.S., Christman, B.D., Ng, J., Philley, K., and Craddock, J.H. (2022) Environmental Niche and Demographic Modeling of American Chestnut near its Southwestern Range Limit. *The American Midland Naturalist* 188(2), 137-176. <https://doi.org/10.1674/0003-0031-188.2.137>
224. Hill Craddock, 2022. Sandercock, A.M., Westbrook, J.W., Zhang, Q., Johnson, H.A, Saielli, T.M., Scrivani, J.A, Fitzsimmons, S.F., Collins, K., Perkins, M.T, Craddock, J.H., Schmutz, J, Grimwood, J., and Holliday, J.A. (2022). Frozen in time: rangewide genomic diversity, structure, and demographic history of relict American chestnut populations. *Molecular Ecology* 31 (18): 4640-4655 <https://doi.org/10.1111/mec.16629>
225. Sean Richards, 2022. Troisi, Jacopo, Antonio Mollo, Martina Lombardi, Giovanni Scala, Sean M. Richards, Steven JK Symes, Antonio Travaglino et al. "The Metabolomic Approach for the Screening of Endometrial Cancer: Validation from a Large Cohort of Women Scheduled for Gynecological Surgery." *Biomolecules* 12, no. 9 (2022): 1229.
226. Sean Richards, 2022. Troisi, Jacopo, Martina Lombardi, Giovanni Scala, Pierpaolo Cavallo, Rennae S. Tayler, Steven JK Symes, Sean M. Richards, Adair DC, Fasano A, McCowan LM, Guida M. "A screening test proposal for congenital defects based on maternal serum metabolomics profile." *American Journal of Obstetrics and Gynecology* (2022).
227. Sean Richards, 2022. Troisi, Jacopo, Maria Tafuro, Martina Lombardi, Giovanni Scala, Sean M. Richards, Steven JK Symes, Paolo Antonio Ascierto et al. "A Metabolomics-Based Screening Proposal for Colorectal Cancer." *Metabolites* 12, no. 2 (2022): 110.
228. Stylianos Chatzimanolis, 2022. Chatzimanolis, S. 2022. Book review of: Evans, A.V. 2021. Beetles of Western North America. *The Coleopterists Bulletin* 76(1): 54–55.
229. Stylianos Chatzimanolis, 2022. Chatzimanolis, S. 2022. Book review of: Klimaszewski, J., A. Brunke, D. S. Sikes, M. Pentinsaari, B. Godin, R. P. Webster, A. Davies, C. Bourdon, and A. F. Newton. 2021. A Faunal Review of Aleocharinae Beetles in the Rapidly Changing Arctic and Subarctic Regions of North America (Coleoptera: Staphylinidae). *The Coleopterists Bulletin* 76(4): 606-607.
230. Azad Hossain, 2022. Hossain, A. and Greg Easson, 2022, Potential Impacts of the Growth of a Megacity in Southeast Asia, A Case Study on the City of Dhaka, Bangladesh, in "Handbook of Climate Change Mitigation and Adaptation", Wei-Yin Chen, John M. Seiner,

- Toshio Suzuki and Maximilian Lackner MBA. (editors), Springer International Publishing, pp 1-24, Online ISBN 978-1-4614-6431-0. Updated Editions (Original version published in 2015).
231. Azad Hossain, 2022. Cointegration of SARS-CoV-2 transmission with weather conditions and mobility during the first year of the COVID-19 pandemic in the United States, 2022, Hong Qin, Syed Tareq, William Torres, Megan Doman, Cleo Falvey, Jamaree Moore, Meng Hsiu Tsai, Yingfeng Wang, Azad Hossain, Mengjun Xie, and Li Yang. Accepted in SPRINGER NATURE - Research Book Series: Transactions on Computational Science & Computational Intelligence.
 232. Richards Sean, 2022. Elizabeth C. Plunk*, Weston S. Chambers*, and Sean M. Richards. 2022. Systems Biology In Metabolomics Perspectives, From Theory to Practical Application. Elsevier. Pages 3-25. 1st Edition - April 1, 2022
 233. Richards Sean, 2022. Jacopo Troisi, Sean M. Richards, Giovanni Scala, and Annamaria Landolfi. 2022. Approaches in Untargeted Metabolomics. In Metabolomics Perspectives, From Theory to Practical Application. Elsevier. In Press. 1st Edition - April 1, 2022
 234. Richards Sean, 2022. Jacopo Troisi, Sean M. Richards, Giovanni Troisi, and Giovanni Scala. 2022. Techniques for Converting Metabolomic Data for Analysis. In Metabolomics Perspectives, From Theory to Practical Application. Elsevier. In Press. 1st Edition - April 1, 2022
 235. Richards Sean, 2022. Jacopo Troisi, Giovanni Troisi, Giovanni Scala, Sean M. Richards. 2022. Data analysis in metabolomics: From Information to Knowledge. In Metabolomics Perspectives, From Theory to Practical Application. Elsevier. In Press. 1st Edition - April 1, 2022
 236. David Aborn, 2023. Young A. (student), Aborn D., Latta S., Boyd J.N, 2023. Avian winter habitat selection of avocado farms and intact forest in the Baboruco region of the Dominican Republic. Journal of Caribbean Ornithology, 36: 147-161
 237. David Aborn, 2023. Feely, M. (student) and D. A. Aborn 2023. Changes in avian diversity and potential invasive seed dispersal post-wildfire in a southeastern deciduous forest; Flipper Bend woods, Signal Mountain, Tennessee. Southeastern Naturalist 22: 445-458
 238. David Aborn, 2023. Marsh, L. K.,(student) and D. A. Aborn. 2023. Relationship Between Human Intrusion and Avian Body Condition During Fall Migration. Cities and the Environment Vol. 16: Iss. 2, Article 3. DOI: 10.15365/cate.2023.160203
 239. Jennifer Boyd, 2023. Boyd J.N., Baskauf C., Lindsay A., Anderson J.T., Rogers W., Cruse-Sanders J., Brzyski J. Phenotypic plasticity and genetic diversity sheds light on endemism of rare Boechera perstellata and its potential vulnerability to climate warming. Ecology and Evolution 13: e10540.
 240. Jennifer Boyd, 2023. Young A., Aborn D., Latta S., Boyd J.N, In Press. Avian winter habitat selection of avocado farms and intact forest in the Baboruco region of the Dominican Republic. Journal of Caribbean Ornithology.
 241. Stylianos Chatzimanolis, 2023. Chatzimanolis, S. 2023. Asimos, a new genus of Xanthopygina from Central and South America. Koleopterologische Rundschau 92: 85–95.
 242. Stylianos Chatzimanolis, 2023. Chatzimanolis, S. 2023. A revision of the genus Photinopygus Chatzimanolis (Staphylinidae: Xanthopygina). Zootaxa 5292(1): 1–100.
 243. Jannatul Ferdoush, 2023. Barman P, Kaja A, Chakraborty P, Guha S, Roy A, Ferdoush J, Bhaumik SR. A novel ubiquitin–proteasome system regulation of Sgf73/ataxin-7 that maintains the integrity of the coactivator SAGA in orchestrating transcription, Genetics, Volume 224, Issue 3, July 2023, iyad071, <https://doi.org/10.1093/genetics/iyad071>
 244. Timothy Gaudin, 2023. Boscaini, A., Iurino, D.A., Sardella, R., Timothy J. Gaudin, T.J. and Pujos, F. 2023. The endocranial cavities of sloths (Xenarthra, Folivora): insights from the brain endocast, bony labyrinth and cranial sinuses. Pp. 737-760 In: M.T. Dozo, A. Paulina-Carabajal, T. Macrini, and S. Walsh (eds.) Paleoneurology of Amniotes: New Directions in the Study of Fossil Endocasts. Springer Nature Switzerland, Cham, Switzerland.
 245. Timothy Gaudin, 2023. Gaudin, T.J., Scaife, T.*, Toledo, N. and De Iuliis, G. 2023. Cranial osteology of the basal megatheriid sloth Schismotherium (Mammalia, Xenarthra,

- Folivora) and its taxonomic implications. *Historical Biology*. 19 pp. DOI: 10.1080/08912963.2022.2162399. *UTC undergrad
246. Timothy Gaudin, 2023. Casali, D.M., A. Boscaini, T.J. Gaudin, and F.A. Perini. 2023. Cranial and postcranial partitions show different patterns of morphological disparity and evolutionary rates in Folivora (Mammalia: Pilosa). *Palaeontology*. e12639. doi: 10.1111/pala.12639.
 247. Timothy Gaudin, 2023. Abstract: Boscaini, A., Casali, D.M., Toledo, N., Bargo, M.S., Cantalapiedra, J.L., Gaudin, T.J., Langer, M.C., Narducci, R., Pujos, F., Vizcaíno, S.F., Soto, E.M., Soto, I.M. 2023. De pequeños arborícolas a gigantes terrestres (y vice versa): la evolución del tamaño corporal en perezosos actuales y extintos. 5th RABE - Reunión Argentina de Biología Evolutiva - La Plata, October 2-6, 2023
 248. Timothy Gaudin, 2023. Abstract: Gaudin, T.J., K. D. Rose, R. Rabenstein, and J. Habersetter. 2023. New forelimb details of Eurotamandua, purported anteater from the middle Eocene of Messel, Germany, reveal extraordinary similarities to palaeonodons (Pholidotamorpha), not to Xenarthra. Society of Vertebrate Paleontology, Annual Meeting.
 249. David Giles, 2023. Hofer R.N., A. Lin, B.J. House, C.N. Purvis, B.J. Harris, S.J.K. Symes and D.K. Giles. 2023. Exogenous polyunsaturated fatty acids (PUFAs) influence permeability, antimicrobial peptide resistance, biofilm formation, and membrane phospholipid structure in A-layer and non-A-layer strains of *Aeromonas salmonicida*. *J Fish Dis* 46(1):31-45. doi: 10.1111/jfd.13715.
 250. David Giles, 2023. Saksena S., K. Forbes, N. Rajan and D. Giles. 2023. Phylogenetic investigation of Gammaproteobacteria proteins involved in exogenous long-chain fatty acid acquisition and assimilation. *Biochem Biophys Rep* 35: 101504.
 251. Francesca Leasi, 2023. Cesaretti A, LEASI F, Todaro MA (2022). Confocal Laser Scanning Microscopy helps understand the functioning of the reproductive apparatus in stylet-bearing Urodasys (Gastrotricha):
 252. Katherine Ludwig, 2023. Abstract: Ludwig, K., Bidgoli, T., Gomez, F., and Stockli, D., 2023, Implications of detrital zircon geochronology and bedrock thermochronology in the Avawatz Mountains for the extent and deformation history of the Southern Death Valley fault: GSA Abstracts with Programs, v. 55, no. 6.
 253. Henry Spratt, 2023. Simmons, S. , H. G. Spratt, Jr., D. Levine, D. Berg, F. Dexter, D. Pitte, A. Peters, 2023. CoVid-19, 3 years later: What questions are still unanswered. *Infection Control Today*. 27, 2. https://www.infectioncontrolday.com/view/covid-19-3-years-later-what-questions-still-unanswered-?utm_source=sfmc&utm_medium=email&utm_campaign=03072023_ICT_KUR-23ICD0270_Kurin_eNL&eKey=aGVucnktc3ByYXR0QHV0Yy5lZHU=.
 254. Henry Spratt, 2023. Spratt, H. G., Jr., David Levine. 2023. CLABSI and CAUTI: What is an Infection Preventionist's Role? *Infection Control Today*, 27, 3. <https://www.infectioncontrolday.com/view/reducing-clabsi-cauti-what-is-an-infection-preventionist-s-role->.
 255. Henry Spratt, 2023. Spratt, H. G., Jr., D. Levine. 2023. Special report on Candida auris: An emerging drug-resistant fungal threat. *Infection Control Today*. <https://www.infectioncontrolday.com/view/special-report-on-candida-auris-an-emerging-drug-resistant-fungal-threat>.
 256. Henry Spratt, 2023. Spratt, H. G., Jr., David Levine. 2023. Mosquito-borne pathogens and Climate Change: The case of West Nile Virus. *Infection Control Today*. <https://www.infectioncontrolday.com/view/mosquito-borne-pathogens-climate-change-case-west-nile-virus>.
 257. DeAnna Beasley, 2023. Lafferty, D., McKenney, E., Hubbard, T., Trujillo, S., Beasley, D.E. (2023) A path forward: creating an academic culture of justice, equity, diversity and

inclusion. Bulletin of the Ecological Society of America. 00(00):e2117.
<https://doi.org/10.1002/bes2.2117>

258. DeAnna Beasley, 2023. Brooks, H.B.(student), Guzman-Hernandez, I.(student), and Beasley, D.E. (2023). Ant diversity in a temperate urban environment. BIOS. 93(4): 117 – 123. <https://doi.org/10.1654/BIOS-D-20-00018>
259. Sean Richards, 2023. Troisi, Jacopo, Steven J. K. Symes, Martina Lombardi, Pierpaolo Cavallo, Angelo Colucci, Giovanni Scala, David C. Adair, Maurizio Guida, and Sean M. Richards. 2023. "Placental Metabolomics of Fetal Growth Restriction" Metabolites 13, no. 2: 235. <https://doi.org/10.3390/metabo13020235>
260. Callie Adams, 2023. Adams, C., Bell, R., Collins, L., Klug, H., Murphy, C., Shaw, J. 2023. Investigations in Biology Laboratory Manual - BIOL 1110. Plymouth, MI: Hayden-McNeil. Sixth Edition.
261. Hope Klug, 2012-2023. Bell, R., Collins, L., Klug, H., Montgomery, M., & Shaw, J. 2012-2023. Investigations in Biology Laboratory Manual: Biology 1110. Hayden-McNeil. (Authored Microevolution & Animal Behavior laboratory exercises).
262. Hope Klug, 2015-2023. Bell, R., Boyd, J., Collins, L., Klug, H., Montgomery, M. & Nelson, C. 2015-2021. Investigations in Biology Laboratory Manual: Biology 1120. Hayden-McNeil. (Authored Speciation laboratory exercise).
263. Katherine Kinnear, 2017-2023. Collins, L, Kinnear K., Bramblett, J. and Caskey, J. (2018). Human Physiology Laboratory Manual. Plymouth, MI: Hayden McNeil Publishing

Appendix 4-J Faculty Presentations 2018-2023

1. David Aborn, 2018. C. Ross (student) and D. A. Aborn. "The effects of urban extent on avian diversity: a citizen science and GIS study". Oral presentation. Joint Association of Field Ornithologists and Wilson Ornithological Society meeting, Chattanooga, TN
2. David Aborn, 2018. M. Feely (student) and D. A. Aborn. "Passerine occurrence and seed dispersal post-wildfire within the Flipper Bend Woods of Signal Mountain, Tennessee". Poster. Joint Association of Field Ornithologists and Wilson Ornithological Society meeting
3. David Aborn, 2018. H. Youngman (student), R. Huffines, and D. A. Aborn. "Post-fledging habitat use and movements of Worm-eating Warblers (*Helmitheros vermivorum*) in the Tennessee River Gorge". Poster. Joint Association of Field Ornithologists and Wilson Ornithological Society meeting
4. Jennifer Boyd, 2018. Wiegand T, Gentry B, McCoy Z, Odell J, Odell H, Bonsall M, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity. Poster. SoCon Undergraduate Research Forum (SURF). Wofford College, Spartanburg, SC. November 2018.
5. Jennifer Boyd, 2018. Wooten S, Boyd JN. Ex situ conservation of the rare white fringeless orchid. Poster. Student Conference on Conservation Science. American Museum of Natural History, New York, NY. October 2018. Wiegand T**, Gentry B**, McCoy Z*, Odell J*, Odell H**, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis. Poster. Ecological Society of America. New Orleans, LA. August 2018.
6. Stylianos Chatzimanolis, 2018. Are these new genera? A morphological phylogenetic analysis of *Xanthopygina*. Joint Annual Meeting of Entomological Society of America and the Entomological Society of Canada, Vancouver, Canada.
7. Timothy Gaudin, 2018. New material of the extinct sloth *Simomyiodon uccasamamensis* (*Xenarthra*, *Mylodontidae*) from the Pliocene of the Bolivian Altiplano: systematic and paleobiological implications. [poster presentation] Society of Vertebrate Paleontology, 78th Annual Meeting, Albuquerque, NM, October 19, 2018.
8. David Giles, 2018. Expanding the roles of exogenous fatty acids in Gram-negative bacteria. Association of Southeastern Biologists Meeting. Oral Presentation. March 2018.
9. Azad Hossain, 2018. Richard B., and Hossain, A., 2018, Mapping the Recovery Process of Vegetation Growth in Copper Basin, Tennessee Using Remotely Sensing Technology, 3rd Annual UTC Research Dialogue, April 3-4, 2017. The University of Tennessee at Chattanooga.
10. Azad Hossain, 2018. Beitel, H.R., Churnet, H.G., Hossain, A., and Mies, J.W., 2018, Characterization of metamorphic zones in the Tennessee Blue Ridge using GIS and digital image processing, 2018 annual meeting of GSA Southeastern Section. 12–13 April, Knoxville, Tennessee.
11. Azad Hossain, 2018. Springer, H. H., and Hossain, A., 2018, Developing a model to map the potential areas for landslide hazards in Hamilton County, TN using GIS and remote sensing, 2018 annual meeting of GSA Southeastern Section. 12–13 April, Knoxville, Tennessee.
12. Azad Hossain, 2018. Adair, W.A., Beitel, H.R., Hamid, Z. A., Hossain, A., and Mies, J.W., 2018, Exploring the potential of remote sensing and GIS for geological mapping of Woodall Shoals, GA-SC, 2018 annual meeting of GSA Southeastern Section. 12–13 April, Knoxville, Tennessee.
13. Hope Klug, 2018. Klug, H. & Stone, L.*. The role of chance in determining mating success (Poster Presentation), Evolution 2018; Montpellier, August 2018
14. Francesca Leasi, 2018. University of Tennessee at Chattanooga. BGE Department Series. Talk title "Meiofauna matter! What small invertebrates tell us about changing environments?"
15. DeAnna Beasley, 2018. Beasley, D.E., Penick, C.A., and Hightower, H.J.* (2018). Cicadas in our backyard. Never Home Alone symposium: Biologists share stories, foods, drinks, and insights from the study of the life in homes and backyards, Raleigh, NC.

16. DeAnna Beasley, 2018. Beasley, D.E., Penick, C.A., Sylvia IV, J.J., and Shell, L.K. (2018). Roundtable: Developing Partnerships for Interdisciplinary Design-Based Learning. Conference of the International Society for Exploring Teaching and Learning, Tempe, AZ.
17. DeAnna Beasley, 2018. Beasley, D.E. (2018). Urbanization disrupts latitude-size rule in periodical cicadas. Ecological Society of America national conference, New Orleans, LA.
18. DeAnna Beasley, 2018. Invited talk: Beasley, D.E., Hartzler, M., and Meador, J. (2018). Citizen Science: Help Your Community Discover the Natural World. 2018 Southeast Conference for Land and Community Conservation, Chattanooga, TN.
19. DeAnna Beasley, 2018. Brooks, H*, Guzman Hernandez, I*, and Beasley, D.E. (2018). Changes in ant biodiversity across an urban gradient. Association of Southeastern Biologists regional conference, Myrtle Beach, SC.
20. DeAnna Beasley, 2018. Guzman Hernandez, I*, Brooks, H*. and Beasley, D.E. (2018). Ant diet preference in urban habitats. Association of Southeastern Biologists regional conference, Myrtle Beach, SC.
21. DeAnna Beasley, 2018. Ross, C, Menninger, H.L., Hartstone-Rose, A. and Beasley, D.E. (2018). Annual cicada species response to a total solar eclipse. Association of Southeastern Biologists regional conference, Myrtle Beach, SC.
22. DeAnna Beasley, 2018. Beasley, D.E. (2018). Urbanization disrupts latitude size rule in periodical cicadas. Association of Southeastern Biologists regional conference, Myrtle Beach, SC.
23. Joey Shaw, 2018. invited talk: Friends of Roan Mountain 56th Annual Roan Mountain Fall Naturalists Rally. 2018. Digitizing Tennessee's one million herbarium specimens.
24. Joey Shaw, 2018. **Krakowiak, A. and J. Shaw. 2018. Orchard Knob: The forgotten glades of Chattanooga and an update on *Clematis fremontii*. Tennessee Academy of Sciences meeting in Clarksville, TN.
25. Joey Shaw, 2018. *Shelton, J. and J. Shaw. 2018. Applications, methods, and examples of research projects using the burgeoning Southeastern Regional Network of Expertise and Collections database. Tennessee Academy of Sciences meeting in Clarksville, TN.
26. Joey Shaw, 2018. *Powell, C. and J. Shaw. 2018. An overview of Tennessee's herbaria based on digitized specimens. Tennessee Academy of Sciences meeting in Clarksville, TN.
27. Joey Shaw, 2018. *Alley, C. and J. Shaw. Evaluating the ranks of the Tennessee Invasive Pest Plant Council using herbarium specimens data from the developing SERNEC database. Tennessee Academy of Sciences meeting in Clarksville, TN.
28. Joey Shaw, 2018. *Shelton, J. and J. Shaw. 2018. A story map of the existing collections of Augustin Gattinger. Poster presented at the Association of Southeastern Biologists meeting in Myrtle Beach, NC.
29. Joey Shaw, 2018. **Krakowiak, A., **A. Kur, and J. Shaw. 2018. A vascular flora of Orchard Knob: A peephole into the historical limestone glades of Chattanooga, TN. Paper presented at the Association of Southeastern Biologists meeting in Myrtle Beach, NC.
30. Joey Shaw, 2018. **Kur, A. and J. Shaw. 2018. On the effectiveness of illustration in modern botanical keys. Paper presented at the Association of Southeastern Biologists meeting in Myrtle Beach, NC.
31. Joey Shaw, 2018. *Shelton, J. and Joey Shaw. 2018. A preliminary vascular plant flora of the Bare Zone of the Copper Hill Basin, Polk County, TN. Paper presented at the Association of Southeastern Biologists meeting in Myrtle Beach, NC.
32. Joey Shaw, 2018. *Powell, C., **J. Motley, H. Qin, and J. Shaw. 2018. A new application to avert transcription errors in digitization of natural history collections: stopping the "taxonomic telephone." Paper presented at the Association of Southeastern Biologists meeting in Myrtle Beach, NC.
33. Joey Shaw, 2018. **Motley, J., *C. Powell, and J. Shaw. 2018. Developing and testing expedient SERNEC data entry solutions: a proposed modification to the SERNEC/Symbiota portal to speed

data entry from images. Paper presented at the Association of Southeastern Biologists meeting in Myrtle Beach, NC.

34. Joey Shaw, 2018. Shaw, J. *C. Powell, and A. Morris. 2018. Building large digitization teams to achieve high digitization throughput of herbarium specimens. Paper presented at the Association of Southeastern Biologists meeting in Myrtle Beach, NC.
35. Hill Craddock, 2018. Hein, K., Perkins, T., and Craddock, J.H. (2018). Implementing Early Screening Methods to Detect Resistance to *Phytophthora cinnamomi* in First-Backcross Chinese-American Chestnut Hybrids. Poster. February 2018, Posters at the Capitol, Legislative Plaza, Nashville, TN
36. Katherine Kinnear, 2018. Natural History & Rehabilitation of Eastern Gray Squirrels. Guest Speaker at Tennessee Naturalist Program, Audubon Acres, Chattanooga, TN. Jan 2018
37. Katherine Kinnear, 2018. Natural History & Rehabilitation of Eastern Gray Squirrels. Guest Speaker at Chattanooga Zoo, Chattanooga, TN Apr 2018
38. Katherine Kinnear, 2018. Wildlife Rehabilitation of Cottontail Rabbits & Eastern Gray Squirrels Guest Speaker at Ivy Academy, Soddy Daisy, TN Oct 2018
39. Thomas Wilson, 2018. Daniels*, K., Carroll, A., Reynolds, B., and T.P. Wilson. 2018. Comparing Unmanned Aerial Vehicles (UAVs) to Traditional Field Methods in Surveying of Basking Riverine Turtles. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 22, 2018.
40. Thomas Wilson, 2018. Hendricks*, T., Team Salamander* and T.P. Wilson. 2018. Comparative Application of Minimally Invasive Identification Methods in *Plethodon dorsalis* and Microhabitat Analysis. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 22, 2018.
41. Thomas Wilson, 2018. Hunt*, N., Carroll, A., and T.P. Wilson. 2018. Development and Assessment of Spatial Predictive Models for a Rare Tennessee Anuran: Barking Treefrog (*Hyla gratiosa*). Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 22, 2018.
42. Sean Richards, 2018. S. Richards. Utilizing Metabolomics to Diagnosis Fetal Anomalies. Invited Lecture. East Tennessee State University. 31 OCT 2018. Invited presentation.
43. Sean Richards, 2018. S. Richards. Chattanooga: Health Effects from a Legacy of America's Dirtiest City. Kevin A. Johnson Annual Memorial Lecture. Southern Illinois University - Edwardsville. September 26, 2018. Invited presentation.
44. Sean Richards, 2018. S. Richards. Metabolomics as a Tool to Investigate, Predict, and Determine Causes of Adverse Birth Outcomes. College of Arts and Science Seminar Series. Southern Illinois University - Edwardsville September 27, 2018. Invited presentation.
45. Sean Richards, 2018. J. Troisi, L. Sarno, S. Richards, S. Symes, D. Adair, G. Scala, RS Taylor, LME McCowan, A. Fasano, P. Martinelli, M. Guida. Fetal Anomalies Non-Invasive Screening, Is Serum Metabolomics a Viable Way? 45th Annual Meeting of the International Clearinghouse for Birth Defects Surveillance and Research (ICBDSR). September 30-October 4, 2018. Prague, Czech Republic.
46. Sean Richards, 2018. J. Troisi, S. Richards, S. Symes, L. McCowen. Noninvasive Screening of Fetal Anomalies: The Serum Metabolomic Way., June 24, 2018. 58th Teratology Society Annual Meeting in Clearwater, Florida.
47. Fernando Alda, 2019. Isabel A, Alda F. First historical database of exotic freshwater fish species in Tennessee. (Poster presentation). SURF SoCon Undergraduate Research Forum, Spartanburg, SC, USA. November 2nd-3rd 2019.
48. Fernando Alda, 2019. Bertrand J, Carpenter A, LeMay B, Long B, Lyons L, Markham W, McCoy E, Melton J, Musa S, Oglesby C, Smith T, Taveras Y, Warren A, Wightman O, Alda F, Hayes, LD. Intraspecific variation in social organizations of Lagomorphs. UTC Research Dialogues, Chattanooga, TN. April 8th-9th 2019

49. Fernando Alda, 2019. Alda F, Elías DJ, Ludt WB, McMahan C, Chakrabarty P. Compared performance of hybrid-target capture methods in resolving the phylogeny of Heroine cichlids: Are all markers good for all nodes?. Joint Meeting of Ichthyologists and Herpetologists, Snowbird UT, USA. July 24th-28th2019
50. Fernando Alda, 2019. Elías D, Alda F, McMahan C, Chakrabarty P. Revisiting the biogeographic history of the Middle American cichlids (Tribe Heroini). Joint Meeting of Ichthyologists and Herpetologists, SnowbirdUT, USA. July 24th-28th2019.
51. Fernando Alda, 2019. Freeman L, Elías D, Alda F, Chakrabarty P. Mitogenomic relationships among Neotropical cichlids (Heroini: Cichlidae)(Poster presentation). Joint Meeting of Ichthyologists and Herpetologists, Snowbird UT, USA. July 24th-28th2019
52. Jennifer Boyd, 2019. Boyd JN, Odell J, Rogers W, Anderson JT, Baskauf CJ, Brzyski J, Cruse-Sanders J. Reasons for rarity? Exploring adaptive and acclimatory constraints of southeastern endemics in the face of contemporary environmental change. Talk. Organized Oral Session on History, Current Status, and Future of Biodiversity in the Southeast, a Center of Biodiversity in the United States. Ecological Society of America. Louisville, KY. August 2019.
53. Jennifer Boyd, 2019. Cruse-Sanders J. Boyd J, Bonsall M, Anderson JT, Rochford M, Odell J, Rogers W. The role of botanical gardens and partnership in conserving biodiversity in the southeastern U.S. Talk. Organized Oral Session on History, Current Status, and Future of Biodiversity in the Southeast, a Center of Biodiversity in the United States. Ecological Society of America. Louisville, KY. August 2019.
54. Jennifer Boyd, 2019. Wiegand T, Gentry B, McCoy Z, Odell J, Odell H, Bonsall M, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity. Poster. World Congress on Undergraduate Research (WorldCUR). Carl Von Ossietzky Universität, Oldenburg, Germany. May 2019.
55. Jennifer Boyd, 2019. Wiegand T, Gentry B, McCoy Z, Odell J, Odell H, Bonsall M, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity. Poster. National Conference on Undergraduate Research (NCUR). Kennesaw State University, Kennesaw, GA. April 2019.
56. Amy Brock-Hon, 2019. Mathias, C.A., Spivey, K., Collyer, N., Brock-Hon, A.L., McCarragher, S., 2019. Geology of Chattanooga: Engaging the Community with its Foundation: Geological Society of America Abstracts with Programs v. 51, n. 3.
57. Stylianos Chatzimanolis, 2019. Coloration no more. Entomological Collections Meeting, St. Louis, Missouri.
58. Timothy Gaudin, 2019. Invited presentation: Invasion of the flying killer armadillos. Santa Fe Audubon Society, Melrose, FL, November 12, 2019.
59. Azad Hossain, 2019. Blanton, R., and Hossain, A., 2019, Quantitative Estimation of Sediments in Surface Water of the Tennessee River, ASPRS Annual Conference 2019, Denver, CO, January 28-31, 2019.
60. Azad Hossain, 2019. Hossain, A., 2019, Investigating Urban Heat Island (UHI) Impact for the City of Chattanooga, TN Using GIS and Remote Sensing, ASPRS Annual Conference 2019, Denver, CO, January 28-31, 2019.
61. Azad Hossain, 2019. Burtleson, J., York, A., Mathias, C., and Hossain, A., 2019, Exploring the Potential of GIS and Remote Sensing Techniques to Study the Impacts of Drought on Plant-Moisture Content in Hamilton County, Tennessee, 2019 annual meeting of GSA Southeastern Section. 28–29 March, Charleston, South Carolina.
62. Azad Hossain, 2019. Bonnette, K. Firat, C., and Hossain, A., 2019, Application of Remote Sensing Technology to Study Coal Ash Spill in River Water, 2019 annual meeting of GSA Southeastern Section. 28–29 March, Charleston, South Carolina.
63. Azad Hossain, 2019. Dohse, S., Hossain, A., Mies, J., and Jones, K., 2019, Geological Mapping of Woodall Shoals, Ga-Sc Using Remote Sensing and Digital Image Processing techniques, 4th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga.

64. Azad Hossain, 2019. York, A., Burleson, J., and Hossain, A., 2019, Investigating the impact of 2016 Southeastern Drought on Vegetation in Hamilton County, TN using GIS and Remote Sensing, 4th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga.
65. Azad Hossain, 2019. Hossain, A., Blanton, R., and Adair, W., 2019, Application of Remote Sensing Technology for Surface Water Quality Studies in Southeast Tennessee, 4th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga.
66. Azad Hossain, 2019. Hall, J. and Hossain, A., 2019, Application of Remote Sensing and GIS to Study the Impact of Urbanization on Surface Water Quality in Hamilton County, TN, April 9-10, 2019. 4th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga.
67. Azad Hossain, 2019. Hossain, A., Blanton, R., and Mathias, C., 2019, Quantitative Remote Sensing of Surface Water Quality in Southeast Tennessee. AGU Fall Meeting, 9-13 December 2019, San Francisco, CA.
68. Azad Hossain, 2019. Hossain, A., Developing computational hydrodynamic and water quality models integrated with satellite observations, The Inaugural Workshop of Southeastern Computational and Geospatial Environmental Hydrology, February 1st, 2019, SimCenter, The University of Tennessee at Chattanooga.
69. Azad Hossain, 2019. Hossain, A., 2019, Watershed Level Urban Growth Estimation in Tennessee Using National Land Cover Database, 2019 annual meeting of GSA Southeastern Section. 28–29 March, Charleston, South Carolina.
70. Azad Hossain, 2019. Hossain, A., and Blanton, R., 2019, Quantitative Estimation of Surface Water Quality Parameters Using Remote Sensing Technology in Southeast Tennessee. Chattanooga Development Symposium, August 6, 2019.
71. Azad Hossain, 2019. Hossain, A., Blanton, R., and Mathias, C., 2019, Surface Water Quality Monitoring Using Remote Sensing Technology in Chattanooga. SWPBA 46th Annual Meeting in Chattanooga, TN October 14th to 17th, 2019.
72. Azad Hossain, 2019. Hossain, A., Blanton, R., and Mathias, C., 2019, Estimating Surface Water Quality Using Remote Sensing Technology, Research Symposium at Chattanooga State Community College, November 15, 2019.
73. Azad Hossain, 2019. Hossain, A., Blanton, R., and Mathias, C., 2019, 2020, Quantitative Remote Sensing of Surface Water Quality in Southeast Tennessee Utilizing Planet Dove Imagery, 69th Annual Southeastern / 55th Annual Northeastern Section Meeting – 2020, 20-22 March 2020, Reston, Virginia (Abstract accepted). Conference cancelled due to COVID-19.
74. Hope Klug, 2019. The operation of mate acquisition revisited, Seminar: Virginia Tech, Ecology, Evolution & Behavior Seminar Series, April 2019
75. Hope Klug, 2019. Hossain, A.K.M, Burleson, J.*, Klug, H., Boyd, J. & Blanton, R. □ Developing a Geographic Information System to map and analyze the conservation status of conifers, ferns, and flowering plants in the United States (Poster Presentation) , Southern Forestry and Natural Resource Management GIS Conference; Athens, GA, December 2019
76. Hope Klug, 2019. Wiegand T*, Gentry B*, McCoy Z□, Odell J□, Odell H□, Bonsall M, Klug H, & Boyd J. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity (Poster Presentation), World Congress on Undergraduate Research (WorldCUR); Carl Von Ossietzky Universität, Oldenburg, Germany, May 2019
77. Hope Klug, 2019. Wiegand T*, Gentry B*, McCoy Z□, Odell J□, Odell H□, Bonsall M, Klug H, & Boyd J. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity (Poster Presentation), National Conference on Undergraduate Research (NCUR); Kennesaw State University, Kennesaw, GA, April 2019
78. Francesca Leasi, 2019. University of Tennessee at Chattanooga. ASPIRE Students Program. Talk title "What small invertebrates tell us about changing environments."

79. Francesca Leasi, 2019. University of Tennessee at Chattanooga. QIIME2 Workshop. Talk title "Introduction to Environmental Genomics."
80. Francesca Leasi, 2019. University of Tennessee at Chattanooga. QIIME2 Workshop. Talk title "Metagenomics: Procedures and Protocols."
81. Francesca Leasi, 2019. Miller A, Leasi F Marine rotifers from the United States. ReSEARCH Dialogues. University of Tennessee at Chattanooga. April 9-10, 2019.
82. Francesca Leasi, 2019. Forbes K, Alda F, Leasi F, Giles D. Phylogenetic distribution of exogenous fatty acid acquisition and membrane incorporation proteins in Gram-negative bacteria. 2019 iCompBio Summer REU, Chattanooga TN.
83. Francesca Leasi, 2019. Curini-Galletti M, Artois T, Di Domenico M, Fontaneto D, Jondelius U, Jorger KM, Leasi F, Martinez Garcia A, Norenburg JL, Todaro ML. Contribution of soft-bodied meiofaunal taxa to Italian marine biodiversity. Italian Zoological Society Symposium. Rome, Italy. Sept 23-26, 2019.
84. Francesca Leasi, 2019. Leasi F, Miller A, De Smet M. Effect of salinity and habitat on rotifer communities from the United States and description of two new species. International Meiofauna Conference, Evora, Portugal. July 7-12, 2019.
85. Francesca Leasi, 2019. Leasi F, Laflamme EM, Sevigny JL, Thomas KK. Integrating biodiversity surveys of meiofauna and microbiome for ecosystem biomonitoring. International Meiofauna Conference, Evora, Portugal. July 7-12, 2019.
86. Francesca Leasi, 2019. Sevigny JL, Westbrook A, Leasi F, Briggs E, Simpson S, Thomas WK. Improved mitochondrial metagenomic methods for analyzing meiofaunal communities. International Meiofauna Conference, Evora, Portugal. July 7-12, 2019.
87. Francesca Leasi, 2019. Sevigny JL, Leasi F, Westbrook A, Simpson SD, Hall J., Morris K, Bik H, Montagna P, Norenburg JL, Thomas WK. The contribution of a diverse set of metazoan draft genomes and improvement of metagenomic analyses of meiofaunal communities. 3rd Global Invertebrate Genomics Alliance Research Conference and Workshop. Curaçao. October 19-22, 2018.
88. Ashley Manning-Berg, 2019. Invited Talk: California State University at Long Beach Dept. of Geology: Surface Environments of the 'Boring Billion'
89. Ashley Manning-Berg, 2019. Invited Talk: The University of California at Riverside Geology Seminar Series: Silicification of Microbial Mats during the 'Boring Billion'
90. Ashley Manning-Berg, 2019. Manning-Berg, Ashley R., Dunham, Jeremy I., Kah, Linda, Tuite, Michael, Williford, Kenneth. 2019. Preservation bias in silicified Proterozoic cyanobacterial mats. Geobiology Society Conference
91. Jonathan Mies, 2019. The Geology of Chattanooga, with Reference to Rock City, Ruby Falls and Ordovician Volcanoes Road Scholars, DoubleTree Hotel, Chattanooga, TN,
92. Jonathan Mies, 2019. The Geology of Chattanooga, with Reference to Rock City, Ruby Falls and Sequatchie Valley Road Scholars, DoubleTree Hotel, Chattanooga, TN
93. DeAnna Beasley, 2019. Beasley, D.E. and Cantu, R. (2019). Ant Picnic: An Integrative STEM Investigation. Chattanooga STEM New Teacher Institute. Education Noyce Scholarship Program.
94. Joey Shaw, 2019. Shaw, J., *C. Powell, **D. Ledesma, **J. Motley, J. Best, and H. Qin. 2019. Specimen Digitization Workflow Optimization Tools—Centralized Technical Services Increase Oversight, Efficiency, and Uniformity Within the Digitization Process. Paper presented at iDigBio Summit IX in Gainesville, FL.
95. Joey Shaw, 2019. **Ledesma, D., *C. Powell, **J. Motley, J. Best, J. Shaw, and H. Qin. 2019. Specimen Digitization Workflow Optimization Tools—The Creation of Neural Networks ColorNet and Modification of Faster R-CNN for CRC detection. Paper presented at iDigBio Summit IX in Gainesville, FL.
96. Joey Shaw, 2019. *Powell, C., **D. Ledesma, **J. Motley, J. Best, H. Qin, and J Shaw. 2019. Specimen Digitization Workflow Optimization Tools—Herbarium Applications for Specimen Auto-processing, or HerbASAP. Paper presented at iDigBio Summit IX in Gainesville, FL.

97. Joey Shaw, 2019. *Alley, C., and J. Shaw. 2019. A reevaluation of Tennessee's non-native plant species using online herbarium specimen data to develop species distribution models. Paper presented at the Botany2019 meeting in Tuscon, AZ.
98. Joey Shaw, 2019. *Powell, C., **J. Motley, H. Chin, and J. Shaw. 2019. "Born digital," introducing a field to database workflow for herbaria. Paper presented at the Botany2019 meeting in Tuscon, AZ.
99. Joey Shaw, 2019. *Powell, C., **J. Motley, H. Chin, and J. Shaw. 2019. "Born digital," enabling a field to database workflow for herbaria. Paper presented at the Society for the Preservation of Natural History Collections in Chicago, IL.
100. Joey Shaw, 2019. *Alley, C. and J. Shaw. 2019. A reevaluation of Tennessee's non-native plant species using online herbarium specimen data to develop species distribution models. Paper presented at the Association of Southeastern Biologists meeting in Memphis, TN.
101. Joey Shaw, 2019. *Powell, C., **J. Motley, H. Chin, and J. Shaw. 2019. "Born digital," addressing the challenges of a field- to-database workflow for collections based research. Paper presented at the Association of Southeastern Biologists meeting in Memphis, TN.
102. Joey Shaw, 2019. **Ledesma, D., *C. Powell, W. Baker, J. Shaw, Y. Lang, and H. Chin. 2019. Using Convolutional Neural Networks to Classify the Reproductive State of Digitized Herbarium Specimens. Paper presented at the Association of Southeastern Biologists meeting in Memphis, TN.
103. Joey Shaw, 2019. Shaw, J., *C. Alley, *C. Powell, *E. Rylander, and *J. Shelton. 2019. Using SERNEC data to plan your next family road trip. Paper presented at the Association of Southeastern Biologists meeting in Memphis, TN.
104. Joey Shaw, 2019. *Shelton, J. and J. Shaw. 2019. The Lost Flora of Tennessee; A Floristic Investigation Into the Copper Hill Basin, Polk County, Tennessee. Paper presented at the Association of Southeastern Biologists meeting in Memphis, TN.
105. Joey Shaw, 2019. *Rylander, E., and J. Shaw. 2019. Using digitized herbarium specimens to predict the potential distributions of Tennessee's historical plant species. Poster presented at the Association of Southeastern Biologists meeting in Memphis, TN.
106. Joey Shaw, 2019. Beck, James, *L. Konrade, and J. Shaw. 2019. A rangewide herbarium-derived dataset indicates high levels of gene flow in black cherry (*Prunus serotina*). Paper presented at the Association of Southeastern Biologists meeting in Memphis, TN.
107. Joey Shaw, 2019. *Parrish, N. and J. Shaw. 2019. Preliminary Vascular Flora of Walls of Jericho State Natural Area, Franklin County, Tennessee. Paper presented at the Tennessee Academy of Sciences meeting in Columbia, TN.
108. Joey Shaw, 2019. *Alley, C. and J. Shaw. 2019. *Saxifraga tridactylites* (Saxifragaceae) is naturalized in the southeastern and northwestern United States, with a center of distribution in Tennessee. Paper presented at the Tennessee Academy of Sciences meeting in Columbia, TN.
109. Joey Shaw, 2019. *Rylander, E. and J. Shaw. 2019. Using digitized herbarium specimens to predict potential distributions of Tennessee's historical angiosperm species. Paper presented at the Tennessee Academy of Sciences meeting in Columbia, TN.
110. Joey Shaw, 2019. *Stepaniuk, M. and J. Shaw. 2019. Comparing biodiversity of power line right-of-way to surrounding forest habitats by conducting a floristic study of these adjacent sites in Marion County, Tennessee. Paper presented at the Tennessee Academy of Sciences meeting in Columbia, TN.
111. Joey Shaw, 2019. Shaw, J. 2019. Release of the Tennessee-Kentucky Plant Atlas: an online, comprehensive resource for the plant species of these two states. Paper presented at the Tennessee Academy of Sciences meeting in Columbia, TN.
112. Hill Craddock, 2019. Genus *Castanea*: Current Research from the Chattanooga Chestnut Project Invited lecture to Biology Sciences Seminar Series, Mississippi State University. 12 April 2019.

113. Katherine Kinnear, 2019. Principles of Wildlife Rehabilitation Guest Speaker at TEAMS Competition at Signal Mountain Middle and High School, Signal Mountain, TN 2019
114. Katherine Kinnear, 2019. Principles of Wildlife Rehabilitation, Guest Speaker at UTC Wildlife and Zoology Club Chattanooga, TN Nov 2019
115. Thomas Wilson, 2019. Daniels*, K, Carroll, A., and T.P. Wilson. 2019. Comparing UAVS to Traditional Field Methods in Surveying of Freshwater Turtles. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 14-17, 2019, Black Mountain, NC.
116. Thomas Wilson, 2019. Childers*, T., Team Salamander, and T.P. Wilson. 2019. *Plethodon dorsalis*: Microhabitat Analysis and Individual Identification. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 14-17, 2019, Black Mountain, NC.
117. Thomas Wilson, 2019. Head*, R, Team Salamander, and T.P. Wilson. 2019. An ongoing assessment of habitat and species richness at Sequatchie Cave at Sequatchie Cave State Natural Area in Marion County, TN National Speleological Society, 2019 Biospeleology Session, Wednesday, June 19th
118. Thomas Wilson, 2019. Head*, R, Team Salamander, and T.P. Wilson. 2019. An ongoing assessment of habitat and species richness at Sequatchie Cave at Sequatchie Cave State Natural Area in Marion County. The Wildlife Society Annual Meeting, Reno NV, Sept. 29 – Oct. 3, 2019.
119. Thomas Wilson, 2019. Bakland*, P.E., Wilson, T.P., Carver, E., Barbosa, J., and B. Reynolds. 2018. Preliminary Results of a Study in Progress Examining the Prevalence of *Batrachochytrium dendrobatidis* (Bd) at Wetlands and Retention Ponds in East Tennessee. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 22, 2018.
120. Bramblett Jeremy, 2019. Bramblett, Jeremy L., T. J. Gaudin, A. B. Heckert, and M. L. Toran. Using Polymer Clays to Make Molds and Casts of Fossils for Teaching and Outreach. 80th Annual Meeting of the Association of Southeastern Biologists in Memphis, April 3rd-7th 2019.
121. Fernando Alda, 2020. Elías DJ, Alda F, McMahan C, Chakrabarty P. Patrones biogeográficos a escala fina en sistemas acuáticos en el Norte del Neotrópico [in Spanish]. Foro virtual: La Tectónica y Fisiografía de
122. Fernando Alda-Pons | CV12 Centroamérica y su Efecto en la Distribución y Evolución de la Diversidad Biológica. Universidad de San Carlos de Guatemala, Guatemala. October 31st 2020
123. Fernando Alda, 2020. Harvey T, Alda F. Revised phylogenetic hypothesis of Neotropical electric fishes using complete mitochondrial genomes (Poster presentation). National Collegiate Honors Council NCHC20. October 8th-9th 2020.
124. Fernando Alda, 2020. De Blonk T, Alda F. Assembly and phylogenomic analysis of complete mitochondrial genomes: a comparative study. iCompBio 2020 Summer REU. The University of Tennessee at Chattanooga, Chattanooga TN, USA. July 29th-30th 2020.
125. Fernando Alda, 2020. Alda F. Putting evolutionary mechanisms in practice—with school supplies. WCTL Annual Instructional Excellence Virtual Conference. The University of Tennessee at Chattanooga, Chattanooga TN, USA. May 5th-6th 2020.
126. Fernando Alda, 2020. Harvey T, Alda F. Revised phylogenetic hypothesis and comparative evolution of mitochondrial genomes of Neotropical weakly electric fishes (Gymnotiformes) (Poster presentation). UTC Research Dialogues. The University of Tennessee at Chattanooga, Chattanooga TN, USA. April 14th-15th 2020. Conference cancelled due to COVID-19 pandemic.
127. Jennifer Boyd, 2020. Rogers, W, Lee D, Platero D, Gentry B, Calles S, Rochford M, Odell J, Anderson JT, Boyd JN, Cruse-Sanders J. Reasons for rarity? Using a common garden approach to investigate the response of rare *Pityopsis ruthii* (Ruth's golden aster) to potential habitat change. Talk. BOTANY. Virtual meeting. August 2020.

133. Stylianos Chatzimanolis, 2020. A new brachypterous Xanthopygina genus from the Northern Andes. Entomological Society of America Annual (Virtual) Meeting. (Invited)
134. Stephanie DeVries, 2020. Conference Presentation: "A modeling tool to estimate land-use impacts on groundwater nitrate concentrations observed at high-capacity pumping wells in an unconfined glacial aquifer." GSA 2020 Connects Online Meeting, October 27, 2020.
135. Stephanie DeVries, 2020. Invited Lecture: "A C++ based model for estimating the concentration of nitrate at a municipal well in central Wisconsin." Presented to the Wisconsin Nitrate Task Force on August 21, 2020.
136. Timothy Gaudin, 2020. Osteological anomalies in the narial anatomy of the extant two-toed sloth *Choloepus* and the homology of the internarial bar in some fossil sloths. Society of Vertebrate Paleontology, 80th Annual Meeting (on-line meeting), October 2020.
137. Azad Hossain, 2020. Hossain, A., and Burleson, J., 2020, Developing a model to map the potential areas for landslide hazards in Hamilton County, TN using geospatial technology, 5th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga., April 14-15, 2020. Abstract accepted. Conference cancelled due to COVID-19.
138. Azad Hossain, 2020. Hossain, A., Blanton, R., and Mathias, C., 2020, Surface water quality estimation in Southeast Tennessee using Sentinel - 2 satellite imagery, 5th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga., April 14-15, 2020. Abstract accepted. Conference cancelled due to COVID-19.
139. Azad Hossain, 2020. Mathias, C., and Hossain, A., 2020, Bathymetric Digital Elevation Model for the Tennessee River, 5th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga., April 14-15, 2020. Abstract accepted. Conference cancelled due to COVID-19.
140. Azad Hossain, 2020. Mathias, C., and Hossain, A., 2020, Developing a Bathymetric Digital Elevation Model for the Tennessee River, Chattanooga Development Symposium 2020, November 10, 2020.
141. Ashley Manning-Berg, 2020. Invited Talk: The University of Cincinnati Department of Geology: How Exceptional is Exceptional Preservation?
142. Ashley Manning-Berg, 2020. Research Dialogues 2020 Modeling of microbial mat decay and implications for the early Earth fossil record
143. Ashley Manning-Berg, 2020. Manning-Berg, Ashley R., Kah, Linda C., 2020. How Exceptional is Exceptional Fossilization? The Characterization of Silicified Mesoproterozoic Microbial Mats of The Angmaat Formation, Baffin Island, Canada. Geological Society of America Abstracts with Programs. Vol 52, No. 6, doi: 10.1130/abs/2020AM-355970
144. DeAnna Beasley, 2020. Invited talk: Beasley, D.E. (2020). Yale Law School: Law, Ethics, and Animals Program. What about Bugs? Why Insects Urgently Need Human Empathy & Action.
145. DeAnna Beasley, 2020. Beasley, D.E. (2020). Citizen science tools for online teaching. Chattanooga STEM New Teacher Institute. Education Noyce Scholarship Program.
- 146.
147. DeAnna Beasley, 2020. Invited talk: Healthy Cities: What insects tell us about urban living. Kennesaw State University. Marietta, GA.
148. Joey Shaw, 2020. **Ledesma, D. and J. Shaw. 2020. Two disparate worlds collide: an overview of the growing mutual relationship between Botany and machine learning. Paper presented at Tennessee Academy of Sciences (online).
149. Joey Shaw, 2020. *Williams, J. and J. Shaw. 2020. The vascular flora of Booker T. Washington State Park, Hamilton County, Tennessee. Paper presented at Tennessee Academy of Sciences (online).
150. Joey Shaw, 2020. *Stepaniuk, M. and J. Shaw. 2020. Using herbarium specimens to trace heavy metal pollutants and compare them pre- and post- 1969 in the formerly most polluted city in the United States, Chattanooga, Tennessee. Paper presented at Tennessee Academy of Sciences (online).

151. Joey Shaw, 2020. *Powell, C, **J. Motley, J. Shaw. 2020. Expediting Specimen Label Creation and Record Transcription Using Born-Digital Field Notes. Paper presented at Botany2020 (online).
152. Joey Shaw, 2020. **Ledesma, D., *C. Powell, J. Shaw, and H. Qin. 2020. Enabling automated herbarium sheet image post-processing through neural network models for color reference chart detection. Paper presented at Association of Southeastern Biologists meeting (online).
153. Joey Shaw, 2020. *Alley, C., *E. Rylander, **J. Dawson, *M. Feely, **D. Ledesma, *N. Parrish, *C. Powell, *J. Shelton, W. Barger, P. Davison, J. Shaw. 2020. *Saxifraga tridactylites* (Saxifragaceae) naturalized in the southeastern and northwestern United States. Paper presented at Association of Southeastern Biologists meeting (online).
154. Joey Shaw, 2020. *Powell, C., J. Shaw. 2020. Abusing regular expressions to extract verbatim coordinates from herbarium specimen labels. 2020. Paper presented at Association of Southeastern Biologists meeting (online).
155. Joey Shaw, 2020. *Powell, C., **D. Ledesma, **J. Motley, J. Best, H. Qin, and J. Shaw. 2020. Development of the Herbarium Application for Specimen Auto-Processing, a realtime processing solution for herbarium specimen images. Paper presented at Association of Southeastern Biologists meeting (online).
156. Joey Shaw, 2020. *Parrish, N. and J. Shaw. 2020. Preliminary vascular flora of Walls of Jericho State Natural Area, Franklin County, Tennessee. Paper presented at Association of Southeastern Biologists meeting (online).
157. Hill Craddock, 2020. Crawford, H. and J.H. Craddock (2020) Silviculture of the American chestnut in the Cumberland uplands of Tennessee. TACF Annual Meeting. Gettysburg, PA. October 19, 2020. https://acf.org/wp-content/uploads/2019/11/393596_TACF_2019-Poster-Abstracts-Booklet.pdf
158. Hill Craddock, 2020. Chestnut Chat 6: The Art of Grafting, with Dr. Hill Craddock, TN-TACF Chapter President and Steve Hoy, Penn State Orchard Manager. Both will offer tips and discuss the successes and challenges of grafting. Friday, May 29, 2020. <https://www.youtube.com/watch?v=A162sq0GLag&feature=youtu.be>
159. Thomas Wilson, 2020. Childers*, T. and T.P. Wilson. 2020. *Plethodon dosalis* (complex): microhabitat analysis. UTC Research Dialogues
160. Thomas Wilson, 2020. Harris*, C. and T.P. Wilson. 2020. Presence and prevalence of *Ophidiomyces ophiodiicola* in Tennessee snake populations: an initial assessment. UTC Research Dialogues
161. Thomas Wilson, 2020. Kelehear*, S., Wilson, T.P., and N. Hunt. 2020. Using Geospatial Analysis to Model for The Cryptic Salamander (*Hemidactylium scutatum*) in Tennessee. UTC Research Dialogues
162. Thomas Wilson, 2020. Childers*, T., Team Salamander, and T.P. Wilson. 2020. PLETHODON DORSALIS (COMPLEX): MICROHABITAT ANALYSIS. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 27, 2020
163. Thomas Wilson, 2020. Head*, R.H., Team Salamander, T.P. Wilson. 2020. An investigation of microhabitat partitioning between two species of troglomenic salamanders, *Eurycea lucifuga* and *Plethodon glutinosus*, at Sequatchie Cave. Southeastern Partners in Amphibian and Reptile Conservation
164. Annual Meeting, Poster, February 27, 2020.
165. Thomas Wilson, 2020. Kelehear*, S., Hunt, N., Team Salamander, and T.P. Wilson. 2020. USING GEOSPATIAL ANALYSIS TO MODEL FOR THE CRYPTIC SALAMANDER *HEMIDACTYLIUM SCUTATUM* IN TENNESSEE. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 27, 2020.
166. Thomas Wilson, 2020. Jaynes*, M., Team Salamander, and T.P. Wilson. 2020. Discord and Harmony: The Regulation of Amphibians and Reptiles Across Southeastern States.

Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 27, 2020.

167. Thomas Wilson, 2020. Bakland*, P.E., Wilson, T.P., Carver, E.A., Barbosa, J.M., and B.R. Reynolds. 2019. Prevalence Assessment of the Amphibian Chytrid Fungus *Batrachochytrium dendrobatidis* across two habitat types in East Tennessee. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 14-17, 2019, Black Mountain, NC.
168. Thomas Wilson, 2020. Harris*, C., Team Salamander and T.P. Wilson. 2020. Prevalence of *Ophidiomyces ophiodiicola* in Tennessee Snake Populations. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 14-17, 2019, Black Mountain, NC.
169. Fernando Alda, 2021. Harvey T, Alda F. Differential selective pressures in mitochondrial protein coding genes between electric and non-electric fishes. Poster Communication. NCHC Annual Conference, Lake Buena Vista FL, USA. October 27th-31st 2021.
170. Fernando Alda, 2021. Harvey T, Alda F. Differential selective pressures in mitochondrial protein coding genes between electric and non-electric fishes. iCompBio 2021 Summer REU. The University of Tennessee at Chattanooga, Chattanooga TN, USA. July 28th-29th 2021.
171. Fernando Alda, 2021. Elías DJ, McMahan CD, Alda F, García-Alzate C, Hart PB, Chakrabarty P. Phylogenomics and biogeographic history of trans-Andean tetras in the genus *Hyphessobrycon* Durbin 1908. Joint Meeting of Ichthyologists and Herpetologists, Phoenix AZ, USA July 21st-23rd (in person), July 26th-27th (virtual) 2021
172. Fernando Alda, 2021. Hart PB, Arnold R, Alda F, Chakrabarty P. Evolutionary relationships of anglerfishes (Lophiiformes) Reconstructed using ultraconserved elements. Joint Meeting of Ichthyologists and Herpetologists, Phoenix AZ, USA July 21st-23rd (in person), July 26th-27th (virtual) 2021.
173. Fernando Alda, 2021. Elías DJ, Alda F, McMahan CD, García-Alzate C, Hart PB, Chakrabarty P. Phylogenomics and biogeographic history of the Middle American Tetras of the genus *Hyphessobrycon* (Characidae). Virtual Evolution, June 21st-25th 2021
174. Fernando Alda, 2021. Shepherd D, Alda F. Chromosome mutation as a mechanism for speciation. Poster Communication. UTC ReSEARCH Dialogues. University of Tennessee at Chattanooga, Chattanooga TN, USA. April 12th-14th 2021
175. Fernando Alda, 2021. Harvey T, Alda F. Revised phylogenetic hypothesis of Neotropical electric fishes using complete mitochondrial genomes. Poster Communication. UTC ReSEARCH Dialogues. University of Tennessee at Chattanooga, Chattanooga TN, USA. April 12th-14th 2021
176. Fernando Alda, 2021. De Blonk T*, Wimberly J*, Schönhuth S, Neely D, Mayden R, Blum MJ, Alda F. Phylogeography of Stonerollers across North America (Campostoma: Cyprinidae). Poster Communication. UTC ReSEARCH Dialogues. University of Tennessee at Chattanooga, Chattanooga TN, USA. April 12th-14th 2021. *These authors contributed equally to this work.
177. Jennifer Boyd, 2021. Boyd JN, Brzyski J, Anderson JT, Baskauf C, Cruse-Sanders J. How do fitness measures, functional traits, and genetic diversity relate to plant species rarity? A meta-analysis of congeneric comparisons. Talk. Ecological Society of America. Virtual Meeting. August 2021.
178. Jennifer Boyd, 2021. Anderson J, Boyd JN, Cruse-Sanders J, Brzyski J, Baskauf C. Eco-evolutionary consequences of rarity. Talk. Reasons for Rarity Colloquium. Botany 2021. Virtual meeting. July 2021.
179. Jennifer Boyd, 2021. Boyd JN, Odell J, Cruse-Sanders J, Rogers W, Anderson JT, Baskauf C, Brzyski J. Comparative plasticity and genetic diversity of rare *Pityopsis ruthii* and its common congener *P. graminifolia*. Talk. Reasons for Rarity Colloquium. Botany 2021. Virtual meeting. July 2021.

180. Jennifer Boyd, 2021. Brzyski J, Boyd JN, Cruse-Sanders J, Baskauf C, Anderson J, Yurek J. Are rare species constrained by their acclimatory and evolutionary ability? A congeneric comparison using Echinacea. Talk. Reasons for Rarity Colloquium. Botany 2021. Virtual meeting. July 2021.
181. Stylianos Chatzimanolis, 2021. Out of Xanthopygus (Coleoptera: Staphylinidae): escape from polyphyly. Entomological Society of America Annual Meeting, Colorado, USA. (Invited - Virtual).
182. Stephanie DeVries, 2021. Conference Presentation: "Microplastics in groundwater and the role of soil thickness in mitigating septic effluent as a source." GSA Connects 2021, Portland, Oregon, October 10, 2021
- 183.
184. David Giles, 2021. The emerging role(s) of exogenous fatty acids in Gram-negative bacteria. Invited Research Talk for students in the NSF ASPIRE program at UTC. January 2021.
185. David Giles, 2021. Fishing for new antimicrobials: Synergism between fatty acids and piscidin treatment. Association of Southeastern Biologists Virtual Meeting. March 2021
186. David Giles, 2021. Houck C, *Giles D, Cotten M. 2021. Fishing for New Antimicrobials: Synergism between Fatty Acids and Piscidin Treatment. Association of Southeastern Biologists Oral Presentation for Virtual Meeting. Also presented for UTC Research Dialogues.
187. Azad Hossain, 2021. Firat, C. and Hossain, A., 2021, Estimating Suspended Sediment Concentrations in the Tennessee River and the Surrounding Tributaries During a High Precipitation Event Using Planetscope Satellite Imagery, The Geological Society of America 2021 Annual Meeting in Portland, Oregon, 10-13 October 2021, Abstract # 371135.
188. Azad Hossain, 2021. William, S. and Hossain, A., 2021, Seeing the carbon for the trees - using remote sensing to model forest carbon, The Geological Society of America 2021 Annual Meeting in Portland, Oregon, 10-13 October 2021, Abstract # 368262.
189. Azad Hossain, 2021. Hossain, A., and Mathias, C., 2021, Remote Sensing of Water Quality in the Tennessee River Using Sentinel-2 Imagery, GSA Southeastern Section - 70th Annual Meeting – 2021, April 1-2, 2021, Online Meeting. GSA Abstract #362338.
190. Azad Hossain, 2021. Hossain, A. and Mathias, C., 2021, Remote Sensing of Water Quality Using Planet Dove Imagery, 6th Annual UTC Research Dialogue, April 12-15, 2021. The University of Tennessee at Chattanooga.
191. Azad Hossain, 2021. Hossain, A., and Mathias, C., 2021, Remote Sensing of Water Quality in the Tennessee River Using Sentinel-2 Imagery, GSA Southeastern Section - 70th Annual Meeting – 2021, April 1-2, 2021, Online Meeting. GSA Abstract #362338.
192. Hope Klug, 2021. The operation of mate acquisition revisited, Seminar: San Diego State University, Biology Department, May 2021
193. Francesca Leasi, 2021. Cline J, Leasi F Effects of dissolved and suspended solids on the biodiversity of freshwater meiofauna from the Tennessee River. 56th National Collegiate Honors Council Annual Conference. Orlando, FL. Oct 27-31, 2021.
194. Ashley Manning-Berg, 2021. Invited Talk: The Paleontological Association of Georgia Fossil Symposium: A Sign of the times: Where do the stromatolites of the Knox Group fit?
195. Ashley Manning-Berg, 2021. Manning-Berg, Ashley R., Lam, Elizabeth K., Riedman, Leigh Anne, Gomes, Maya. 2021. Modern microbial mat taphonomy and its implications on microfossil preservation. Geological Society of America Abstracts with Programs. Vol 53, No. 6. doi: 10.1130/abs/2021AM-371005
196. Ashley Manning-Berg, 2021. Jones, Brendell, Manning-Berg, Ashley R., Roney, Ryan, Santamaria, Jose, Czaja, Andrew D., 2021. Stromatolitic fabrics within chert nodules in the Knox Group of northwest Georgia. Geological Society of America Abstracts with Programs. Vol 53, No. 6. doi: 10.1130/abs/2021AM-371149
197. Jonathan Mies, 2021. The Geology of Chattanooga, with Reference to Rock City and Ruby Falls Road Scholars, DoubleTree Hotel, Chattanooga, TN,

198. DeAnna Beasley, 2021. Invited talk: Beasley, D.E. (2021). Healthy Cities: What insects can tell us about urban living. Cal Poly Pomona, Pomona, CA.
199. DeAnna Beasley, 2021. Invited talk: Beasley, D.E. (2021). Healthy Cities: What insects can tell us about urban living. University of South Florida, Tampa, FL.
200. DeAnna Beasley, 2021. Invited guest lecturer: Beasley, D.E. (2021). What insects can tell us about urban living. North Carolina State University, Raleigh, NC. Wicked Problems, Wolfpack Solutions online course.
201. DeAnna Beasley, 2021. Invited talk: Beasley, D.E. (2021). Healthy Cities: What insects tell us about urban living. Portland State University, Portland O.R. Invited keynote speaker at PSU Graduate Student Colloquium.
202. DeAnna Beasley, 2021. Invited talk: Beasley, D.E. (2021). Healthy Cities: What insects tell us about urban living. San Diego State University, San Diego, CA.
203. DeAnna Beasley, 2021. Invited talk: Beasley, D.E. (2021). Healthy Cities: What insects tell us about urban living. North Carolina State University. Raleigh, N.C.
204. Joey Shaw, 2021. invited talk: Annual Spring Wildflower Pilgrimage in the Great Smoky Mountains National Park 1951-2021. 2021. Paper presented at the Association of Southeastern Biologists meeting (online).
205. Joey Shaw, 2021. Shaw, J. 2021. Tennessee-Kentucky Plant Atlas: an online comprehensive resource for 3600 vascular plant species. Paper presented at the Association of Southeastern Biologists meeting (online).
206. Joey Shaw, 2021. **Ledesma, D. and J. Shaw. 2021. Leveraging statistical analyses and focused expertise for the assignment of botanical coefficients of conservatism values in Tennessee and Kentucky. Paper presented at Association of Southeastern Biologists (online).
207. Joey Shaw, 2021. *Stepaniuk, M. and J. Shaw. 2021. Using herbarium specimens to trace heavy metal pollutants and compare them pre- and post- 1969 in the formerly most polluted city in the United States, Chattanooga, Tennessee. Paper presented at Association of Southeastern Biologists (online).
208. Fernando Alda, 2022. Hanson-Regan W§, Mendoza-Franco EF, Reina RG, Bermingham E, Torchin M, Alda F. Coevolution or geography: What drives parasite diversification? Poster Communication. UTC ReSEARCH Dialogues. University of Tennessee at Chattanooga, Chattanooga TN, USA. April 12th-14th2022.
209. Fernando Alda, 2022. Elías DJ, Alda F, McMahan CD, Brown J, Chakrabarty P. Investigating phylogenetic signal and exploring treespace to illuminate contentious relationships in riverine radiations: Herichthyines cichlids as a case study. Oral Communication. Joint Meeting of Ichthyologists and Herpetologists, Spokane WA, USA. July 27th-30th2022.
210. Fernando Alda, 2022. Alda F, de Blonk T, Wimberly J, Schönhuth S, Neely DA, Mayden RL, Blum MJ. Poster Communication. Joint Meeting of Ichthyologists and Herpetologists, Spokane WA, USA. July 27th-30th2022
211. Fernando Alda, 2022. Bagley JC, Bonner RE, Braswell C, Elías DJ, Glick MJ, Hanson-Regan W§, Morrow K, O'Malley K¶, Parker CE, Smith M¶, Alda F. Poster Communication. Joint Meeting of Ichthyologists and Herpetologists, Spokane WA, USA. July 27th-30th2022
212. Jennifer Boyd, 2022. Boyd JN, Anderson JT, Baskauf C, Brzyski J, Cruse-Sanders J. Eco-evolutionary causes and consequences of rarity in plants. Talk. Ecological Society of America. Montreal, Canada. August 2022.
213. Jennifer Boyd, 2022. Baskauf C, Lindsey A, Rogers W, Boyd J, Anderson J, Brzyski J, Cruse-Sanders J. Comparison of phenotypic plasticity and genetic diversity of a rare and a widespread species of *Boechera* (Brassicaceae), *B. perstellata* and *B. laevigata*. Talk. Botany 2022. Anchorage, AK. July 2022.
214. Jennifer Boyd, 2022. Wiegand T, Corlew A, Rogers W, Cruse-Sanders J, Boyd J. Investigating associations between phenotypic plasticity and geographic distribution in *Helianthus*. Poster. Botany 2022. Anchorage, AK. July 2022.

215. Jennifer Boyd, 2022. Young A, Aborn D, Latta S, Boyd JN. Avian winter habitat selection of avocado farms and intact forest in the Baboruco region of the Dominican Republic. Poster. Ecological Society of America. Montreal, Canada. August 2022.
216. Amy Brock-Hon, 2022. Brock-Hon, 2022. From Nevada soils to Tennessee Depressions: Investigating Features at Various Scales: GSA Abstracts with Programs, v. 54, n. 2.
217. Stylianos Chatzimanolis, 2022. Why are Xanthopygina (Coleoptera: Staphylinidae) rove beetles shiny? Joint Annual Meeting of Entomological Society of America and the Entomological Society of Canada, Vancouver, Canada.
218. Stephanie DeVries, 2022. Invited Lecture: "Diary of a shape-shifting scientist: What's nitrogen got to do with it?" Department of Earth and Planetary Sciences, University of Tennessee at Knoxville, October 20, 2022.
219. Stephanie DeVries, 2022. Conference Presentation: "A modeling tool to estimate land-use impacts on groundwater nitrate concentrations observed at high-capacity pumping wells in an unconfined glacial aquifer." GSA NC/SE Joint Sectional Meeting, Cincinnati, OH, April 7–8, 2022.
220. Jannatul Ferdoush, 2022. Gave an invited presentation on "Regulation of nuclear phase of eukaryotic gene expression by Ubiquitin- Proteasome System (UPS)" in the University of Chittagong, Bangladesh. December 2022.
221. Timothy Gaudin, 2022. Invited presentation: Pangolins, sloths, science & mentorship. East Brainerd Kiwanis. October 28, 2022.
222. Timothy Gaudin, 2022. Invited presentation: (with grad student Carissa Turner) The spread of nine-banded armadillos (*Dasypus novemcinctus*) in Tennessee: Determining habitat preference of nine-banded armadillos in Tennessee with assistance from community science. Innovations in Invasive Species Management Conference, Nashville TN, December 14-15, 2022.
223. David Giles, 2022. Resistance is futile: A 'Trojan Horse' strategy for battling bacterial infections. FLY for Researchers Pitch Competition. UTC Research Dialogue event. April 2022.
224. Azad Hossain, 2022. Faxon, A., Hossain, A., Mies, J., and Shirmeen, T., 2022, Studying Suspended Sediment Concentrations in the South Chickamauga Creek of Chattanooga, TN using Satellite Imagery, Digital Image Processing, and Numeric Modeling. NCUR 2022 @Home on April 4-8, 2022.
225. Azad Hossain, 2022. Faxon, A., Hossain, A., Mies, J., and Shirmeen, T., 2022, Studying Suspended Sediment Concentrations in the South Chickamauga Creek using Satellite Imagery and Numeric Modeling, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
226. Azad Hossain, 2022. Stuart, W., and Hossain, A., 2022, Spatio-Temporal Analysis of Chattanooga, TN's urban forest from 1984 – 2021 Using Remote Sensing, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
227. Azad Hossain, 2022. Campbell, S., and Hossain, A., 2022, Application of Remote Sensing to Study the Potential Impact of 2020 Wildfire Events on the Glaciers of Mount Baker, Washington, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
228. Azad Hossain, 2022. Jones, S., and Hossain, A., 2022, Potential Impact of Ground Water Depletion on Vegetation in the Mississippi Delta Using GRACE and MODIS NDVI Data, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
229. Azad Hossain, 2022. Hossain, A., Campbell, S., and Mies, J., 2022, Investigating Seasonal Variation of Urban Heat Island Effect in the City of Chattanooga, TN Using Remote Sensing, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
230. Azad Hossain, 2022. Anzalone, B., and Hossain, A., 2022, Mapping Relative Variation of Suspended Sediment Concentration in the Tennessee River Using Remote Sensing, UTC Research Dialogues 2022, April 12-13, 2022.
231. Azad Hossain, 2022. Faxon, A., Hossain, A., Mies, J., and Shirmeen, T., 2022, Evaluating the Performance of PlanetScope Imagery to Study Suspended Sediment Concentrations in the

South Chickamauga Creek of Chattanooga, TN, UTC Research Dialogues 2022, April 12-13, 2022.

232. Azad Hossain, 2022. Stuart, W., and Hossain, A., 2022, Mapping the Changes in Urban Forest of Chattanooga, TN from 1984 – 2021, UTC Research Dialogues 2022, April 12-13, 2022.
233. Azad Hossain, 2022. Campbell, S., and Hossain, A., 2022, Application of Remote Sensing to Study the Potential Impact of Wildfire on Glaciers, UTC Research Dialogues 2022, April 12-13, 2022.
234. Azad Hossain, 2022. Jones, S., and Hossain, A., 2022, Studying the Potential Impact of Groundwater Depletion on Surface Vegetation in the Mississippi Delta Using Remote Sensing, UTC Research Dialogues 2022, April 12-13, 2022.
235. Azad Hossain, 2022. Firat, C., and Hossain, A., 2022, Modeling the Impact of Land Use and Land Cover Change on the Water Quality of the South Chickamauga Creek of Chattanooga, Tennessee, UTC Research Dialogues 2022, April 12-13, 2022.
236. Azad Hossain, 2022. Hossain, A., Burleson, J., Springer, H., Welborn, R., and Mies, J., 2022, Landslide Hazards in Hamilton County, TN, UTC Research Dialogues 2022, April 12-13, 2022.
237. Azad Hossain, 2022. Hossain, A., Campbell, S., and Mies, J., 2022, Urban Heat Island Effect in the City of Chattanooga, TN, UTC Research Dialogues 2022, April 12-13, 2022.
238. Azad Hossain, 2022. Mollica, M., and Hossain, A., 2022, Spatio-temporal Analysis of Snowpack on the Rocky Mountains Using GIS, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
239. Azad Hossain, 2022. Bowman, H., Hossain, A., Breetzke, D., 2022, Application of Geospatial Technology to Map the Potential Locations of Chert in the Daniel Boone National Forest, Kentucky, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
240. Azad Hossain, 2022. Firat, C., and Hossain, A., 2022, Investigating the Potential of PlanetScope Imagery to Study Suspended Sediment Concentration in the Tennessee River, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
241. Azad Hossain, 2022. Anzalone, B., and Hossain, A., 2022, Evaluating the Performance of NDSSI, NDTI, and NSMI in the Tennessee River Using Ground Measurements of Turbidity, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
242. Azad Hossain, 2022. Bordash, W., Hossain, A., and Mies, J., 2022, Remote Sensing of Volcanic Eruption Characteristics in the Galapagos Islands, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
243. Hope Klug, 2022. Parental care, filial cannibalism, & the evolution of social behavior, Seminar: University of Illinois, Department of Evolution, Ecology and Behavior, January 2022
244. Hope Klug, 2022. Klug, H. Rasnick, G.*, Jordan, C.*, Farnsley, S., & Lehonen, T. What happens when losers become winners? Nest competition and sexual selection in the sand goby (Poster Presentation), Tvärminne Zoological Station 120-Year-Anniversary Open House, Hanko, Finland, September 2022
245. Hope Klug, 2022. Klug, H., Reyes, E.□, & Langley, C.* Cascading effects of pre-adult survival on sexual selection (Poster Presentation), International Society for Behavioral Ecology Conference, Stockholm, Sweden, August 2022
246. Hope Klug, 2022. Rasnick, G.* & Klug, H. Pre-mating pool resource competition and sexual selection (Poster Presentation), International Society for Behavioral Ecology Conference, Stockholm, Sweden, August 2022
247. Hope Klug, 2022. de Blonk, T.*, Bonsall, M.B., & Klug, H. Links between life history, mate preferences, and the loss and gain of parental care (Poster Presentation), International Society for Behavioral Ecology Conference, Stockholm, Sweden, August 2022
248. Hope Klug, 2022. Jordan, C.*, Rasnick, G.*, Lehtonen, T., Farnsley, S., & Klug, H. Nest competition and sexual selection in the sand goby: what happens when losers become winners?

(Oral Presentation), International Society for Behavioral Ecology Conference, Stockholm, Sweden, August 2022

249. Francesca Leasi, 2022. Bergmeier F, Leasi F, Thomas WK, Seigny JL, Todt C, Kocot, Jerger KM. Solenogastres enter the stage of mitogenomics: comparative characterizations of the first solenogaster mitochondrial genomes. World Congress of Malacology. Munich, Germany. August 1-5, 2022.
250. Francesca Leasi, 2022. Leasi F, Cline J, Elsaed N, Qualey L. First report of meiofauna biodiversity from the Tennessee River. 83rd Annual Meeting of Association of Southeastern Biologists. Little Rock (AK). March 30 - April 2, 2022.
251. Francesca Leasi, 2022. Cline J, Leasi F. The Effects of Dissolved and Suspended Solids on Freshwater Meiofauna. ReSEARCH Dialogues. University of Tennessee at Chattanooga. April 12-13, 2022.
252. Francesca Leasi, 2022. Leasi F, Cline J, Elsaed N, Qualey L. First report of meiofauna biodiversity from the Tennessee River. ReSEARCH Dialogues. University of Tennessee at Chattanooga. April 12-13, 2022.
253. Ashley Manning-Berg, 2022. Invited Talk: University of Missouri Dept. of Geosciences Decomposition and Preservation of microbial mats: An Actualistic Experiment
254. Ashley Manning-Berg, 2022. Invited Talk: Vanderbilt University Dept. of Earth Science Taphonomic Insights into Exceptional Preservation: What's Missing?
255. Ashley Manning-Berg, 2022. Manning-Berg, Ashley R., Lam, Elizabeth Kathleen., 2022. Taphonomic changes and decomposition pathways of microbial consortiums. Geological Society of America Abstracts with Programs. Vol 54, No. 5. doi: 10.1130/abs/2022AM-381907
256. Ashley Manning-Berg, 2022. Tingle, Kelly, Anderson, Ross, Manning-Berg, Ashley R., Darroch, Simon. 2022. Experimental taphonomy of protists. Geological Society of America Abstracts with Programs. Vol 54, No. 5. doi: 10.1130/abs/2022AM-379310
257. Ashley Manning-Berg, 2022. Ritchey, Evan, Manning-Berg, Ashley R., Roney, Ryan. 2022. Petrographic observations of diagenetically altered stromatolitic fabrics of the Knox group, Chatsworth, Georgia. Geological Society of America Abstracts with Programs. Vol 54, No. 5, doi: 10.1130/abs/2022AM-380804
258. Ashley Manning-Berg, 2022. Thompson, Samuel M., Thornton, Quillen., Mollica, Matthew, Manning-Berg, Ashley R., Muhlbauer, Jason., 2022. Mississippian algal structures within the Bangor Limestone formation at Raccoon Mountain, Chattanooga, Tennessee. Geological Society of America Abstracts with Programs. Vol 54, No. 5, doi: 10.1130/abs/2022AM-380242
259. Ashley Manning-Berg, 2022. Mollica, Matthew, Thornton, Quillen., Thompson, Samuel M., Manning-Berg, Ashley R., DeVries, Stephanie. 2022. Assessing anthropogenic effects on water quality in Raccoon Mountain Caverns, Chattanooga, Tennessee. Geological Society of America Abstracts with Programs. Vol 54, No. 5. doi: 10.1130/abs/2022AM-380248
260. Ashley Manning-Berg, 2022. Powers, Caden, White, Cole, DeVries, Stephanie, Manning-Berg, Ashley R., 2022. Exploring a potential method to identify and quantify tire particles from other microplastics. Geological Society of America Abstracts with Programs. Vol 54, No. 5. doi: 10.1130/abs/2022AM-383192
261. Ashley Manning-Berg, 2022. Elizabeth Lam Qualifying changes to microbial communities during decomposition to interpret mat morphologies observed in the rock record UTC Research Dialogues 2022
262. Ashley Manning-Berg, 2022. Ameerah Turner The effect of original morphology on diagenetic pathways of microorganisms prior to fossilization Research Dialogues 2022
263. Jonathan Mies, 2022. The Geology of Chattanooga, with Reference to Rock City and Ruby Falls Road Scholars, DoubleTree Hotel, Chattanooga, TN,

264. Tahmina Shirmeen, 2022. Faxon, A., Hossain, A., Mies, J., and Shirmeen, T., 2022, Studying Suspended Sediment Concentrations in the South Chickamauga Creek using Satellite Imagery and Numeric Modeling, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
265. Tahmina Shirmeen, 2022. Faxon, A., Hossain, A., Mies, J., and Shirmeen, T., 2022, Studying Suspended Sediment Concentrations in the South Chickamauga Creek of Chattanooga, TN using Satellite Imagery, Digital Image Processing, and Numeric Modeling. NCUR 2022, April 4-8, 2022.
266. DeAnna Beasley, 2022. Jarvis, C. (grad researcher) and Beasley, D.E. (2022). Urbanization effects on *Apis mellifera* colonies. Entomological Society of America, Vancouver, British Columbia, Canada.
267. Joey Shaw, 2022. invited talk: Discover Live in America. 2022. The Spring Wildflower Pilgrimage History and Contributions to Science. (online).
<https://www.youtube.com/watch?v=tmFXQOjTd70>
268. Joey Shaw, 2022. invited talk: Nature by the Pint (Chattanooga). 2022. The Spring Wildflower Pilgrimage History and Contributions to Science.
269. Joey Shaw, 2022. invited talk: iNaturalist Tutorial for the Tennessee Native Plant Society on Lookout Mountain. 2022. I prepared this invited presentation but could not make it, so prepped my graduate student Garrett Billings to give the presentation and workshop in my stead.
270. Joey Shaw, 2022. *Brothers, S., and J. Shaw. 2022. Taxonomic, conservation, ecological, and morphological analysis of 4553 plant species of the interior Southeast US. Paper presented at Tennessee Academy of Sciences meeting (Nashville, TN).
271. Joey Shaw, 2022. *McGuigan, C., A. Kur, and J. Shaw. 2022. Assessing the usefulness of botanical illustration in the Guide to the Vascular Plants of Tennessee. Paper presented at Tennessee Academy of Sciences meeting (Nashville, TN).
272. Joey Shaw, 2022. Shaw, J. 2022. Progress toward the Second Edition of the Guide to the Vascular Plants of Tennessee. Paper presented at Tennessee Academy of Sciences meeting (Nashville, TN).
273. Joey Shaw, 2022. *Billings, G., and J. Shaw. 2022. The preliminary vascular plant flora of the Walls of Jericho in Jackson County, Alabama and Franklin County Tennessee; highlights of an endemically rich natural area. Paper presented at Botany2022, Anchorage, AL
274. Joey Shaw, 2022. **Hicks, A., and J. Shaw. 2022. Standards for conducting an iflora: Using iNaturalist to conduct a vascular flora of the Charles B. Henson Cave Preserve in Dade, County, Georgia. Paper presented at Association of Southeastern Biologists meeting (Little Rock, AR).
275. Joey Shaw, 2022. *Billings, G., and J. Shaw. 2022. Preliminary vascular plant flora of the Walls of Jericho in Jackson County, Alabama and Franklin County Tennessee. Paper presented at Association of Southeastern Biologists meeting (Little Rock, AR).
276. Joey Shaw, 2022. **Doss, S., and J. Shaw. 2022. Discovering, counting, and summarizing the National Park specimens at UCHT. Poster presented at Association of Southeastern Biologists meeting (Little Rock, AR).
277. Hill Craddock, 2022. Harden, K.E. and Craddock, J.H. (2022). Oxalic acid leaf disk assays may be another method of screening phenotypic variability in “American” looking *Castanea* hybrid trees. Poster presented at: The American Chestnut Foundation Fall Symposium, October 1, 2022, Asheville, NC.
278. Hill Craddock, 2022. Nguyen, T., and Craddock, J.H. (2022). A small stem assay using hypovirulent *Cryphonectria parasitica* to screen *Castanea dentata* backcross F2 families may set the stage for long-term survival [Poster presentation]. The American Chestnut Foundation Fall Symposium, 30 September-2 October 2022, Asheville, NC, United States.
279. Hill Craddock, 2022. Invited Lecture: Conservation of *Castanea* genetic resources in the Southeast: A Science Café with Dr. Hill Craddock, Atlanta Botanical Garden, Atlanta GA, Thursday, 21 August 2022.

280. Katherine Kinnear, 2022. Creating Connections in Wildlife Education & Rehabilitation, Presenter at UTC Instructional Excellence Retreat May 2022
281. Thomas Wilson, 2022. Cobb*, N.R., Hunt, N.R. Team Salamander*, and T.P. Wilson. 2022. Green Salamander (*Aneides aeneus*) Abundance and Proximity to Hiking Trails in the Greater Chattanooga Area. Annual Meeting-
282. Association of Southeastern Biologists, Little Rock AR.
283. Thomas Wilson, 2022. Gaylord*, E. M., Hunt, N.R., Team Salamander*, and T. P. Wilson. 2022. Developing a Predictive Geospatial Habitat Model for Green Salamanders (*Aneides aeneus*) in East Tennessee. Annual Meeting- Association of Southeastern Biologists, Little Rock AR.
284. Thomas Wilson, 2022. Palaniyappan, E., Liang, YU, Bathi, J.B., Wilson, T.P., Owino, J. and I. Fomunung. 2022. Deep Learning-enabled Assessment of Environment, Social and Economic Benefits of Green Infrastructures. No. 7166. TRISTAN 2022 (The 11th Triennial Symposium on Transportation Analysis conference).
285. Thomas Wilson, 2022. Turner*, C.M., Wilson, T.P., Loughry, W.J., and T. J. Gaudin. 2022. Determining Habitat Preference of Nine-Banded Armadillo in Tennessee with Assistance from Community Science Data. Annual Meeting Southeastern Bat Diversity Network, March 9-10, 2022.
286. Sean Richards, 2022. Sean Richards, Jacopo Troisi, Antonio Raffone, Antonio Travaglino, Gaetano Belli, Carmen Belli, PhD, Santosh Anand, Luigi Giugliano, Pierpaolo Cavallo, Giovanni Scala, Steven Symes, David Adair, Alessio Fasano, Vincenzo Bottigliero, Maurizio Guida. A Serum Metabolomic Signature for Endometrial Cancer Screening in Postmenopausal Women. April 26-27, 2022. 3rd Global Virtual Summit on Gynecology, Obstetrics & Women's Health. World Gynecology 2022. Invited Presentation.
287. Sean Richards, 2022. S. Richards. Toxins of the Great Smoky Mountains National Park. You'll never go in the woods again! April 27-30, 2022. 72nd Annual Spring Wildflower Pilgrimage. Gatlinburg, TN.
288. Sean Richards, 2022. *Robert Charles Dixon, Frank Bailey, Steven Symes and Sean Richards. Assessing the Effects of the Pharmaceutical Contaminant Atorvastatin on the Growth and Metabolome of the Red Swamp Crayfish, *Procambarus clarkia*. Abstracts of the 2022 Society of Environmental Toxicologists and Chemists. November 13-17, 2022. Pittsburgh, PA.
289. Sean Richards, 2022. Jacopo Troisi, *Martina Lombardi, Antonio Raffone, Giovanni Scala, Matteo Delli Carri, Annamaria Landolfi, Sean Richards, Steven Symes. The metabolomic way for the screening of endometrial cancer. Abstracts of the 18th Annual Conference of the Metabolomics Society. June 19-23, 2022. Valencia, Spain.
290. Sean Richards, 2022. Steve Symes, *Martina Lombardi, Giovanni Scala, Matteo Delli Carri, Sean Richards, GEMMA Consortium, Jacopo Troisi. Genome, Environment, Microbiome and Metabolome in Autism (GEMMA) Study: Beyond Biomarker Identification for the Precision Treatment and Early Detection of Autism Spectrum Disorders. Abstracts of the 18th Annual Conference of the Metabolomics Society. June 19-23, 2022. Valencia, Spain.
291. Sean Richards, 2022. *Martina Lombardi, Giovanni Scala, Matteo Delli Carri, Sean Richards, Steven J.K. Symes, Monica Cantile, Egidio Celentano, Sandro Pignata, Nicola Normanno, Jacopo Troisi. A Metabolomics-Based Ensemble Machine Learning Approach for Comprehensive Cancer Screening. Abstracts of the 18th Annual Conference of the Metabolomics Society. June 19-23, 2022. Valencia, Spain.
292. Sean Richards, 2022. Sean Richards, *Martina Lombardi, Steven J.K. Symes, David C. Adair, Giovanni Scala, Matteo Delli Carri, Floriana Palladino, Pierpaolo Cavallo, Lesley McCowan, Rannae Taylor, Laura Sarno, Maurizio Guida, Jacopo Troisi. Beyond the free circulating fetal dna evaluation: a metabolomic based proposal for prenatal screening. Abstracts of the 18th Annual Conference of the Metabolomics Society. June 19-23, 2022. Valencia, Spain.

293. Sean Richards, 2022. Jacopo Troisi, *Martina Lombardi, Antonio Raffone, Giovanni Scala, Matteo Delli Carri, Annamaria Landolfi, Sean Richards, Steven Symes. The metabolomic way for the screening of endometrial cancer. Abstracts of the 4th Annual Conference of the Metabolomics Association of North America. September 16-18, 2022. Edmonton, Alberta, Canada.
294. Sean Richards, 2022. Steve Symes, *Martina Lombardi, Giovanni Scala, Matteo Delli Carri, Sean Richards, GEMMA Consortium, Jacopo Troisi. Genome, Environment, Microbiome and Metabolome in Autism (GEMMA) Study: Beyond Biomarker Identification for the Precision Treatment and Early Detection of Autism Spectrum Disorders. Abstracts of the Abstracts of the 4th Annual Conference of the Metabolomics Association of North America. September 16-18, 2022. Edmonton, Alberta, Canada.
295. Sean Richards, 2022. *Martina Lombardi, Giovanni Scala, Matteo Delli Carri, Sean Richards, Steven J.K. Symes, Monica Cantile, Egidio Celentano, Sandro Pignata, Nicola Normanno, Jacopo Troisi. A Metabolomics-Based Ensemble Machine Learning Approach for Comprehensive Cancer Screening. Abstracts of the Abstracts of the 4th Annual Conference of the Metabolomics Association of North America. September 16-18, 2022. Edmonton, Alberta, Canada.
296. Sean Richards, 2022. Sean Richards, *Martina Lombardi, Steven J.K. Symes, David C. Adair, Giovanni Scala, Matteo Delli Carri, Floriana Palladino, Pierpaolo Cavallo, Lesley McCowan, Rannae Taylor, Laura Sarno, Maurizio Guida, Jacopo Troisi. Beyond the free circulating fetal dna evaluation: a metabolomic based proposal for prenatal screening. Abstracts of the Abstracts of the 4th Annual Conference of the Metabolomics Association of North America. September 16-18, 2022. Edmonton, Alberta, Canada.
297. Bramblett Jeremy, 2022. Bramblett, Jeremy L., L. Gossett, and J. Mies. Using Portable Document Cameras and Portable Digital Microscopes in Both Virtual and On-Class Historical Geology and Petrology Labs. Geological Society of America Abstracts with Programs, v. 54 no. 4, DOI:10.1130/abs/2022NC-374974.
298. Jennifer Boyd, 2023. Boyd JN, Baskauf C, Lindsay A, Anderson JT, Brzyski J, Cruse-Sanders J. Comparative phenotypic plasticity and genetic diversity of rare *Boechera perstellata* and widespread *B. laevigata*. Talk. Ecological Society of America. Portland, OR. August 2023.
299. Jennifer Boyd, 2023. Boyd JN, Anderson JT, Brzyski J, Baskauf C, Cruse-Sanders J. Investigating the eco-evolutionary causes and consequences plant species rarity with meta-analyses. Talk. Botany 2023. Boise, ID. July 2023.
300. Jennifer Boyd, 2023. Boyd JN, Anderson JT, Brzyski J, Baskauf C, Cruse-Sanders J. Eco-evolutionary causes and consequences of rarity in plants. Talk. XV International Seminar, Biodiversity Management and Conservation: Plant Ecology and Conservation. Catania, Italy. June 2023.
301. Jennifer Boyd, 2023. Boyd JN, Beasley D, DeVries S, Farsley S. J. Environmental Studies presents a panel on translational research in the natural science. Panel. UTC Spring Research and Arts Conference. Chattanooga, TN. April 2023.
302. Amy Brock-Hon, 2023. Newbille, A., Anzalone, B., Powers, C., Qualls, H., Thomas, S., Brock-Hon, A., Hon, K.D., McCarragher, S., Meese, P., 2023. Investigation of the morphology of a large sandstone depression on the Cumberland Plateau of Tennessee using Geomorphic Mapping and GPR. GSA Abstracts with Programs, v. 55, no. 6.
303. Stylianos Chatzimanolis, 2023. Systematics and natural history of *Xanthopygina* rove beetles. University of Illinois at Urbana-Champaign. (Invited).
304. Stephanie DeVries, 2023. Invited Lecture: "Hide and Seek: Using Fluorescence to Find the Plastics Hiding in Plain Sight," Department of Earth and Planetary Sciences, University of Tennessee at Knoxville, February 9, 2023.

305. Jannatul Ferdoush, 2023. Gave oral presentation on “Ubiquitin-Proteasome System (UPS) Regulation of an Evolutionarily Conserved PAF1 Involved in Pancreatic Oncogenesis” in the UTC Spring Research and Art Conference. April 2023.
306. Timothy Gaudin, 2023. New forelimb details of Eurotamandua, purported anteater from the middle Eocene of Messel, Germany, reveal extraordinary similarities to palaeonodonts (Pholidotamorpha), not to Xenarthra. Society of Vertebrate Paleontology, 83rd Annual Meeting, Cincinnati, OH, October 18, 2023.
307. David Giles, 2023. MAGA: Make Antibiotics Great Again. Lightning Talk. Association of Southeastern Biologists Meeting. March 2023.
308. Azad Hossain, 2023. Campbell, S., and Hossain, A., 2023, Analyzing Greenness Change for the United States from 2000-2020 Using Google Earth Engine, 2023 ASPRS Annual Conference at Geo Week February 13 – 15, Denver, Colorado, Abstract # 215054.
309. Azad Hossain, 2023. Hossain, A. and Campbell, S., 2023, Investigating Urban Heat Island Effect of Small Cities in the United States Using Remote Sensing, 2023 ASPRS Annual Conference at Geo Week February 13 – 15, Denver, Colorado, Abstract # 215052.
310. Azad Hossain, 2023. Firat, C. and Hossain, A., 2023, Analyzing Historical Turbidity in the Tennessee River Using Google Earth Engine, ASPRS Mid-South Conference 2023, April 21, 2023, Oak Ridge National Laboratory, Knoxville, TN.
311. Azad Hossain, 2023. Bassham, P., Stein, J., Cox, M., and Hossain, A., 2023, Tree Canopy & Impervious Surface Coverage Change on Signal Mountain and Walden from 2010-2021, ASPRS 2023 International Technical Symposium, June 12-16, 2023, Virtual.
312. Azad Hossain, 2023. Hossain, A., and Larson, B., 2023, Spatio-Temporal Analysis of Suspended Sediment Concentration in Lake Pontchartrain Using Remote Sensing, ASPRS 2023 International Technical Symposium, June 12-16, 2023, Virtual.
313. Azad Hossain, 2023. Hart, J., and Hossain, A., 2023, Investigating Multiple Turbidity Indices on Parksville Reservoir in Southeastern Tennessee, ASPRS 2023 International Technical Symposium, June 12-16, 2023, Virtual.
314. Azad Hossain, 2023. Latil-Quinn, M., Eviner, V., and Hossain, A., Remote Sensing of Invasive Barbed Goatgrass in Oak Woodland Savannas Using PlanetScope Imagery, ASPRS 2023 International Technical Symposium, June 12-16, 2023, Virtual.
315. Azad Hossain, 2023. Hossain, A. and Campbell, S., 2023, Investigating the Changes in Vegetation Coverage in Mega Cities in the World Using Google Earth Engine, ASPRS Mid-South Conference 2023, April 21, 2023, Oak Ridge National Laboratory, Knoxville, TN.
316. Azad Hossain, 2023. Larson, B. and Hossain, A., 2023, Qualitative Analysis of Algal Blooms in Lake Pontchartrain Using Remote Sensing, ASPRS Mid-South Conference 2023, April 21, 2023, Oak Ridge National Laboratory, Knoxville, TN.
317. Azad Hossain, 2023. Firat, C., Hossain, A. and Chao, X., 2023, Integrating Remote Sensing with Hydrodynamic Models to Investigate Sediment Transport in the Tennessee River Basin, 2023 ASPRS Annual Conference at Geo Week February 13 – 15, Denver, Colorado, Abstract # 214052.
318. Azad Hossain, 2023. Krishnan, P., Wilson, T., Wang, J., Hossain, A., and Hayes, L., 2023, Impact of climate and land cover changes on the social organization of Octodon degus, Oak Ridge Associated Universities’ Project Conference, March 6, 2023, Knoxville, TN.
319. Francesca Leasi, 2023. Invited speaker at the Virtual Rotifer Conference Lecture Series. Talk title “The evolution of salinity tolerance in monogonont rotifers.”
320. Francesca Leasi, 2023. Invited speaker at the workshop: Advances in Rotifer Phylogeny with a focus on Reproductive Traits. University of Texas at El Paso July 31 – Aug 4, 2023. Talk title “Microbiome and ecology of rotifers.”
321. Francesca Leasi, 2023. Invited speaker at the Meiofauna Biodiversity Workshop in Fort Pierce (FL). June 19-30. Talk title "Metabarcoding: a tool to accelerate biodiversity assessments."

322. Francesca Leasi, 2023. Invited speaker at the Virtual Series of Invertebrate Zoology Talks (NoBones). Smithsonian National Museum of Natural History. Talk title "Integrating biodiversity surveys of meiofauna and host-associated microbiome for ecosystem bio-monitoring."
323. Francesca Leasi, 2023. Wakefield G, Bryant K, Leasi F. Preserving lentic freshwater biodiversity in Hamilton County: an assessment of anthropogenic impacts and conservation strategies. Spring Research and Arts Conference. University of Tennessee at Chattanooga. April 12, 2023.
324. Francesca Leasi, 2023. Hanson-Regan W, Leasi F, Alda-Pons F. Invasive and Native Fish Microbiomes: Identifying and Comparing the Inhabitants of Fish Guts. Spring Research and Arts Conference. University of Tennessee at Chattanooga. April 12, 2023.
325. Francesca Leasi, 2023. Royal M, Leasi, Holt B. Meiofauna Serve as a Bioindicator to Reveal Changes in a Freshwater Environment. Baylor Science and Engineering Symposium. Baylor School. Chattanooga. May 9, 2023.
326. Francesca Leasi, 2023. Listen A, Leasi, Holt B. Taxonomic, Phylogenetic, and Functional Turnover of Alaskan Prokaryotes. Baylor Science and Engineering Symposium. Baylor School. Chattanooga. May 9, 2023.
327. Ashley Manning-Berg, 2023. Invited Talk: University of Arkansas Dept of Geology Surface Environment Transitions of the "Boring Billion" and Today
328. Ashley Manning-Berg, 2023. Invited Talk: Tellus Museum Mineral Symposium: Signs of Life: Physical, Chemical Evidence of Life in Ancient Rocks
329. Ashley Manning-Berg, 2023. Thornton, Quillen, Manning-Berg, A.R., and DeVries, S., Identification of microplastics in sediment deposits along a commercialized and non-commercialized segment of Raccoon Mountain Caverns: A tale of two tours. Geological Society of America Abstracts with Programs. Vol. 55, No. 6, doi: 10.1130/abs/2023AM-390742
330. Ashley Manning-Berg, 2023. Newbille, A., Manning-Berg, A.R., Lab-created abiotic silica gels; insights into Proterozoic silicification processes. Geological Society of America Abstracts with Programs. Vol. 55, No. 6, 2023 doi: 10.1130/abs/2023AM-392855
331. Ashley Manning-Berg, 2023. Ritchey, Evan, Manning-Berg, Ashley R., Roney, Ryan. 2022. Petrographic observations of diagenetically altered stromatolitic fabrics of the Knox group, Chatsworth, Georgia. UTC Research Dialogues 2023
332. Ashley Manning-Berg, 2023. Thompson, Samuel M., Thornton, Quillen., Mollica, Matthew, Manning-Berg, Ashley R., Muhlbauer, Jason., 2022. Mississippian algal structures within the Bangor Limestone formation at Raccoon Mountain, Chattanooga, Tennessee. UTC Research Dialogues 2023
333. Ashley Manning-Berg, 2023. Mollica, Matthew, Thornton, Quillen., Thompson, Samuel M., Manning-Berg, Ashley R., DeVries, Stephanie. 2022. Assessing anthropogenic effects on water quality in Raccoon Mountain Caverns, Chattanooga, Tennessee. UTC Research Dialogues 2023
334. Ashley Manning-Berg, 2023. Powers, Caden, White, Cole, DeVries, Stephanie, Manning-Berg, Ashley R., 2022. Exploring a potential method to identify and quantify tire particles from other microplastics. UTC Research Dialogues 2023
335. DeAnna Beasley, 2023. Saikali, J. (Presenter), D. Beasley, C. Acuff, S. McCarragher, H. Smith, G. Valdez, O. Lovett, V. Raczkowski, B. Bellmar, A. Jack, C. Hansen, M. W. Thompson, H. Mohammed, and K. Orf. (August 2023). "The Socio-Ecological Role of Greenways in Urban Systems - An Interdisciplinary Approach." UTC Fall Research Conference. Chattanooga, TN.
336. DeAnna Beasley, 2023. Acuff, C., Beasley, D.E., & McCarragher, S. Examining the Socio-Ecological Role of Greenways in Small and Medium-Sized Cities. Southeastern Conference for Public Administration Annual Conference. September 27–30, 2023. Atlanta, GA.
337. DeAnna Beasley, 2023. Invited panelist: Beasley, D.E., DeVries, S., Farnsley, S., and Boyd, J. (2023). Environmental Studies Program Panel on Translational Research in the Natural Sciences. UTC Research and Arts Conference.

338. Joey Shaw, 2023. *Brothers, S., and J. Shaw. 2023. Taxonomic, conservation, ecological, morphological, and reproductive analysis of 4500 plant species of the interior Southeast US. Paper presented at the Botany2023 meeting in Boise, ID.
339. Joey Shaw, 2023. *Billings, G., and J. Shaw. 2023. Modeling Niche Habitats of Expected Rare Species within the Vascular Flora of the Walls of Jericho, Alabama. Paper presented at the Botany2023 meeting in Boise, ID. (Note: Student failed to attach my name to this presentation.)
340. Joey Shaw, 2023. *Billings, G., and J. Shaw. 2023. A Vascular Flora of the Walls of Jericho in Jackson County, AL. Paper presented at Association of Southeastern Biologists meeting (Winston-Salem, NC).
341. Joey Shaw, 2023. *Towery, Q., and J. Shaw. 2023. Quantifying National Park Specimens at the University of Tennessee at Chattanooga Herbarium (UCHT). Paper presented at Association of Southeastern Biologists meeting (Winston-Salem, NC).
342. Joey Shaw, 2023. *Brothers, S. and J. Shaw. 2023. Taxonomic, conservation, ecological, morphological, and reproductive analysis of 4500 plant species of the interior Southeast US. Paper presented at Association of Southeastern Biologists meeting (Winston-Salem, NC).
343. Joey Shaw, 2023. Shaw, J. 2023. Progress toward the Second Edition of the Guide to the Vascular Plants of Tennessee. Paper presented at Association of Southeastern Biologists meeting (Winston-Salem, NC).

Appendix 4-K Faculty Campus, Community, and Professional Service

1. David Aborn, 2018-2022, Community, Chattanooga Audubon Society, At-large Board Member
2. David Aborn, 2023, Community, Chattanooga Audubon Society, Board President
3. David Aborn, 2022, Community, Chattanooga Audubon Society, Board Vice-president
4. David Aborn, 2017, Community, Tennessee Ornithological Society, Chapter President
5. David Aborn, 2010-present, Community, Tennessee Naturalist Program, Ornithology Instructor
6. David Aborn, 2015-2023, Professional, Association of Field Ornithologists, At-large Board Member
7. David Aborn, 2015-present, Professional, North American Crane Working Group, Board Member
8. David Aborn, 2022-present, Professional, Association of Field Ornithologists, Co-chair of DEIJ Committee
9. David Aborn, 2007-present, University (beyond BGE), Environmental Task Force, Committee Member
10. David Aborn, 2017-2018, University (beyond BGE), University of Tennessee at Chattanooga, Faculty Grants Committee
11. David Aborn, 2020-2022, University (beyond BGE), UTC College of Arts and Sciences, Post-tenure Review Committee
12. David Aborn, 2022-2023, University (beyond BGE), University of Tennessee at Chattanooga, Undergraduate Petitions Committee
13. Fernando Alda, 2023, Professional, Frontiers in Genetics, Editor, Associate Editor
14. Fernando Alda, 2023, Professional, Evolutionary and Population Genetics section Frontiers in Ecology and Evolution and Frontiers in Plant Science, Reviewer
15. Nominanda Barbosa, 2023-present, Community, tnAchieves, Mentor
16. Nominanda Barbosa, 2022-2023, Community, Community engagement from the CAS dean's office, Volunteer service to the Chattanooga Community Kitchen
17. Nominanda Barbosa, 2020-2021, University (beyond BGE), Faculty Senate, Executive Committee Member
18. Nominanda Barbosa, 2021-2022, University (beyond BGE), WCTL Course Development Program, Faculty Fellow
19. Nominanda Barbosa, 2018-Present (except Covid), University (beyond BGE), UTC Undergraduate commencement, Marshall
20. Nominanda Barbosa, 2019-2020, University (beyond BGE), Learning Support and Auxiliary Services UTC committee, Member
21. Nominanda Barbosa, 2021, University (beyond BGE), Gen. Ed. Committee (Work group)-Reimaging General Education, Natural Science", Member of work group
22. Nominanda Barbosa, 2018, University (beyond BGE), WCTL Certification, Mental Health First Aid
23. Nominanda Barbosa, 2018-2021, University (beyond BGE), First generation college students/UTC, Mentor
24. Nominanda Barbosa, 2020-2021, University (beyond BGE), Faculty Senate, Secretary
25. DeAnna Beasley, 2019, Professional, ASB Poster and Presentation Awards Committee, Member
26. DeAnna Beasley, 2021, University (beyond BGE), Africana Studies Advisory Committee, Member
27. DeAnna Beasley, 2023, University (beyond BGE), Africana Studies Director Search Committee, Member
28. DeAnna Beasley, 2018 - 2021, University (beyond BGE), High-Impacts Practices Award Committee, Member
29. DeAnna Beasley, 2022, University (beyond BGE), Honors College Advisory Committee, Member
30. DeAnna Beasley, 2017-2021, University (beyond BGE), MOCS I3 Planning Committee, Member

31. DeAnna Beasley, 2020-2021, University (beyond BGE), Reimaging General Education Committee, Member
32. Jennifer Boyd, 2023, Community, Tennessee Naturalist Program, Ecology Instructor
33. Jennifer Boyd, 2020, Community, Signal Mountain Middle High School, Science and Technology Club Project Advisor
34. Jennifer Boyd, 2018-present, Community, Town of Signal Mountain, Tree Board Member
35. Jennifer Boyd, 2022-present, Community, Town of Signal Mountain, Tree Board Secretary
36. Jennifer Boyd, 2018, 2019, 2021, Community, Cherokee National Forest, White Fringeless Orchid Monitoring
37. Jennifer Boyd, 2020, 2023, Professional, National Science Foundation, Ad-Hoc Reviewer
38. Jennifer Boyd, 2018, Professional, Elsevier, Book Reviewer
39. Jennifer Boyd, 2018, Professional, Oxford University Press, Book Reviewer
40. Jennifer Boyd, 2018-present, Professional, Southern Appalachian Botanical Society, Castanea (Journal) Subject Editor
41. Jennifer Boyd, 2018-present, Professional, Botanical Society of America, Member
42. Jennifer Boyd, 2018-present, Professional, Ecological Society of America, Member
43. Jennifer Boyd, 2018-present, Professional, Southern Appalachian Botanical Society, Member
44. Jennifer Boyd, 2023, Professional, Botanical Society of America, NSF GRFP (Graduate Research Fellowship Program) Mentor
45. Jennifer Boyd, 2019-present, Professional, National Science Foundation, Panelist
46. Jennifer Boyd, 2023, Professional, Botanical Society of America PLANTS (Preparing Leaders and Nurturing Tomorrow's Scientist), Mentor
47. Jennifer Boyd, 2022-present, Professional, Ecological Society of America, Southeast Chapter Chair
48. Jennifer Boyd, 2020-2023, University (beyond BGE), Faculty Administrative Relations Committee, Committee Member
49. Jennifer Boyd, 2019-2021, University (beyond BGE), College of Arts and Sciences, Diversity Committee Chair
50. Jennifer Boyd, 2018-2019, University (beyond BGE), College of Arts and Sciences, Executive Committee Member
51. Jennifer Boyd, 2018-2019; 2021-present, University (beyond BGE), Faculty Senate, Executive Committee Member
52. Jennifer Boyd, 2020, University (beyond BGE), Walker Center for Teaching and Learning, Faculty Summer Cohort Leader
53. Jennifer Boyd, 2017-present, University (beyond BGE), WCTL Experiential Learning Task Force, Member
54. Jennifer Boyd, 2023-present, University (beyond BGE), Faculty Senate, Past President
55. Jennifer Boyd, 2021-2022, University (beyond BGE), Faculty Senate, President Elect
56. Jennifer Boyd, 2022-2023, University (beyond BGE), Faculty Senate, President Elect
57. Jennifer Boyd, 2018-2019, University (beyond BGE), Faculty Senate, Secretary
58. Amy Brock-Hon, 2018-2023, Community, Multiple interviews with local television news stations covering geologic happenings and geologic history of area., Interviewee
59. Amy Brock-Hon, 2019-2021, Community, Revamp of Creative Discovery Museum 'Unearthed' exhibit, Consultant
60. Amy Brock-Hon, 2019-present, Community, Geology portion of Tennessee Naturalist Group, Lecturer and field camp leader
61. Amy Brock-Hon, 2019, Community, Letter to a Pre-Scientist, Pen-Pal
62. Amy Brock-Hon, 2022-2023, Community, UTC Observatory Star Parties, Speaker
63. Amy Brock-Hon, 2019, Professional, Technical Program Chair of GSA annual meeting in Phoenix, AZ, Chair

64. Amy Brock-Hon, 2021, Professional, Technical Program Chair of GSA Annual Meeting, Portland, OR, Chair
65. Amy Brock-Hon, 2018, Professional, Technical Program Co-Chair of GSA Annual Meeting, Indianapolis, IN, Co-Chair
66. Amy Brock-Hon, 2020, Professional, Technical Program Co-Chair of GSA Connects Online Meeting, Co-Chair
67. Amy Brock-Hon, 2017-2022, Professional, Annual Program Committee for GSA, Committee Member
68. Amy Brock-Hon, 2018, Professional, GSA Strategic Planning Program Task Force, Committee Member
69. Amy Brock-Hon, 2018-2022, Professional, SE Section of the GSA Student Support Committee, Committee Member
70. Amy Brock-Hon, 2018-2023, Professional, UTC Campus Rep for GSA, Member
71. Amy Brock-Hon, 2020-present, University (beyond BGE), Assistant Director, Clarence T. Jones Observatory, Assistant Director
72. Amy Brock-Hon, 2018, University (beyond BGE), CAS Assistant Dean Search Committee, Committee Member
73. Amy Brock-Hon, 2023, University (beyond BGE), CAS Natural Sciences and Math PTR Subcommittee, Committee Member
74. Amy Brock-Hon, 2018, University (beyond BGE), Ruth Holmberg Grant Review Committee, Committee Member
75. Amy Brock-Hon, 2019-2022, University (beyond BGE), UTC CAS Executive Committee, Committee Member
76. Amy Brock-Hon, 2020-present, University (beyond BGE), UTC Clarence T. Jones Observatory Advisory Board, Committee Member
77. Amy Brock-Hon, 2020-2022, University (beyond BGE), UTC General Education Curriculum Committee, Committee Member
78. Amy Brock-Hon, 2021-2022, University (beyond BGE), UTC Reimagining General Education Natural Sciences Working Group, Committee Member
79. Ethan Carver, 2023, Community, Baylor School, Science and Engineering Symposium, Judge
80. Ethan Carver, 2022, Community, Baylor School, Science and Engineering Symposium, Judge
81. Ethan Carver, 2019, Community, Lakesite Academy of Math, Science and Technology, Career Day, Presenter
82. Ethan Carver, 2023-present, Professional, Conference of Southern Graduate Schools; Thesis Award Committee, Chair
83. Ethan Carver, 2022, Professional, Conference of Southern Graduate Schools; 3MT Judge, Judge
84. Ethan Carver, 2021-2022, Professional, Conference of Southern Graduate Schools; Executive Committee, Member
85. Ethan Carver, 2018-2021 and 22-23, Professional, Conference of Southern Graduate Schools; Thesis Award Committee, Member
86. Ethan Carver, 2018-present, Professional, Council of Graduate Schools: Advocacy Ambassadors Network, Member
87. Ethan Carver, 2018-2021, Professional, Tennessee Conference of Southern Graduate Schools; Thesis Award Committee, Member
88. Ethan Carver, 2023-present, Professional, Tennessee Conference of Southern Graduate Schools, Past President
89. Ethan Carver, 2021-2023, Professional, Tennessee Conference of Southern Graduate Schools, President
90. Ethan Carver, 2019-2021, Professional, Tennessee Conference of Southern Graduate Schools, President-elect

91. Ethan Carver, 2016-present, Professional, Conference of Southern Graduate Schools, Representative
92. Ethan Carver, 2016-present, Professional, Council of Graduate Schools, Representative
93. Ethan Carver, 2018, University (beyond BGE), Compliance and Equity Subcommittee, Athletics Board, Chair
94. Ethan Carver, 2018, University (beyond BGE), Graduate School Recruitment and Marketing Coordinator Hiring Committee, Chair
95. Ethan Carver, 2014-present, University (beyond BGE), Institutional Animal Care and Use Committee, Chair
96. Ethan Carver, 2018, University (beyond BGE), Athletics Board, Member
97. Ethan Carver, 2016-present, University (beyond BGE), Banner Core Team, Member
98. Ethan Carver, 2019-present, University (beyond BGE), Curriculum Team, Member
99. Ethan Carver, 2016-present, University (beyond BGE), ex officio, Graduate Council, Member
100. Ethan Carver, 2016-present, University (beyond BGE), ex officio, Graduate Council: Appeals Committee, Member
101. Ethan Carver, 2016-present, University (beyond BGE), ex officio, Graduate Council: Best Practice Committee, Member
102. Ethan Carver, 2018-present, University (beyond BGE), Information Technology Advisory Council, Member
103. Ethan Carver, 2020, University (beyond BGE), OPEIR Executive Director Hiring Committee, Member
104. Ethan Carver, 2018, University (beyond BGE), PA Director Hiring Committee, Member
105. Ethan Carver, 2020-2021, University (beyond BGE), Police Advisory Committee, Member
106. Ethan Carver, 2021-2023, University (beyond BGE), SACSCOC Reaffirmation Leadership Committee, Member
107. Ethan Carver, 2020-2021, University (beyond BGE), Strategic Planning Steering Committee, Teaching and Learning Subcommittee, Member
108. Ethan Carver, 2022-2023, University (beyond BGE), Ukraine Project Task Force, Member
109. Ethan Carver, 2019-2020, University (beyond BGE), UT-Instructional Committee, Member
110. Ethan Carver, 2022, University (beyond BGE), UTAA Outstanding Teacher Award Committee, Member
111. Ethan Carver, 2021-present, University (beyond BGE), UTC Global Education Advisory Board, Member
112. Ethan Carver, 2018, University (beyond BGE), UTC Registrar Hiring Committee, Member
113. Stylianos Chatzimanolis, 2023, Community, Audobon Acres, Insect collecting at night event
114. Stylianos Chatzimanolis, 2022, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Leader
115. Stylianos Chatzimanolis, 2019, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Leader
116. Stylianos Chatzimanolis, 2018, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Leader
117. Stylianos Chatzimanolis, 2020, Community, Apison Elementary, Presenter
118. Stylianos Chatzimanolis, 2018, Community, Apison Elementary, Presenter
119. Stylianos Chatzimanolis, 2018, Community, Montessori School, Presenter
120. Stylianos Chatzimanolis, 2019, Community, Palace Theater, Stand Up for Science
121. Stylianos Chatzimanolis, 2021, Community, Channel 3 (WRCB), TV interview

122. Stylianos Chatzimanolis, 2018, Community, Channel 3 (WRCB), TV interview
123. Stylianos Chatzimanolis, 2015-2020, Professional, The Coleopterist Bulletin, Book Review Editor
124. Stylianos Chatzimanolis, 2018, Professional, Democritus University of Thrace, Greece, External reviewer for promotion
125. Stylianos Chatzimanolis, 2023, Professional, University of Texas at Tyler, External reviewer for promotion
126. Stylianos Chatzimanolis, 2019, Professional, National Science Foundation, Panelist
127. Stylianos Chatzimanolis, 2018, Professional, Entomological Society of America, Poster Judge
128. Stylianos Chatzimanolis, 2020, Professional, Entomological Society of America, Poster Judge
129. Stylianos Chatzimanolis, 2022, Professional, Alpine Entomology, Reviewer
130. Stylianos Chatzimanolis, 2021, Professional, Arthropods Systematics & Phylogeny, Reviewer
131. Stylianos Chatzimanolis, 2022, Professional, BMC Ecology and Evolution, Reviewer
132. Stylianos Chatzimanolis, 2019, Professional, Contribution to Zoology, Reviewer
133. Stylianos Chatzimanolis, 2021, Professional, Cretaceous Research, Reviewer
134. Stylianos Chatzimanolis, 2022, Professional, InsectSystematics and Evolution, Reviewer
135. Stylianos Chatzimanolis, 2019, Professional, Journal of Natural History, Reviewer
136. Stylianos Chatzimanolis, 2021, Professional, Journal of Natural History, Reviewer
137. Stylianos Chatzimanolis, 2019, Professional, Journal of Paleontology, Reviewer
138. Stylianos Chatzimanolis, 2019, Professional, Molecular Phylogenetics and Evolution, Reviewer
139. Stylianos Chatzimanolis, 2021, Professional, National Science Foundation, Reviewer
140. Stylianos Chatzimanolis, 2022, Professional, National Science Foundation, Reviewer
141. Stylianos Chatzimanolis, 2019, Professional, Organisms Diversity & Evolution, Reviewer
142. Stylianos Chatzimanolis, 2022, Professional, Palaeoworld, Reviewer
143. Stylianos Chatzimanolis, 2018, Professional, Paleontology, Reviewer
144. Stylianos Chatzimanolis, 2019, Professional, Papéis Avulsos de Zoologia, Reviewer
145. Stylianos Chatzimanolis, 2022, Professional, Specimen, Reviewer
146. Stylianos Chatzimanolis, 2018, Professional, Systematic Entomology, Reviewer
147. Stylianos Chatzimanolis, 2019, Professional, Systematic Entomology, Reviewer
148. Stylianos Chatzimanolis, 2019, Professional, Systematic Entomology, Reviewer
149. Stylianos Chatzimanolis, 2019, Professional, Systematic Entomology, Reviewer
150. Stylianos Chatzimanolis, 2019, Professional, Systematics and Biodiversity, Reviewer
151. Stylianos Chatzimanolis, 2018, Professional, The Coleopterist Bulletin, Reviewer
152. Stylianos Chatzimanolis, 2019, Professional, The Coleopterist Bulletin, Reviewer
153. Stylianos Chatzimanolis, 2022, Professional, The Great Lakes Entomologist, Reviewer
154. Stylianos Chatzimanolis, 2019, Professional, Transactions of the American Entomological Society, Reviewer
155. Stylianos Chatzimanolis, 2019, Professional, Transactions of the American Entomological Society:, Reviewer
156. Stylianos Chatzimanolis, 2021, Professional, ZooKeys, Reviewer
157. Stylianos Chatzimanolis, 2019, Professional, Zoological Journal of the Linnean Society, Reviewer
158. Stylianos Chatzimanolis, 2022, Professional, Zoologischer Anzeiger, Reviewer
159. Stylianos Chatzimanolis, 2018, Professional, Zootaxa, Reviewer
160. Stylianos Chatzimanolis, 2019, Professional, Zootaxa, Reviewer
161. Stylianos Chatzimanolis, 2019, Professional, Zootaxa, Reviewer

162. Stylianos Chatzimanolis, 2021, Professional, Zootaxa, Reviewer
163. Stylianos Chatzimanolis, 2013-present, Professional, Biodiversity Data Journal, Subject Editor
164. Stylianos Chatzimanolis, 2012-2020, Professional, Journal of Paleontology, Subject Editor
165. Stylianos Chatzimanolis, 2018-2019, University (beyond BGE), Honor Court, Chair
166. Stylianos Chatzimanolis, 2016-present, University (beyond BGE), Honor Court, Committee Member
167. Stylianos Chatzimanolis, 2019-present, University (beyond BGE), Student Conduct Board, Committee Member
168. Hill Craddock, 1997-present, Community, The American Chestnut Foundation, Board Member
169. Hill Craddock, 2022-2023, Community, U.S. Dept. Agriculture Regional Project NE1833, Chair
170. Hill Craddock, 2020-2021, Community, Virtual Spring Wildflower Pilgrimage, Identifier
171. Hill Craddock, 2022-present, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Leader
172. Hill Craddock, 2009-2019, Community, Chattanooga Tree Commission, member
173. Hill Craddock, 1999-present, Community, U.S. Dept. Agriculture Regional Project NE1833 (formerly:NE140 and NE1333) Biological Improvement of Chestnut through Technologies that Address Management of the Species, its Pathogens and Pests ((Secretary 1999; Chairman 2000, 2017), Member
174. Hill Craddock, 2018-present, Community, The Tennessee Chapter of The American Chestnut Foundation, President
175. Hill Craddock, 2018-present, Professional, American Society for Horticultural Science, Member, reviewer
176. Hill Craddock, 2018-present, Professional, International Society for Horticultural Science, Member, reviewer
177. Hill Craddock, 2018-present, Professional, The American Society of Plant Taxonomists, Member, reviewer
178. Hill Craddock, 2018-present, Professional, Various, Reviewer
179. Hill Craddock, 2018-present, University (beyond BGE), The Linda T. Collins Arboretum, Chair
180. Hill Craddock, 2018-present, University (beyond BGE), UTC Landscape Committee, Chair
181. Hill Craddock, 2023, University (beyond BGE), Beta Beta Beta Biological Honor Society, Faculty advisor
182. Hill Craddock, 2018-present, University (beyond BGE), UTC Men's Ultimate, Faculty advisor
183. Hill Craddock, 2018-present, University (beyond BGE), UTC Women's Ultimate, Faculty advisor
184. Hill Craddock, 2018-present, University (beyond BGE), UTC Council of Scholars, Member
185. Hill Craddock, 2022-present, University (beyond BGE), UTC Curriculum Committee, member
186. Hill Craddock, 2020-2022, University (beyond BGE), UTC Petitions Committee, member
187. Hill Craddock, 2020-2024, University (beyond BGE), UTC Petitions Committee, member
188. Hill Craddock, 2018-present, University (beyond BGE), UTC Tree Advisory Committee, Member

189. Stephanie DeVries, 2021, Professional, Journal of Environmental Water Quality, Editor
190. Stephanie DeVries, 2023, Professional, American Geophysical Union, Reviewer
191. Stephanie DeVries, 2020, Professional, Environmental Pollution, Reviewer
192. Stephanie DeVries, 2022, Professional, Environmental Science and Pollution Research, Reviewer
193. Stephanie DeVries, 2020, Professional, Environmental Science and Pollution Research, Reviewer
194. Stephanie DeVries, 2022, Professional, Frontiers in Water, Reviewer
195. Stephanie DeVries, 2020, Professional, Intl Journal of Envntl Research & Public Health, Reviewer
196. Stephanie DeVries, 2020, Professional, Journal of Horticulture Science and Forestry, Reviewer
197. Stephanie DeVries, 2020, Professional, Journal of Soils and Sediments, Reviewer
198. Stephanie DeVries, 2020, Professional, Journal of the International Society for Microbial Ecology, Reviewer
199. Stephanie DeVries, 2021, Professional, National Science Foundation, Reviewer
200. Stephanie DeVries, 2021, Professional, Science of the Total Environment, Reviewer
201. Stephanie DeVries, 2021, Professional, Water Research, Reviewer
202. Stephanie DeVries, 2020, University (beyond BGE), Faculty Grants, committee member
203. Stephanie DeVries, 2021, University (beyond BGE), Faculty Senate, committee member
204. Stephanie DeVries, 2022, University (beyond BGE), Walker Center for Teaching and Learning, Committee Member
205. Sarah Farnsley, 2020-2023, Community, Chattanooga Audubon Society, Board Member
206. Sarah Farnsley, 2022-2023, Community, Chattanooga Audubon Society, Secretary
207. Sarah Farnsley, 2022, University (beyond BGE), Faculty Senate NTT Committee, Committee Chair
208. Sarah Farnsley, 2023, University (beyond BGE), Learning Community Committee, Committee Member
209. Sarah Farnsley, 2018-2023, University (beyond BGE), Honor Court, Hearing Officer
210. Sarah Farnsley, 2018, University (beyond BGE), Faculty Senate, Senator
211. Sarah Farnsley, 2023, University (beyond BGE), Total Organizational Health Task Force, Member
212. Timothy Gaudin, 9 in 2022, 1 in 2019, 2 in 2018, Community, Interviewed by media outlets for research-related stories, INterviewee
213. Timothy Gaudin, 2022, Community, East Brainder Kiwanis, Invited Presenter
214. Timothy Gaudin, 2019, Community, Santa Fe Audubon Society in Melrose, FL, Invited Presenter
215. Timothy Gaudin, 2022, 2023, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Leader
216. Timothy Gaudin, 2022, Community, Reflection Riding during their Fall Pollinator Festival, My Mammalogy class students (BIOL 4140) and I conducted a public outreach program
217. Timothy Gaudin, 3 in 2023, 2 in 2022, 2 in 2018, Community, Multiple, Presenter
218. Timothy Gaudin, 2021 - present, Professional, Journal of Mammalian Evolution, Associate Editor
219. Timothy Gaudin, 2021, Professional, Paleoneurology of Amniotes: New Directions in the Study of Fossil Endocasts. M.T. Dozo and T. Macrini (eds.)(2021), Book Reviewer
220. Timothy Gaudin, 2020, Professional, Society for the Study of Mammalian Evolution, Convener for Symposium
221. Timothy Gaudin, 2018 - present, Professional, Eastern Paleontologist, Editorial Board member

222. Timothy Gaudin, 2022 - present, Professional, Frontiers in Mammal Science, specialty section: Evolution, Anatomy and the Palaeosciences, Editorial Board member
223. Timothy Gaudin, 2018 - present, Professional, Journal of Mammalian Evolution, Editorial Board member
224. Timothy Gaudin, 2020, Professional, 30th Colloquium on the Conservation of Mammals of the Southeastern United States, Athens, GA, Judge for student talks
225. Timothy Gaudin, 2018-Present, Professional, Society for the Study of Mammalian Evolution, President
226. Timothy Gaudin, 2023, Professional, Ameghiniana, Reviewer
227. Timothy Gaudin, 2022, Professional, Edentata, Reviewer
228. Timothy Gaudin, 2023, Professional, Frontiers in Veterinary Science, Reviewer
229. Timothy Gaudin, 2022, Professional, Heliyon, Reviewer
230. Timothy Gaudin, 2021, Professional, Journal of Anatomy, Reviewer
231. Timothy Gaudin, 2023, Professional, Journal of Cave and Karst Studies, Reviewer
232. Timothy Gaudin, 2019, Professional, Journal of Mammalian Evolution, Reviewer
233. Timothy Gaudin, 2019, Professional, Journal of Paleontology, Reviewer
234. Timothy Gaudin, 2020, Professional, Journal of Paleontology, Reviewer
235. Timothy Gaudin, 2018, Professional, Journal of Systematic Paleontology, Reviewer
236. Timothy Gaudin, 2018, Professional, Journal of Vertebrate Paleontology, Reviewer
237. Timothy Gaudin, 2021, Professional, Journal of Vertebrate Paleontology, Reviewer
238. Timothy Gaudin, 2022, Professional, Journal of Vertebrate Paleontology, Reviewer
239. Timothy Gaudin, 2018, Professional, Nature:Ecology & Evolution, Reviewer
240. Timothy Gaudin, 2019, Professional, Palaeontology, Reviewer
241. Timothy Gaudin, 2021, Professional, Southeastern Naturalist, Reviewer
242. Timothy Gaudin, 2018 - present, Professional, AIB SEVOLISTTN, List Manager
243. Timothy Gaudin, 2018 - present, Professional, Multiple, Consultant
244. Timothy Gaudin, Fall 2018 - Spring 2019, University (beyond BGE), Search committee for new department head in Dept of Chemistry & Physics,, Chair
245. Timothy Gaudin, Fall 2020 - Spring 2023, University (beyond BGE), Academic Standards Committee, Committee Member
246. Timothy Gaudin, Fall 2017 - Spring 2018, University (beyond BGE), Faculty Budget and Economic Status Committee, Committee Member
247. Timothy Gaudin, Fall 2018 - Spring 2019, University (beyond BGE), Faculty Senate Academic Standards Committee, Committee Member
248. Timothy Gaudin, Fall 2019 - Spring 2020, University (beyond BGE), Classroom Technology Committee, Committee Member
249. Timothy Gaudin, Fall 2023 - Spring 2024, University (beyond BGE), Faculty Budget and Economic Status Committee, Committee Member
250. Loren Hayes, 2021-present, Community, Developing educational activities for local schools, collaboration with UTC School of Education
251. Loren Hayes, 2011-present, Professional, Journal of Mammalogy, Associate Editor
252. Loren Hayes, 2020-present, Professional, Frontiers in social evolution seminar series (international, remote), co-coordinator
253. Loren Hayes, 2022, Professional, NERC (Canada), Proposal reviewer
254. Loren Hayes, 2019, 2021, Professional, Animal Behaviour, Reviewer
255. Loren Hayes, 2023, Professional, Behavioral Ecology, Reviewer
256. Loren Hayes, 2022, Professional, Behavioral Ecology and Sociobiology, Reviewer
257. Loren Hayes, 2019, Professional, Behavioral Processes, Reviewer
258. Loren Hayes, 2023, Professional, Ethology, Reviewer
259. Loren Hayes, 2021, Professional, Mammalia, Reviewer
260. Loren Hayes, 2023, Professional, Mammalian Biology, Reviewer

261. Loren Hayes, 2020, Professional, National Science Foundation, reviewer
262. Loren Hayes, 2022, Professional, Proceedings of the Royal Society of London, Reviewer
263. Loren Hayes, 2021, 2022, University (beyond BGE), Wildlife Pilgrimage, Activity leader
264. Loren Hayes, 2022-present, University (beyond BGE), CAS Executive committee, Committee Member
265. Loren Hayes, 2019, University (beyond BGE), Faculty Grants, Committee Member
266. Loren Hayes, 2020, 2021, 2022, University (beyond BGE), Faculty Rating of Administrators, Committee Member
267. Loren Hayes, 2019, 2020, University (beyond BGE), UTC SEARCH awards, Reviewer
268. Azad Hossain, 2022-Present, Community, Signal Mountain Tree Board, Helping to map tree canopy using geospatial technology
269. Azad Hossain, 2022-Present, Community, Northside Neighborhood House, Helping with geospatial technology for mapping
270. Azad Hossain, 2017, Community, Chattanooga Geology Club, Invited lecture on landslides
271. Azad Hossain, 2018, 2019, Community, Thrasher Elementary School, Invited lecture on rocks and minerals
272. Azad Hossain, 2020, Community, Signal Mountain Middle and High School, Invited lecture on urban development and sustainability
273. Azad Hossain, 2023, Community, Brainerd High School Future Ready Kick-Off Event, Invited lecturer
274. Azad Hossain, 2018, Community, Red Bank Lion's Club at Chattanooga., Invited lecturer on landslides
275. Azad Hossain, 2020, Community, Chattanooga STEM School, Mentor
276. Azad Hossain, 2020, Community, Chattanooga STEM School, Workshop organizer
277. Azad Hossain, 2020, Community, Chattanooga Regional Science and Engineering Fair, Judge
278. Azad Hossain, 2022, 2023, Community, Baylor School Science Symposium, Judge
279. Azad Hossain, 2019, Community, Chattanooga Times Free Press, Inc., Several interviews on Chattanooga's landslide hazard
280. Azad Hossain, 2018, 2019, 2020, 2021, Community, TV Interview (Channel 3, Channel 9, and News 12), Several interviews on Chattanooga's landslide hazard
281. Azad Hossain, 2018, Community, Collegedale Library & Learning Center's Kids Club, Show and tell on rocks and minerals
282. Azad Hossain, 2021 - Present, Professional, Sustainability, Review Board Member
283. Azad Hossain, 2018-2020, Professional, Applied Science, Reviewer
284. Azad Hossain, 2021-2022, Professional, Marine Geodesy, Reviewer
285. Azad Hossain, 2016-2017, Professional, Natural Hazard, Reviewer
286. Azad Hossain, 2023, Professional, PLOS 1, Reviewer
287. Azad Hossain, 2018 - Present, Professional, Remote Sensing, Reviewer
288. Azad Hossain, 2021, Professional, Royal Society Open Science, Reviewer
289. Azad Hossain, 2017, Professional, Scientific Reports, Reviewer
290. Azad Hossain, 2020-2021, Professional, Sensor, Reviewer
291. Azad Hossain, 2017 - Present, Professional, Sustainability, Reviewer
292. Azad Hossain, 2017-2021, Professional, Water, Reviewer
293. Azad Hossain, 2019, Professional, Water Resources Research, Reviewer
294. Azad Hossain, 2017, 2023, Professional, American Society of Photogrammetry and Remote Sensing, Conference Moderator
295. Azad Hossain, 2023, Professional, University of Calgary, External PhD Examiner

296. Azad Hossain, 2020, Professional, Connecticut Sea Grant and New York Sea Grant, Grant proposal reviewer
297. Azad Hossain, 2022 - Present, Professional, Remote Sensing, Guest Editor
298. Azad Hossain, 2019, 2023, Professional, Road Scholar Program Geology of Chattanooga, Invited lecturer
299. Azad Hossain, 2004 - Present, Professional, American Geophysical Union, Member
300. Azad Hossain, 2003 - Present, Professional, American Society of Photogrammetry and Remote Sensing, Member
301. Azad Hossain, 2016 - Present, Professional, Geological Society of America, Member
302. Azad Hossain, 2017 - present, Professional, Environmental Science: Current Research, Member of editorial board
303. Azad Hossain, 2021 - Present, Professional, Remote Sensing, Topic Editor and Review Board Member
304. Azad Hossain, 2023-Present, University (beyond BGE), CAS Committee of Inclusion and Engagement Excellence, Co-Chair
305. Azad Hossain, 2022-2023, University (beyond BGE), CAS DEI Committee, Committee Member
306. Azad Hossain, 2020-2021, University (beyond BGE), Faculty Grant, Committee Member
307. Azad Hossain, 2018, University (beyond BGE), IGT Lab Research Associate Search Committee, Committee Member
308. Azad Hossain, 2018-present, University (beyond BGE), IGTLab Advisory Committee, Committee Member
309. Azad Hossain, 2020-2021, 2023, University (beyond BGE), Undergraduate Academic Standard, Committee Member
310. Azad Hossain, 2017-2020, 2021-2023, University (beyond BGE), Undergraduate Curriculum, Committee Member
311. Azad Hossain, 2021, University (beyond BGE), IGTLab and Department of Continuing Education, Developed GIS Certificate Program
312. Azad Hossain, 2021, 2022, University (beyond BGE), Technology Symposium, Judge
313. Azad Hossain, 2019, University (beyond BGE), Workshop on Computational Geospatial Hydrology, Organizer
314. Azad Hossain, 2020, University (beyond BGE), ORSP Faculty Prep Grant, Reviewer
315. Azad Hossain, 2020, University (beyond BGE), URACE Grant, Reviewer
316. Azad Hossain, 2020-2023, University (beyond BGE), Environmental Sustainability and Climate Systems, Thrust Leader
317. Bramblett Jeremy, 2022-2023, Community, Creative Discovery Museum, New fossil exhibit reviewer
318. Bramblett Jeremy, 2023, Community, Soddy Elementary School 3rd Grade Classes, Presenter
319. Bramblett Jeremy, 2018-2020, University (beyond BGE), UTC Admissions Committee, member
320. Bramblett Jeremy, 2020-2023, University (beyond BGE), UTC General Education Committee, member
321. Bramblett Jeremy, 2023-2024, University (beyond BGE), UTC Learning Environment Committee, member
322. Katherine Kinnear, 2016-present, Community, Tennessee Wildlife Resources Agency, Class II Rehabilitator
323. Katherine Kinnear, 2021, Community, Red Bank Elementary, Guest Speaker
324. Katherine Kinnear, 2023-present, Community, Marshall Creek Wildlife Rehabilitation & Conservancy, Treasurer
325. Katherine Kinnear, , University (beyond BGE), Pre-Vet Student Club, Faculty Advisor

326. Katherine Kinnear, 2022-present, University (beyond BGE), MocUp First Generation Student Program, Faculty Mentor
327. Katherine Kinnear, 2021-present, University (beyond BGE), Honor Court, Member
328. Katherine Kinnear, 2021-2023, University (beyond BGE), SEARCH Awards, Reviewer
329. Hope Klug, 2018-2023, Community, GEAR UP Science Lab Day, University of Tennessee Chattanooga, Activity Leader
330. Hope Klug, 2020, Community, Hamilton County Department of Education, Hamilton County Professional Development for Teachers
331. Hope Klug, 2018, Community, High School Students in Research Mentoring, Mentor
332. Hope Klug, 2018-2023, Professional, Frontiers in Ecology & Evolution, Associate Editor
333. Hope Klug, 2013—2018, Professional, Proceedings of the Royal Society B, Associate Editor
334. Hope Klug, 2018—2021, Professional, Faculty of 1000, Behavioral Ecology Section Member
335. Hope Klug, 2018, Professional, Frontiers in Ecology & Evolution, Guest Associate Editor
336. Hope Klug, 2018-2023, Professional, Various journals in ecology and evolution, Reviewer
337. Hope Klug, 2018-2023 (at least once per year), Professional, National Science Foundation, Reviewer and Panel Member
338. Hope Klug, 2012-2020, Professional, Journal of Evolutionary Biology, Reviewing Editor
339. Hope Klug, 2016-2023, University (beyond BGE), Academic Advisor for Women in the Natural Sciences (WINS), Chair (through 2023) and Member
340. Hope Klug, 2018-2019, University (beyond BGE), Council of Academic Department Heads, Member
341. Hope Klug, 2016-2018, University (beyond BGE), Wheeler Odor Grant Board Member, Member
342. Hope Klug, 2019-2021, University (beyond BGE), Commission on the Status of Women, Chair of the Data Committee, Member and Chair of Data Committee
343. Margaret Kovach, 2021-2022, University (beyond BGE), Development Committee, Member
344. Margaret Kovach, 2018, University (beyond BGE), Faculty Grants Committee, Member
345. Margaret Kovach, 2019-2022, University (beyond BGE), Grade Appeals Committee, Member
346. Margaret Kovach, 2019-2022, University (beyond BGE), UTC SEARCH Award proposals, Reviewer
347. Ashley Manning-Berg, 2022, Community, Tellus Museum Fossil Mania, Outreach/presenter
348. Ashley Manning-Berg, 2022, Community, Thrasher Elementary Science Night, Outreach/presenter
349. Ashley Manning-Berg, 2021-Present, Community, Clifton Hills Elementary 2nd Grade Outreach, Presenter
350. Ashley Manning-Berg, 2021-Present, Community, Lookout Valley Elementary 2nd Grade Outreach, Presenter
351. Ashley Manning-Berg, 2022, Professional, National Association of Geoscience Teachers, Earth Educators Rendezvous Schedule Organizer
352. Ashley Manning-Berg, 2023, Professional, American Chemical Society, Grant Reviewer
353. Ashley Manning-Berg, 2020-2021, Professional, National Aeronautics and Space Administration Grant Panels, Grant Reviewer and Panelist
354. Ashley Manning-Berg, 2022, Professional, National Science Foundation, Grant Reviewer and Panelist

355. Ashley Manning-Berg, 2022-Present, Professional, The University of Cincinnati Early Career - Grad Student Mentorship Program, Mentor
356. Ashley Manning-Berg, 2020, Professional, The University of Cincinnati Dept. of Geology Seminar Panel, Being a Woman in Geoscience, Panelist
357. Ashley Manning-Berg, 2023, Professional, Earth Science Reviews, Reviewer
358. Ashley Manning-Berg, 2019; 2022, Professional, Geology, Reviewer
359. Ashley Manning-Berg, 2022;2023;2023, Professional, Minerals, Reviewer
360. Ashley Manning-Berg, 2022, Professional, Nature Geoscience, Reviewer
361. Ashley Manning-Berg, 2020, Professional, PALAIOS, Reviewer
362. Ashley Manning-Berg, 2019, Professional, Precambrian Research, Reviewer
363. Ashley Manning-Berg, 2020-Present, University (beyond BGE), University Committee - Faculty Rating of Administrators, Committee Member
364. Ashley Manning-Berg, 2022-Present, University (beyond BGE), College of Arts and Sciences Residential Learning Community Coordinator, Coordinator
365. Ashley Manning-Berg, 2021-2022, University (beyond BGE), Walker Center for Teaching and Learning, Panelist
366. Ashley Manning-Berg, 2020-Present, University (beyond BGE), UTC SEARCH Award proposals, Reviewer
367. Ashley Manning-Berg, 2023- Present, University (beyond BGE), Faculty Senate, Senator
368. Jonathan Mies, 2019-2022, Community, Road Scholars, Guest Speaker
369. Jonathan Mies, 2020-2021, University (beyond BGE), College of Arts and Sciences RTP Committee, Committee Chair
370. Jonathan Mies, 2019-2020, University (beyond BGE), Departmental RTP Committee, Committee Chair
371. Jonathan Mies, 2018-2019, University (beyond BGE), Search Committee for Assistant Professor in hydrology/aqueous geochemistry, Committee Chair
372. Jonathan Mies, 2018-2019, University (beyond BGE), Search Committee for Asst Professor in sedimentology and paleontology, Committee Chair
373. Jonathan Mies, 2022, University (beyond BGE), Search Committee for Geology Lecturer, Committee Chair
374. Jonathan Mies, 2019-2020, University (beyond BGE), Course Learning Evaluations Committee, Member
375. Jonathan Mies, 2020, University (beyond BGE), Search Committee for Geology Lecturer, Member
376. Jonathan Mies, 2020, University (beyond BGE), Undergraduate Admissions Committee, Member
377. Jonathan Mies, 2015-2021, University (beyond BGE), Wheeler Odor Research Advisory Board, Member
378. Monica Miles, 2023-Present, Community, Chattanooga Audubon Society, Board Member
379. Monica Miles, 2018-2020; 2022-Present, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Hike Leader
380. Monica Miles, 2022-Present, Community, Letters to Pre-Scientist, Pen-Pal
381. Monica Miles, 2022-Present, University (beyond BGE), Faculty Senate Course Learning Evaluations Committee, Committee Member
382. Sean Richards, 2013-2019, Community, North Chickamauga Creek Conservancy, Board Member
383. Sean Richards, 2019-present, Community, Hamilton County Regional Health Council Chair, Chair
384. Sean Richards, 2018-2020, Community, Tobacco Free Chattanooga, Chair
385. Sean Richards, 2018, Community, American Cancer Society, Science Ambassador

386. Sean Richards, 2017-2019, Community, Hamilton County Regional Health Council ViceChair, Vice Chair
387. Sean Richards, 2016-2018, Consulting, Miller&Martin PLLC, Expert consultant
388. Sean Richards, 2018-present, Professional, 17 Toxicology and Metabolomics journals, Ad-Hoc Reviewer
389. Sean Richards, 2006-present, Professional, Ecotoxicology, Associate Editor for Ecological Risk Assessment
390. Sean Richards, 2017-present, Professional, Advances in Clinical Toxicology, Editorial Board member
391. Sean Richards, 2018-present, Professional, Archives of Environmental Sciences and Environmental Toxicology, Editorial Board member
392. Sean Richards, 2017-present, Professional, Current Research: Environmental Science, Editorial Board member
393. Sean Richards, 2014-present, Professional, Global Journal of Environmental Science & Management, Editorial Board member
394. Sean Richards, 2018-present, Professional, Pharmacology, Toxicology and Pharmaceutics Open Access Open Journal, Editorial Board member
395. Sean Richards, 2004-present, Professional, US EPA Food Quality Protection Act (FQPA) Science Review Board, Review Board
396. Sean Richards, 2020-present, Professional, Developmental and Reproductive Toxicology (2020-present), Review Editor
397. Sean Richards, 2018, Professional, NSF – MRI and Rapid Response Research (RAPID), Reviewer
398. Joey Shaw, 2018, Community, Four Day Program for Escuela Verde Charter School, Milwaukee, WI, 10 students and three teachers over four days
399. Joey Shaw, 2019, Community, Four Day Program for Escuela Verde Charter School, Milwaukee, WI, 11 students and three teachers over four days
400. Joey Shaw, 2022, Community, Four Day Program for Escuela Verde Charter School, Milwaukee, WI, 12 students and three teachers over four days
401. Joey Shaw, 2018, Community, Normal Park Museum Magnet, 5 first grade classes on Biological Collections
402. Joey Shaw, 2019, Community, Normal Park Museum Magnet, 5 first grade classes on Biological Collections
403. Joey Shaw, 2022, Community, Normal Park Museum Magnet, 5 first grade classes on Biological Collections
404. Joey Shaw, 2023, Community, Normal Park Museum Magnet, 5 first grade classes on Biological Collections
405. Joey Shaw, 2023, Community, Two West Knoxville HS Class Fieldtrips to GSMNP, 50 student program on jobs in conservation
406. Joey Shaw, 2022, Community, Two West Knoxville HS Class Fieldtrips to GSMNP, 51 student program on jobs in conservation
407. Joey Shaw, 2019, Community, Two West Knoxville HS Class Fieldtrips to GSMNP, 52 student program on jobs in conservation
408. Joey Shaw, 2018, Community, Two West Knoxville HS Class Fieldtrips to GSMNP, 53 student program on jobs in conservation
409. Joey Shaw, 2021-2023, Community, Reflection Riding Arboretum and Nature Preserve, Board Member
410. Joey Shaw, 2015-present, Community, Highlands Biological Station, Board Member (Scientific Advisors)
411. Joey Shaw, 2018, Community, Friends of Roan Mountain, Digitizing Tennessee's one million herbarium specimens

412. Joey Shaw, 2018, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Director and Organizer
413. Joey Shaw, 2019, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Director and Organizer
414. Joey Shaw, 2020, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Director and Organizer
415. Joey Shaw, 2021, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Director and Organizer
416. Joey Shaw, 2022, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Director and Organizer
417. Joey Shaw, 2023, Community, Spring Wildflower Pilgrimage, Great Smoky Mountains National Park, Director and Organizer
418. Joey Shaw, 2018, Community, WUTC Interview, Interview Spring Wildflower Pilgrimage
419. Joey Shaw, 2018, Community, WUTC interview, UTC Herbarium NSF Funding Specimen Digitization
420. Joey Shaw, 2023, Community, Interview fort Tennessee Aquarium on Spring Wildflower Pilgrimage, Interviewee
421. Joey Shaw, 2021, Professional, National Science Foundation, Interview Discovery Files
422. Joey Shaw, 2009-present, Professional, Tennessee Rare Plant Advisory Committee (Appt by State of TN), Member
423. Joey Shaw, 2017-2019, Professional, Association of Southeastern Biologists, Past President
424. Joey Shaw, 2018-2019, Professional, Tennessee Academy of Sciences, President and Secretary Botany Section
425. Joey Shaw, , Professional, Reviewer for journals, Reviewer
426. John Tucker, 2018-2023, Community, Chattanooga-Hamilton County Air Pollution Control Bureau Board, Vice-Chair (since 2021), Member
427. John Tucker, 2022, Professional, Agronomy, Reviewer
428. John Tucker, 2019, Professional, Forests, Reviewer
429. John Tucker, 2021, Professional, Forests, Reviewer
430. John Tucker, 2022, Professional, Intl Journal of Envntl Research & Public Health, Reviewer
431. John Tucker, 2021, Professional, Sustainability, Reviewer
432. John Tucker, 2023, Professional, Water, Reviewer
433. John Tucker, 2019, University (beyond BGE), Assistant Dean Search Committee Arts & Sciences, Chair
434. John Tucker, 2019-2020, University (beyond BGE), Chemistry & Physics Department Head Search Committee, Chair
435. John Tucker, 2018-2020, University (beyond BGE), Executive Committee Arts & Sciences, Chair
436. John Tucker, 2018-2019, University (beyond BGE), Mathematics Department Head Search Committee, Chair
437. John Tucker, 2018-2020, University (beyond BGE), Tenure & Promotion Committee Arts & Sciences, Chair
438. John Tucker, 2018-2023, University (beyond BGE), Wheeler Odor Board Arts & Sciences, Chair
439. John Tucker, 2021-2023, University (beyond BGE), Envntl Studies Advisory Commmittee, Member
440. John Tucker, 2019, University (beyond BGE), Non-Tenure Track Faculty Task Force UTC, Member

- 441. John Tucker, 2022-2023, University (beyond BGE), Promotion Committee Political Science and Public Service Dept, Member
- 442. Thomas Wilson, 2018-2024, Community, Animal Use Committee CNC, member
- 443. Thomas Wilson, 2010-2024, Community, Turtle Survival Alliance, member
- 444. Thomas Wilson, 1999-2024, Professional, Partners in Amphibian and Reptile Conservation, member
- 445. Thomas Wilson, 2018-2024, Professional, ASB Poster and Presentation Awards Committee, member and reviewer
- 446. Thomas Wilson, 1992-2024, Professional, ASIH, member and reviewer
- 447. Thomas Wilson, 1992-2024, Professional, SSAR, member and reviewer
- 448. Thomas Wilson, 2010-2024, Professional, The Wildlife Society, member and reviewer
- 449. Thomas Wilson, 2013-2024, Professional, Turtle Survival Alliance, Species Survival Agreement
- 450. Thomas Wilson, 2020-2024, University (beyond BGE), UTC Student Chapter of The Wildlife Society, Advisor
- 451. Thomas Wilson, 2022-2023, University (beyond BGE), UTC Graduate Council, Chair
- 452. Thomas Wilson, 2022-2023, University (beyond BGE), UTC Graduate Council Appeals Committee, Chair
- 453. Thomas Wilson, 2020-2021, University (beyond BGE), UTC Graduate Council- Best Practices Committee, Chair
- 454. Thomas Wilson, 2011-2024, University (beyond BGE), Wildlife-Zoology Club, Founder and Advisor
- 455. Thomas Wilson, 2019, University (beyond BGE), CAS Reappointment, Tenure and Promotion Committee, member
- 456. Thomas Wilson, 2023-2024, University (beyond BGE), UTC Graduate Council, member
- 457. Thomas Wilson, 2018-2021, University (beyond BGE), UTC Graduate Council- Appeals, member
- 458. Thomas Wilson, 2018-2024, University (beyond BGE), UTC Graduate Council- Curriculum Committee, Member
- 459. Thomas Wilson, 2019, University (beyond BGE), CAS Assistant Dean Search Committee, member
- 460. Thomas Wilson, 2017-2024, University (beyond BGE), IACUC, Vice-Chair (since 2021), Member
- 461. Thomas Wilson, 2021-2022, University (beyond BGE), UTC Graduate Council, Vice-Chair (since 2021), Member

Appendix 4-L Graduate Student Mentorship

1. Paul-Erik Bakland, Level: Graduate, Mentor: Thomas Wilson, 2018, Museum Curation
2. Jonah Hall, Level: Graduate, Mentor: Azad Hossain, 2018, Thesis (Major Advisor)
3. Jonah Hall, Level: Graduate, Mentor: Azad Hossain, 2018, Independent Study
4. Rick Blanton, Level: Graduate, Mentor: Azad Hossain, 2018, Graduate Research
5. Caryn Ross, Level: Graduate, Mentor: Azad Hossain, 2018, Thesis (Committee Member)
6. Kyle Jones, Level: Graduate, Mentor: Azad Hossain, 2018, Thesis (Committee Member)
7. Tegan Hendricks, Level: Graduate, Mentor: Azad Hossain, 2018, Thesis (Committee Member)
8. Tanner Gatlin, Level: Graduate, Mentor: Azad Hossain, 2018, Thesis (Committee Member)
9. Rick Blanton, Level: Graduate, Mentor: Azad Hossain, 2018, Independent Study
10. Courtney Alley, Level: Graduate, Mentor: Azad Hossain, 2018, Thesis (Committee Member)
11. Caryn Ross, Level: Graduate, Mentor: David Aborn, 2018, Thesis advisor: Evaluating land use changes on wintering bird populations using Christmas Bird Count data
12. Mary Feely, Level: Graduate, Mentor: David Aborn, 2018, Thesis advisor: Post-fire recovery of bird communities
13. Kimika Tsukide, Level: Graduate, Mentor: Henry Spratt, 2018, Work at a local Sewage Treatment Plant
14. Kyle Jones, Level: Graduate, Mentor: Henry Spratt, 2018, Thesis: An inventory and mapping of cliffs within the south Cumberland Plateau region of Tennessee.
15. Elizabeth Webb, Level: Graduate, Mentor: Henry Spratt, 2018, Work with a local organization focused on public education related to surface water quality
16. Charlotte Bossy, Level: Graduate, Mentor: Jennifer Boyd, 2018, Non-thesis Research: Investigation of climate change ecotypes across altitudinal gradients
17. Jared Odell, Level: Graduate, Mentor: Jennifer Boyd, 2018, Thesis Advisor: Comparative plasticity of rare *Pityopsis ruthii* and its common congener *P. graminifolia*
18. Kalen Foster, Level: Graduate, Mentor: Jennifer Boyd, 2018, Non-thesis Research: Translocation of *Platanthera integrilabia*
19. Kyle Jones, Level: Graduate, Mentor: Jennifer Boyd, 2018, Thesis Committee: An inventory and mapping of cliffs within the South Cumberland Plateau region of Tennessee
20. Mia Rochford, Level: Graduate, Mentor: Jennifer Boyd, 2018, Dissertation Committee: Native plant species' response to anthropogenic change (University of Georgia)
21. Rachel Kelly, Level: Graduate, Mentor: Jennifer Boyd, 2018, Learning Discourse Advisor
22. Savanna Wooten, Level: Graduate, Mentor: Jennifer Boyd, 2018, Thesis Advisor: Impacts of habitat management on translocation of the rare terrestrial herb *Platanthera integrilabia*
23. Courtney Alley, Level: Graduate, Mentor: Joey Shaw, 2018, MS Thesis: Reevaluation and habitat modeling of Tennessee's invasive plant species.
24. Erica Rylander, Level: Graduate, Mentor: Joey Shaw, 2018, MS Thesis: Using digitized herbarium specimens to predict potential distributions of Tennessee's historical angiosperm species.
25. John Shelton, Level: Graduate, Mentor: Joey Shaw, 2018, MS Thesis: The vascular flora of Copper Basin, Polk County, Tennessee.
26. Monica Miles, Level: Graduate, Mentor: Loren Hayes, 2018, Artiodactyla social organization
27. Kelly Daniels, Level: Graduate, Mentor: Thomas Wilson, 2018, Thesis (Chair)
28. Kelly Daniels, Level: Graduate, Mentor: Thomas Wilson, 2018, Independent Study- Team Salamander
29. Kelly Daniels, Level: Graduate, Mentor: Thomas Wilson, 2018, Museum Curation
30. Kelly Daniels, Level: Graduate, Mentor: Thomas Wilson, 2018, Turtle Survival Alliance
31. Nyssa Hunt, Level: Graduate, Mentor: Thomas Wilson, 2018, Independent Study- Team Salamander
32. Nyssa Hunt, Level: Graduate, Mentor: Thomas Wilson, 2018, Museum Curation

33. Nyssa Hunt, Level: Graduate, Mentor: Thomas Wilson, 2018, Turtle Survival Alliance
34. Nyssa Hunt, Level: Graduate, Mentor: Thomas Wilson, 2018, Research
35. Jonah Hall, Level: Graduate, Mentor: Thomas Wilson, 2018, Research
36. Paul-Erik Bakland, Level: Graduate, Mentor: Thomas Wilson, 2018, Thesis (Chair)
37. Paul-Erik Bakland, Level: Graduate, Mentor: Thomas Wilson, 2018, Independent Study- Team Salamander
38. Paul-Erik Bakland, Level: Graduate, Mentor: Thomas Wilson, 2018, North American Amphibian Monitoring Project
39. Paul-Erik Bakland, Level: Graduate, Mentor: Thomas Wilson, 2018, Turtle Survival Alliance
40. Paul-Erik Bakland, Level: Graduate, Mentor: Thomas Wilson, 2018, Research
41. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2018, Thesis (Chair)
42. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2018, Independent Study- Team Salamander
43. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2018, Museum Curation
44. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2018, North American Amphibian Monitoring Project
45. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2018, Turtle Survival Alliance
46. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2018, Research
47. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2018, Thesis (Chair)
48. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2018, Research
49. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2018, Independent Study- Team Salamander
50. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2018, Museum Curation
51. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2018, North American Amphibian Monitoring Project
52. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2018, Turtle Survival Alliance
53. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2018, Research
54. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2018, Independent Study- Team Salamander
55. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2018, Museum Curation
56. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2018, North American Amphibian Monitoring Project
57. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2018, Research
58. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2018, Independent Study- Team Salamander
59. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2018, Museum Curation
60. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2018, North American Amphibian Monitoring Project
61. Jena Morton, Level: Graduate, Mentor: Thomas Wilson, 2018, North American Amphibian Monitoring Project
62. Jarid Prah, Level: Graduate, Mentor: ThomasWilson, 2018, Turtle Survival Alliance
63. Jordan Allen, Level: Graduate, Mentor: Tim Gaudin, 2018, Habitat suitability modeling for *Lontra canadensis* (River otter) in east Tennessee
64. Alberto Boscaini, Level: Graduate, Mentor: Tim Gaudin, 2018, Co-PhD advisor [with Dr. François Pujos of IANIGLA]. Project: “Taxonomía y filogenia de los Mylodontinae (Mammalia, Xenarthra) con énfasis en los taxones de Bolivia y otras formas ‘tropicales’: implicancia en la historia evolutiva de la subfamilia” [Insti
65. Nyssa Hunt, Level: Graduate, Mentor: Thomas Wilson, 2018, Thesis (Chair)
66. Nyssa Hunt, Level: Graduate, Mentor: Thomas Wilson, 2018, North American Amphibian Monitoring Project
67. Kyle Jones, Level: Graduate, Mentor: Thomas Wilson, 2018, Research

68. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2018, Thesis (Chair)
69. Jarid Prael, Level: Graduate, Mentor: Thomas Wilson, 2018, Non-Thesis (Chair)
70. Jena Morton, Level: Graduate, Mentor: Thomas Wilson, 2018, Non-Thesis (Chair)
71. Jonah Hall, Level: Graduate, Mentor: Azad Hossain, 2019, Thesis (Major Advisor)
72. Rick Blanton, Level: Graduate, Mentor: Azad Hossain, 2019, Graduate Research
73. Rick Blanton, Level: Graduate, Mentor: Azad Hossain, 2019, GERS Laboratory Research
74. Rick Blanton, Level: Graduate, Mentor: Azad Hossain, 2019, Independent Study
75. Caryn Ross, Level: Graduate, Mentor: Azad Hossain, 2019, Thesis (Committee Member)
76. Tegan Hendricks, Level: Graduate, Mentor: Azad Hossain, 2019, Thesis (Committee Member)
77. Courtney Alley, Level: Graduate, Mentor: Azad Hossain, 2019, Thesis (Committee Member)
78. Kimberly Jones, Level: Graduate, Mentor: Azad Hossain, 2019, Thesis (Committee Member)
79. Preyanka Dey, Level: Graduate, Mentor: Azad Hossain, 2019, Independent Research
80. Erin Taylor, Level: Graduate, Mentor: Azad Hossain, 2019, Thesis (Committee Member)
81. Caryn Ross, Level: Graduate, Mentor: David Aborn, 2019, Thesis advisor: Evaluating land use changes on wintering bird populations using Christmas Bird Count data
82. Mary Feely, Level: Graduate, Mentor: David Aborn, 2019, Thesis advisor: Post-fire recovery of bird communities
83. Eliot Berz, Level: Graduate, Mentor: David Aborn, 2019, Thesis advisor: Migratory connectivity in Louisiana Waterthrushes
84. Nicole Harty, Level: Graduate, Mentor: Henry Spratt, 2019, PT graduate student studying bacterial contamination of rehabilitation devices used in PT
85. Allison Powel, Level: Graduate, Mentor: Henry Spratt, 2019, PT graduate student studying bacterial contamination of rehabilitation devices used in PT
86. Graceline Sanford, Level: Graduate, Mentor: Henry Spratt, 2019, PT graduate student studying bacterial contamination of rehabilitation devices used in PT
87. Carolee Mabe, Level: Graduate, Mentor: Henry Spratt, 2019, PT graduate student studying bacterial contamination of rehabilitation devices used in PT
88. Kimika Tsukide, Level: Graduate, Mentor: Henry Spratt, 2019, MS in ESC Degree, Non-thesis option
89. Elizabeth Webb, Level: Graduate, Mentor: Henry Spratt, 2019, MS in ESC Degree, Non-thesis option
90. Charlotte Bossy, Level: Graduate, Mentor: Jennifer Boyd, 2019, Non-thesis Research: Investigation of climate change ecotypes across altitudinal gradients
91. Jared Odell, Level: Graduate, Mentor: Jennifer Boyd, 2019, Thesis Advisor: Comparative plasticity of rare *Pityopsis ruthii* and its common congener *P. graminifolia*
92. Kalen Foster, Level: Graduate, Mentor: Jennifer Boyd, 2019, Non-thesis Research: Translocation of *Platanthera integrilabia*
93. Mia Rochford, Level: Graduate, Mentor: Jennifer Boyd, 2019, Dissertation Committee: Native plant species' response to anthropogenic change (University of Georgia)
94. Savanna Wooten, Level: Graduate, Mentor: Jennifer Boyd, 2019, Thesis Advisor: Impacts of habitat management on translocation of the rare terrestrial herb *Platanthera integrilabia*
95. Zachary McCoy, Level: Graduate, Mentor: Jennifer Boyd, 2019, Thesis Committee: An analysis of the evolution of life history traits
96. Courtney Alley, Level: Graduate, Mentor: Joey Shaw, 2019, MS Thesis: Reevaluation and habitat modeling of Tennessee's invasive plant species.
97. Erica Rylander, Level: Graduate, Mentor: Joey Shaw, 2019, MS Thesis: Using digitized herbarium specimens to predict potential distributions of Tennessee's historical angiosperm species.
98. Jada Williams, Level: Graduate, Mentor: Joey Shaw, 2019, Individual Study: National Park Specimens at UTC

99. John Shelton, Level: Graduate, Mentor: Joey Shaw, 2019, MS Thesis: The vascular flora of Copper Basin, Polk County, Tennessee.
100. Megon Stepaniuk, Level: Graduate, Mentor: Joey Shaw, 2019, MS Thesis: Locating herbarium specimens in online digital repositories to be used in future retrospective analysis of heavy metal pollutants from pre- and post-1960s in the most polluted city in the United States, Chattanooga, Tennessee.
101. Megon Stepaniuk, Level: Graduate, Mentor: Joey Shaw, 2019, Individual Study: National Park Specimens at UTC
102. Nate Parrish, Level: Graduate, Mentor: Joey Shaw, 2019, Non-Thesis: Preliminary Vascular Flora of the Walls of Jericho, Tennessee
103. Sara Grillo, Level: Graduate, Mentor: Loren Hayes, 2019, Personality of *Octodon degus*
104. Chyanne Smith, Level: Graduate, Mentor: Loren Hayes, 2019, Male social organization
105. Imma Aquino, Level: Graduate, Mentor: Sean Richards, 2019, University of Salerno, Italy student; Placental tissue metabolome analysis by GC-MS
106. Edward Clawson, Level: Graduate, Mentor: Sean Richards, 2019, Bioinformatics student worked under me studying phthalate exposure in custodial workers
107. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2019, Non-Thesis (Chair)
108. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2019, Research
109. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2019, Independent Study- Team Salamander
110. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2019, North American Amphibian Monitoring Project
111. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2019, Thesis (Chair)
112. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2019, Independent Study- Team Salamander
113. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2019, Museum Curation
114. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2019, North American Amphibian Monitoring Project
115. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2019, Turtle Survival Alliance
116. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2019, Research
117. Jena Morton, Level: Graduate, Mentor: Thomas Wilson, 2019, North American Amphibian Monitoring Project
118. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2019, Thesis (Chair)
119. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2019, Research
120. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2019, Independent Study- Team Salamander
121. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2019, Museum Curation
122. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2019, North American Amphibian Monitoring Project
123. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2019, Turtle Survival Alliance
124. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2019, Research
125. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2019, Independent Study- Team Salamander
126. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2019, Museum Curation
127. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2019, North American Amphibian Monitoring Project
128. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2019, Thesis (Chair)
129. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2019, Research
130. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2019, Independent Study- Team Salamander
131. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2019, Museum Curation

132. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2019, North American Amphibian Monitoring Project
133. McKenize Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2019, Turtle Survival Alliance
134. Jordan Allen, Level: Graduate, Mentor: Thomas Wilson, 2019, Thesis (Committee Member)
135. Jordan Allen, Level: Graduate, Mentor: Tim Gaudin, 2019, Habitat suitability modeling for *Lontra canadensis* (River otter) in east Tennessee
136. Alberto Boscaini, Level: Graduate, Mentor: Tim Gaudin, 2019, Co-PhD advisor [with Dr. François Pujos of IANIGLA]. Project: “Taxonomía y filogenia de los Mylodontinae (Mammalia, Xenarthra) con énfasis en los taxones de Bolivia y otras formas ‘tropicales’: implicancia en la historia evolutiva de la subfamilia” [Insti
137. Nailah Littlejohn, Level: Graduate, Mentor: Tim Gaudin, 2019, Curatorial Assistant in Mammal collection of UTC Natural History Museum
138. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2019, Turtle Survival Alliance
139. Jarid Prah, Level: Graduate, Mentor: Thomas Wilson, 2019, Museum Curation
140. Jena Morton, Level: Graduate, Mentor: Thomas Wilson, 2019, Non-Thesis (Chair)
141. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2019, Thesis (Chair)
142. Rick Blanton, Level: Graduate, Mentor: Azad Hossain, 2020, GERS Laboratory Research
143. Tegan Hendricks, Level: Graduate, Mentor: Azad Hossain, 2020, Thesis (Committee Member)
144. Erin Taylor, Level: Graduate, Mentor: Azad Hossain, 2020, Thesis (Committee Member)
145. Kimberly Jones, Level: Graduate, Mentor: Azad Hossain, 2020, Thesis (Committee Member)
146. William Stuart, Level: Graduate, Mentor: Azad Hossain, 2020, Thesis (Major Advisor)
147. William Stuart, Level: Graduate, Mentor: Azad Hossain, 2020, Independent Study
148. Dylan Adler, Level: Graduate, Mentor: Azad Hossain, 2020, Thesis (Major Advisor)
149. Dylan Adler, Level: Graduate, Mentor: Azad Hossain, 2020, Independent Study
150. Hunter Lamb, Level: Graduate, Mentor: Azad Hossain, 2020, Thesis (Committee Member)
151. Eliot Berz, Level: Graduate, Mentor: David Aborn, 2020, Thesis advisor: Migratory connectivity in Louisiana Waterthrushes
152. Avery Young, Level: Graduate, Mentor: David Aborn, 2020, Thesis advisor: Bird use of avocado farms in the Dominican Republic
153. Margaret Joyce Miller, Level: Graduate, Mentor: Hill Craddock, 2020, M.S. Thesis: Small stem assay for chestnut blight resistance in segregating half-sib and full-sib families of F2 and backcross hybrid chestnut trees
154. Trent Deason, Level: Graduate, Mentor: Hill Craddock, 2020, M.S. Thesis: Accelerated, graft-based germplasm conservation of American chestnut (*Castanea dentata*) in the South
155. John Shelton, Level: Graduate, Mentor: Hill Craddock, 2020, M.S. Thesis (committee member)
156. Charlotte Bossy, Level: Graduate, Mentor: Jennifer Boyd, 2020, Non-thesis Research: Investigation of climate change ecotypes across altitudinal gradients
157. Jared Odell, Level: Graduate, Mentor: Jennifer Boyd, 2020, Thesis Advisor: Comparative plasticity of rare *Pityopsis ruthii* and its common congener *P. graminifolia*
158. Kalen Foster, Level: Graduate, Mentor: Jennifer Boyd, 2020, Non-thesis Research: Translocation of *Platanthera integrilabia*
159. Mia Rochford, Level: Graduate, Mentor: Jennifer Boyd, 2020, Dissertation Committee: Native plant species’ response to anthropogenic change (University of Georgia)
160. Savanna Wooten, Level: Graduate, Mentor: Jennifer Boyd, 2020, Thesis Advisor: Impacts of habitat management on translocation of the rare terrestrial herb *Platanthera integrilabia*

161. Caleb Powell, Level: Graduate, Mentor: Joey Shaw, 2020, MS Thesis: In support of natural history digitization: assistive tools for the mobilization of biodiversity data.
162. Erica Rylander, Level: Graduate, Mentor: Joey Shaw, 2020, MS Thesis: Using digitized herbarium specimens to predict potential distributions of Tennessee's historical angiosperm species.
163. Garrett Billings, Level: Graduate, Mentor: Joey Shaw, 2020, Individual Study: Herbarium Studies
164. Jada Williams, Level: Graduate, Mentor: Joey Shaw, 2020, Individual Study: Literature Review on Floristics of Tennessee
165. John Shelton, Level: Graduate, Mentor: Joey Shaw, 2020, MS Thesis: The vascular flora of Copper Basin, Polk County, Tennessee.
166. Megon Stepaniuk, Level: Graduate, Mentor: Joey Shaw, 2020, MS Thesis: Locating herbarium specimens in online digital repositories to be used in future retrospective analysis of heavy metal pollutants from pre- and post-1960s in the most polluted city in the United States, Chattanooga, Tennessee.
167. Megon Stepaniuk, Level: Graduate, Mentor: Joey Shaw, 2020, Individual Study: Herbarium Studies
168. Nate Parrish, Level: Graduate, Mentor: Joey Shaw, 2020, Non-Thesis: Preliminary Vascular Flora of the Walls of Jericho, Tennessee
169. Nate Parrish, Level: Graduate, Mentor: Joey Shaw, 2020, Individual Study: Herbarium Studies
170. Miles Matchinske, Level: Graduate, Mentor: Loren Hayes, 2020, Parturition and social organization
171. Chyanne Smith, Level: Graduate, Mentor: Loren Hayes, 2020, Male social organization
172. Edward Clawson, Level: Graduate, Mentor: Sean Richards, 2020, Bioinformatics student worked under me studying phthalate exposure in custodial workers
173. Taylor Day, Level: Graduate, Mentor: Sean Richards, 2020, Bioinformatics student worked under me pharmaceutical effects on *Daphnia magna*
174. Imma Aquino, Level: Graduate, Mentor: Sean Richards, 2020, University of Salerno, Italy student; Placental tissue metabolome analysis by GC-MS
175. Nelson Goodman, Level: Graduate, Mentor: Thomas Wilson, 2020, Non-Thesis (Chair)
176. Carrisa Turner, Level: Graduate, Mentor: Thomas Wilson, 2020, Thesis (Committee Member)
177. Melanie McMillian, Level: Graduate, Mentor: Thomas Wilson, 2020, Non-Thesis (Chair)
178. Nelson Goodman, Level: Graduate, Mentor: Thomas Wilson, 2020, Non-Thesis (Chair)
179. Emily Davis, Level: Graduate, Mentor: Thomas Wilson, 2020, Research Co-Supervisor
180. Kalee Hotchkiss, Level: Graduate, Mentor: Thomas Wilson, 2020, Non-Thesis (Chair)
181. Mike Montgomery, Level: Graduate, Mentor: Thomas Wilson, 2020, Non-Thesis (Chair)
182. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Thesis (Chair)
183. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Research
184. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Independent Study-Team Salamander
185. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Museum Curation
186. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, North American Amphibian Monitoring Project
187. McKenize Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Turtle Survival Alliance
188. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2020, Research
189. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2020, Independent Study-Team Salamander
190. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2020, Museum Curation

191. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2020, North American Amphibian Monitoring Project
192. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2020, Thesis (Chair)
193. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2020, Independent Study- Team Salamander
194. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2020, Museum Curation
195. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2020, North American Amphibian Monitoring Project
196. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2020, Turtle Survival Alliance
197. Tegan Childers, Level: Graduate, Mentor: Thomas Wilson, 2020, Research
198. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2020, Thesis (Chair)
199. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2020, Research
200. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2020, Independent Study- Team Salamander
201. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2020, Museum Curation
202. Rachel Head, Level: Graduate, Mentor: Thomas Wilson, 2020, North American Amphibian Monitoring Project
203. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Thesis (Chair)
204. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Research
205. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Independent Study- Team Salamander
206. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Museum Curation
207. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, North American Amphibian Monitoring Project
208. McKenize Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2020, Turtle Survival Alliance
209. Jordan Allen, Level: Graduate, Mentor: Tim Gaudin, 2020, Habitat suitability modeling for *Lontra canadensis* (River otter) in east Tennessee
210. Jordan Allen, Level: Graduate, Mentor: Thomas Wilson, 2020, Thesis (Committee Member)
211. Jordan Allen, Level: Graduate, Mentor: Thomas Wilson, 2020, Thesis (Committee Member)
212. Sarah Kelehear, Level: Graduate, Mentor: Thomas Wilson, 2020, Thesis (Chair)
213. Jordan Allen, Level: Graduate, Mentor: Thomas Wilson, 2020, Independent Study- Developing Geospatial Habitat Suitability Models for the River Otter
214. Zach McCoy, Level: Teacher, Mentor: Hope Klug, 2021, NSF RET evolution researcher
215. William Stuart, Level: Graduate, Mentor: Azad Hossain, 2021, Thesis (Major Advisor)
216. William Stuart, Level: Graduate, Mentor: Azad Hossain, 2021, Independent Study
217. Connor Firat, Level: Graduate, Mentor: Azad Hossain, 2021, Thesis (Major Advisor)
218. Connor Firat, Level: Graduate, Mentor: Azad Hossain, 2021, Independent Study
219. Connor Firat, Level: Graduate, Mentor: Azad Hossain, 2021, GERS Laboratory Research
220. Preyanka Dey, Level: Graduate, Mentor: Azad Hossain, 2021, Thesis (Committee Member)
221. Erin Taylor, Level: Graduate, Mentor: Azad Hossain, 2021, Thesis (Committee Member)
222. Kimberly Jones, Level: Graduate, Mentor: Azad Hossain, 2021, Thesis (Committee Member)
223. Sean Jones, Level: Graduate, Mentor: Azad Hossain, 2021, Independent Study
224. Eliot Berz, Level: Graduate, Mentor: David Aborn, 2021, Thesis advisor: Migratory connectivity in Louisiana Waterthrushes
225. Avery Young, Level: Graduate, Mentor: David Aborn, 2021, Thesis advisor: Bird use of avocado farms in the Dominican Republic

226. William Hansen-Regan, Level: Graduate, Mentor: Fernando Alda, 2021, Molecular work for ESC
227. Swetha Shamakoora, Level: Graduate, Mentor: Francesca Leasi, 2021, Individual Studies: DNA extraction of rotifers from the Tennessee River
228. Preyanka Dey, Level: Graduate, Mentor: Hope Klug, 2021, Computational biology sexual selection research
229. Avery Young, Level: Graduate, Mentor: Jennifer Boyd, 2021, Thesis Co-Advisor: Bird use of avocado farms and intact forest in the Dominican Republic
230. Mia Rochford, Level: Graduate, Mentor: Jennifer Boyd, 2021, Dissertation Committee: Native plant species' response to anthropogenic change (University of Georgia)
231. Thomas Wiegand, Level: Graduate, Mentor: Jennifer Boyd, 2021, Thesis Advisor: Increased phenotypic plasticity linked to broader geographic range size in sunflower (*Helianthus*) species
232. Garrett Billings, Level: Graduate, Mentor: Joey Shaw, 2021, MS Thesis: Vascular Flora of Walls of Jericho, Alabama
233. Garrett Billings, Level: Graduate, Mentor: Joey Shaw, 2021, Individual Study: Herbarium Studies
234. Jada Williams, Level: Graduate, Mentor: Joey Shaw, 2021, Non-Thesis: Preliminary Vascular Flora of the Booker T. Washington State Park, Tennessee
235. Jada Williams, Level: Graduate, Mentor: Joey Shaw, 2021, Individual Study: Herbarium Studies
236. Megon Stepaniuk, Level: Graduate, Mentor: Joey Shaw, 2021, MS Thesis: Locating herbarium specimens in online digital repositories to be used in future retrospective analysis of heavy metal pollutants from pre- and post-1960s in the most polluted city in the United States, Chattanooga, Tennessee.
237. Nate Parrish, Level: Graduate, Mentor: Joey Shaw, 2021, Non-Thesis: Preliminary Vascular Flora of the Walls of Jericho, Tennessee
238. Logan Platt, Level: Graduate, Mentor: Loren Hayes, 2021, Social structure of *Octodon degus*
239. Jess Morales Valenzuela, Level: Graduate, Mentor: Loren Hayes, 2021, Social organization of *Octodon degus*
240. Miles Matchinske, Level: Graduate, Mentor: Loren Hayes, 2021, Parturition and social organization
241. Chyanne Smith, Level: Graduate, Mentor: Loren Hayes, 2021, Male social organization
242. Jessica Sanders, Level: Graduate, Mentor: Stylianos Chatzimanolis, 2021, New records of beetles in TN
243. McKenzie Jaynes, Level: Graduate, Mentor: Thomas Wilson, 2021, Non-Thesis (Chair)
244. Nelson Goodman, Level: Graduate, Mentor: Thomas Wilson, 2021, Non-Thesis (Chair)
245. Nelson Goodman, Level: Graduate, Mentor: Thomas Wilson, 2021, Research
246. Emily Davis, Level: Graduate, Mentor: Thomas Wilson, 2021, Research Co-Supervisor
247. Erin Taylor, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study- TDOT Green Infrastructure Assessment
248. Mike Montgomery, Level: Graduate, Mentor: Thomas Wilson, 2021, Non-Thesis (Chair)
249. Kerra Ganoa, Level: Graduate, Mentor: Thomas Wilson, 2021, Thesis (Chair)
250. Victoria Sinnott, Level: Graduate, Mentor: Thomas Wilson, 2021, Capstone (Co-Supervisor)
251. Hasan Sabbir, Level: Graduate, Mentor: Thomas Wilson, 2021, Capstone (Co-Supervisor)
252. Devin Edmonds, Level: Graduate, Mentor: Thomas Wilson, 2021, Research
253. Daisy McMillion, Level: Graduate, Mentor: Thomas Wilson, 2021, Research Co-Supervisor

254. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2021, Non-Thesis (Chair)
255. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study-Team Salamander
256. Julia Botz, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study-Geospatial
257. Nicole Cobb, Level: Graduate, Mentor: Thomas Wilson, 2021, Thesis (Chair)
258. Nicole Cobb, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study-Team Salamander
259. Emily Davis, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study-Geospatial
260. Erin Gaylord, Level: Graduate, Mentor: Thomas Wilson, 2021, Thesis (Chair)
261. Erin Gaylord, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study- Team Salamander
262. Kalee Hotchkiss, Level: Graduate, Mentor: Thomas Wilson, 2021, Non-Thesis (Chair)
263. Kalee Hotchkiss, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study-Alaska EPA
264. Sean Jones, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study- TVA Geospatial Water Quality
265. Jerimiah Rhodes, Level: Graduate, Mentor: Thomas Wilson, 2021, Thesis (Chair)
266. Jeremiah Rhodes, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study-Team Salamander
267. Jeremiah Rhodes, Level: Graduate, Mentor: Thomas Wilson, 2021, Thesis (Chair)
268. Taylor Idland, Level: Graduate, Mentor: Thomas Wilson, 2021, Thesis (Chair)
269. Carrissa Turner, Level: Graduate, Mentor: Thomas Wilson, 2021, Thesis (Committee Member)
270. Carissa Turner, Level: Graduate, Mentor: Tim Gaudin, 2021, Determining habitat preferences of *Dasytus novemcinctus* and assessing prevalence of Hansen's disease in Tennessee with assistance from community science data
271. K vin Le Verger, Level: Graduate, Mentor: Tim Gaudin, 2021, PhD Committee: Comparative anatomy and phylogenetic contribution of intracranial osseous canals and cavities in armadillos and glyptodonts (*Xenarthra*, *Cingulata*). [Mus um Nacional d'Histoire Naturelle, Paris, France]
272. Melanie McMillian, Level: Graduate, Mentor: Thomas Wilson, 2021, Non-Thesis (Chair)
273. Erin Taylor, Level: Graduate, Mentor: Thomas Wilson, 2021, Non-Thesis (Chair)
274. Sean Jones, Level: Graduate, Mentor: Thomas Wilson, 2021, Non-Thesis (Chair)
275. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2021, Thesis (Chair)
276. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2021, Independent Study- Team Salamander
277. Sara Churchwell, Level: Graduate, Mentor: Thomas Wilson, 2021, Non-Thesis (Chair)
278. Nicole Cobb, Level: Graduate, Mentor: Thomas Wilson, 2022, Independent Study
279. William Stuart, Level: Graduate, Mentor: Azad Hossain, 2022, Thesis (Major Advisor)
280. Connor Firat, Level: Graduate, Mentor: Azad Hossain, 2022, Thesis (Major Advisor)
281. Shelby Campbell, Level: Graduate, Mentor: Azad Hossain, 2022, Thesis (Major Advisor)
282. Shelby Campbell, Level: Graduate, Mentor: Azad Hossain, 2022, Independent Study
283. Shelby Campbell, Level: Graduate, Mentor: Azad Hossain, 2022, GERS Laboratory Research
284. Connor Firat, Level: Graduate, Mentor: Azad Hossain, 2022, Independent Study
285. Connor Firat, Level: Graduate, Mentor: Azad Hossain, 2022, GERS Laboratory Research
286. Sean Jones, Level: Graduate, Mentor: Azad Hossain, 2022, GERS Laboratory Research
287. Sean Jones, Level: Graduate, Mentor: Azad Hossain, 2022, Independent Study
288. Erin Taylor, Level: Graduate, Mentor: Azad Hossain, 2022, Thesis (Committee Member)

289. Kimberly Jones, Level: Graduate, Mentor: Azad Hossain, 2022, Thesis (Committee Member)
290. Jacob Hart, Level: Graduate, Mentor: Azad Hossain, 2022, Non-Thesis (Major Advisor)
291. Jacob Hart, Level: Graduate, Mentor: Azad Hossain, 2022, Independent Study
292. Jacob Hart, Level: Graduate, Mentor: Azad Hossain, 2022, GERS Laboratory Research
293. Logan Platt, Level: Graduate, Mentor: Azad Hossain, 2022, Thesis (Committee Member)
294. Garrett Billings, Level: Graduate, Mentor: Azad Hossain, 2022, Thesis (Committee Member)
295. Christy Davidson, Level: Graduate, Mentor: Azad Hossain, 2022, Thesis (Committee Member)
296. Cole White, Level: Graduate, Mentor: Azad Hossain, 2022, Independent Study
297. Emily Davis, Level: graduate, Mentor: Bradley Reynolds, 2022, Non-Thesis Work: Research and Ind. Study Supervisor
298. Avery Young, Level: Graduate, Mentor: David Aborn, 2022, Thesis advisor: Bird use of avocado farms in the Dominican Republic
299. Caleb Gruber, Level: Graduate, Mentor: David Aborn, 2022, Thesis advisor: Influence of weather on Tree Swallow breeding
300. Rachel Rose, Level: Graduate, Mentor: David Aborn, 2022, Internship Advisor: Water Quality Intern with TDEC
301. Julia Botz, Level: Graduate, Mentor: David Aborn, 2022, Internship Advisor: Education Assistant at Audubon Acres
302. Chloe Smotherman, Level: Graduate, Mentor: David Aborn, 2022, Thesis advisor: Museum curation of the bird collection
303. Andrew Turgeson, Level: Graduate, Mentor: David Giles, 2022, Research: Molecular Modeling of Antimicrobials Across *Vibrio cholerae* Membranes
304. William Hansen-Regan, Level: Graduate, Mentor: Fernando Alda, 2022, Molecular work for ESC
305. Libba Wigginton, Level: Graduate, Mentor: Henry Spratt, 2022, OT graduate student studying *Staphylococcus aureus* contamination of "hip kits" used in OT rehabilitation
306. Sara Denton, Level: Graduate, Mentor: Henry Spratt, 2022, OT graduate student studying *Staphylococcus aureus* contamination of "hip kits" used in OT rehabilitation
307. Brandi Russell, Level: Graduate, Mentor: Henry Spratt, 2022, OT graduate student studying *Staphylococcus aureus* contamination of "hip kits" used in OT rehabilitation
308. Avery Young, Level: Graduate, Mentor: Jennifer Boyd, 2022, Thesis Co-Advisor: Bird use of avocado farms and intact forest in the Dominican Republic
309. Mia Rochford, Level: Graduate, Mentor: Jennifer Boyd, 2022, Dissertation Committee: Native plant species' response to anthropogenic change (University of Georgia)
310. Thomas Wiegand, Level: Graduate, Mentor: Jennifer Boyd, 2022, Thesis Advisor: Increased phenotypic plasticity linked to broader geographic range size in sunflower (*Helianthus*) species
311. Catherine McGuigan, Level: Graduate, Mentor: Joey Shaw, 2022, Individual Study: Spring Wildflower Pilgrimage Studies
312. Garrett Billings, Level: Graduate, Mentor: Joey Shaw, 2022, MS Thesis: Vascular Flora of Walls of Jericho, Alabama
313. Garrett Billings, Level: Graduate, Mentor: Joey Shaw, 2022, Individual Study: Herbarium Studies
314. Sevyin Brothers, Level: Graduate, Mentor: Joey Shaw, 2022, MS Thesis: Democratizing Plant Conservation Through the Development of C-Ranks
315. Sevyin Brothers, Level: Graduate, Mentor: Joey Shaw, 2022, Individual Study: Herbarium Studies

316. Logan Platt, Level: Graduate, Mentor: Loren Hayes, 2022, Social structure of Octodon degus
317. Jess Morales Valenzuela, Level: Graduate, Mentor: Loren Hayes, 2022, Social organization of Octodon degus
318. Elizabeth Pope, Level: Graduate, Mentor: Loren Hayes, 2022, Life history of mammals
319. Charlotte Anais Olivier, Level: Graduate, Mentor: Loren Hayes, 2022, Univ of Strasbourg - social mammals
320. Ilvanna Salas, Level: Graduate, Mentor: Loren Hayes, 2022, Universidad Mayor, Chile: evolution of sociality
321. Sara Churchwell, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
322. Hasan Sabbir, Level: Graduate, Mentor: Thomas Wilson, 2022, Capstone (Co-Supervisor)
323. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
324. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2022, Independent Study-Red Wolves Species Survival Plan
325. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2022, Museum Curation
326. Erin Gaylord, Level: Graduate, Mentor: Thomas Wilson, 2022, Independent Study-Geospatial
327. Erin Gaylord, Level: Graduate, Mentor: Thomas Wilson, 2022, Thesis (Chair)
328. Jeremiah Rhodes, Level: Graduate, Mentor: Thomas Wilson, 2022, Research
329. Nicole Cobb, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
330. Nicole Cobb, Level: Graduate, Mentor: Thomas Wilson, 2022, Research
331. Jeremiah Rhodes, Level: Graduate, Mentor: Thomas Wilson, 2022, Research
332. Crystal Allen, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
333. Crystal Allen, Level: Graduate, Mentor: Thomas Wilson, 2022, Independent Study
334. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2022, Research
335. Jeremiah Rhodes, Level: Graduate, Mentor: Thomas Wilson, 2022, Research
336. Rachel Rose, Level: Graduate, Mentor: Thomas Wilson, 2022, Research Geospatial
337. Mike Montgomery, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
338. Avriel Null, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
339. Erin Gaylord, Level: Graduate, Mentor: Thomas Wilson, 2022, Museum Curation
340. Nicole Cobb, Level: Graduate, Mentor: Thomas Wilson, 2022, Museum Curation
341. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2022, Museum Curation
342. Mike Montgomery, Level: Graduate, Mentor: Thomas Wilson, 2022, Museum Curation
343. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2022, Museum Curation
344. Jeremiah Rhodes, Level: Graduate, Mentor: Thomas Wilson, 2022, Museum Curation
345. Nelson Goodman, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
346. Meredith Woodward, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
347. Daisy McMillion, Level: Graduate, Mentor: Thomas Wilson, 2022, Research (Co-Supervisor)
348. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2022, Thesis (Chair)
349. E. Palaniyappan, Level: Graduate, Mentor: Thomas Wilson, 2022, Research-TDOT
350. Carrissa Turner, Level: Graduate, Mentor: Thomas Wilson, 2022, Thesis (Committee Member)
351. Mike Montgomery, Level: Graduate, Mentor: Thomas Wilson, 2022, Internship Supervisor- GA Aquarium
352. Hasan Sabbir, Level: Graduate, Mentor: Thomas Wilson, 2022, Capstone (Co-Supervisor)

353. Carissa Turner, Level: Graduate, Mentor: Tim Gaudin, 2022, Determining habitat preferences of *Dasypus novemcinctus* and assessing prevalence of Hansen's disease in Tennessee with assistance from community science data
354. Victoria Sinnott, Level: Graduate, Mentor: Thomas Wilson, 2022, Capstone (Co-Supervisor)
355. Erin Gaylord, Level: Graduate, Mentor: Thomas Wilson, 2022, Research
356. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2022, Research
357. Daisy McMillion, Level: Graduate, Mentor: Thomas Wilson, 2022, Research Co-Supervisor
358. Nelson Goodman, Level: Graduate, Mentor: Thomas Wilson, 2022, Internship Supervisor
359. Hannah Fallon, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
360. Brianna Millican, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
361. Matt Helton, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
362. Kalee Hotchkiss, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
363. Kalee Hotchkiss, Level: Graduate, Mentor: Thomas Wilson, 2022, Independent Study Research- Alaska Department of Environment
364. Mona LatilQuinn, Level: Graduate, Mentor: Thomas Wilson, 2022, Non-Thesis (Chair)
365. Michelle Sidwell, Level: Graduate, Mentor: Ashley Manning-Berg, 2023, Evaluation of wetland construction as a remediation method for acid rock drainage in Signal Mountain, TN
366. Cole White, Level: Graduate, Mentor: Ashley Manning-Berg, 2023, Enhancing the identification and quantification of microplastics in local streams in Chattanooga, TN
367. Connor Firat, Level: Graduate, Mentor: Azad Hossain, 2023, GERS Laboratory Research
368. Connor Firat, Level: Graduate, Mentor: Azad Hossain, 2023, Thesis (Major Advisor)
369. Jacob Hart, Level: Graduate, Mentor: Azad Hossain, 2023, Non-Thesis (Major Advisor)
370. Jacob Hart, Level: Graduate, Mentor: Azad Hossain, 2023, Independent Study
371. Jacob Hart, Level: Graduate, Mentor: Azad Hossain, 2023, GERS Laboratory Research
372. Mona L. Quinn, Level: Graduate, Mentor: Azad Hossain, 2023, Non-Thesis (Major Advisor)
373. Mona L. Quinn, Level: Graduate, Mentor: Azad Hossain, 2023, Independent Study
374. Mona L. Quinn, Level: Graduate, Mentor: Azad Hossain, 2023, Internship
375. William Stuart, Level: Graduate, Mentor: Azad Hossain, 2023, Thesis (Major Advisor)
376. Logan Platt, Level: Graduate, Mentor: Azad Hossain, 2023, Thesis (Committee Member)
377. Garrett Billings, Level: Graduate, Mentor: Azad Hossain, 2023, Thesis (Committee Member)
378. Christy Davidson, Level: Graduate, Mentor: Azad Hossain, 2023, Thesis (Committee Member)
379. Jessica Morales Valenzuela, Level: Graduate, Mentor: Azad Hossain, 2023, Thesis (Committee Member)
380. Daisy McMillion, Level: graduate, Mentor: Bradley Reynolds, 2023, Internship Supervisor
381. Caleb Gruber, Level: Graduate, Mentor: David Aborn, 2023, Thesis advisor: Influence of weather on Tree Swallow breeding
382. Rachel Rose, Level: Graduate, Mentor: David Aborn, 2023, Internship advisor: Water Quality Intern with TDEC
383. Chloe Smotherman, Level: Graduate, Mentor: David Aborn, 2023, Thesis advisor: Museum curation of the bird collection
384. Caitlin Jarvis, Level: Graduate, Mentor: DeAnna Beasley, 2023, The Effects of Urbanization on Disease Prevalence in Managed Honey Bee Hives in Hamilton County, TN
385. Daniel See, Level: Graduate, Mentor: Henry Spratt, 2023, Assessment of PT and OT carriage rates for *Staphylococci* in their nares based on years in service

386. Hannah Nelms, Level: Graduate, Mentor: Hill Craddock, 2023, M.S. Thesis: Propagation of wild-collected *Prunus americana* Marsh. by rooted cuttings for germplasm conservation in the Southern Appalachians
387. Mia Rochford, Level: Graduate, Mentor: Jennifer Boyd, 2023, Dissertation Committee: Native plant species' response to anthropogenic change (University of Georgia)
388. Thomas Wiegand, Level: Graduate, Mentor: Jennifer Boyd, 2023, Thesis Advisor: Increased phenotypic plasticity linked to broader geographic range size in sunflower (*Helianthus*) species
389. Andy Wall, Level: Graduate, Mentor: Joey Shaw, 2023, MS Thesis: Vascular Flora of Cloudland Canyon
390. Garrett Billings, Level: Graduate, Mentor: Joey Shaw, 2023, MS Thesis: Vascular Flora of Walls of Jericho, Alabama
391. Julia Prins, Level: Graduate, Mentor: Joey Shaw, 2023, MS Thesis: Evaluating and Modeling S-ranks for Tennessee Vascular Plants
392. Meredith Woodward, Level: Graduate, Mentor: Joey Shaw, 2023, MS Thesis: Tennessee's Herbaria and Digitization Progress and Workflows
393. Meredith Woodward, Level: Graduate, Mentor: Joey Shaw, 2023, Individual Study: Herbarium Studies and Digitization
394. Meredith Woodward, Level: Graduate, Mentor: Joey Shaw, 2023, Individual Study: Herbarium Studies
395. Quinn Towery, Level: Graduate, Mentor: Joey Shaw, 2023, MS Thesis: Vascular Flora of Bark Camp Barrens in Coffee County
396. Quinn Towery, Level: Graduate, Mentor: Joey Shaw, 2023, Individual Study: Plant taxonomy Teaching Assistant
397. Sewyn Brothers, Level: Graduate, Mentor: Joey Shaw, 2023, MS Thesis: Democratizing Plant Conservation Through the Development of C-Ranks
398. Sewyn Brothers, Level: Graduate, Mentor: Joey Shaw, 2023, Individual Study: Plant taxonomy Teaching Assistant
399. Shelby Campbell, Level: Graduate, Mentor: John Tucker, 2023, Thesis Chair, MS ESC, Analysis of Econlockhatchee River Riparian Habitat Protection Program
400. Ashley Ellis, Level: Graduate, Mentor: John Tucker, 2023, MPH, research mentor and graduate assistantship supervisor, TDEC Lead in drinkingwater in childcare centers
401. Denyelle Kilgour, Level: Graduate, Mentor: Loren Hayes, 2023, NSF IRES - Tufts University
402. Connor Firat, Level: Graduate, Mentor: Loren Hayes, 2023, NSF IRES - UTC
403. Kyle Finn, Level: Graduate, Mentor: Loren Hayes, 2023, NSF IRES - Univ of Pretoria
404. Sarah Heissenberger, Level: Graduate, Mentor: Loren Hayes, 2023, NSF IRES - University of Arkansas
405. Meredith Woodward, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
406. Nelson Goodman, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
407. Hannah Fallon, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
408. Hannah Fallon, Level: Graduate, Mentor: Thomas Wilson, 2023, Internship Supervisor
TVA
409. Avriel Null, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
410. Erin Gaylord, Level: Graduate, Mentor: Thomas Wilson, 2023, Thesis (Chair)
411. Erin Gaylord, Level: Graduate, Mentor: Thomas Wilson, 2023, Research
412. Jeremiah Rhodes, Level: Graduate, Mentor: Thomas Wilson, 2023, Research
413. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2023, Research
414. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2023, Research
415. Nicole Cobb, Level: Graduate, Mentor: Thomas Wilson, 2023, Research

416. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2023, Independent Study
417. Meagan Bertoli, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
418. Brianna Millican, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
419. Brianna Millican, Level: Graduate, Mentor: Thomas Wilson, 2023, Independent Study
420. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2023, Independent Study
421. Shelby Campbell, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
422. Lizzy McAllister, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
423. Sally Tyrell, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
424. Angelique Petersen, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
425. Sydney Fuhrig, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
426. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2023, Research
427. Sara Churchwell, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
428. Crystal Allen, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
429. Crystal Allen, Level: Graduate, Mentor: Thomas Wilson, 2023, Internship Supervisor
430. Matt Helton, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
431. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2023, Thesis (Chair)
432. Jeremiah Rhodes, Level: Graduate, Mentor: Thomas Wilson, 2023, Research
433. Daisy McMillion, Level: Graduate, Mentor: Thomas Wilson, 2023, Research Co-Supervisor
434. Julia Jones, Level: Graduate, Mentor: Tim Gaudin, 2023, Cranial osteology of extinct Hispaniolan sloth *Parocnus serus*, and phylogeny of West Indian megalonychid sloths
435. Chloe Smotherman, Level: Graduate, Mentor: Tim Gaudin, 2023, Moving digital museum records of UTC Natural History Museum bird and mammal collections into standard Darwin Core format, and onto online Symbiota data sharing site
436. Avriel Null, Level: Graduate, Mentor: Thomas Wilson, 2023, Internship Supervisor TVA
437. Shelby Campbell, Level: Graduate, Mentor: Thomas Wilson, 2023, Internship Supervisor TVA
438. Brianna Millican, Level: Graduate, Mentor: Thomas Wilson, 2023, Research
439. Nelson Goodman, Level: Graduate, Mentor: Thomas Wilson, 2023, Internship Supervisor TDEC
440. Hannah Fallon, Level: Graduate, Mentor: Thomas Wilson, 2023, Amphibian Ecology and Conservation Project
441. Nelson Goodman, Level: Graduate, Mentor: Thomas Wilson, 2023, Amphibian Ecology and Conservation Project
442. Crystal Allen, Level: Graduate, Mentor: Thomas Wilson, 2023, Amphibian Ecology and Conservation Project
443. Nicole Cobb, Level: Graduate, Mentor: Thomas Wilson, 2023, Amphibian Ecology and Conservation Project
444. Brianna Millican, Level: Graduate, Mentor: Thomas Wilson, 2023, Amphibian Ecology and Conservation Project
445. Avriel Null, Level: Graduate, Mentor: Thomas Wilson, 2023, Amphibian Ecology and Conservation Project
446. Rachel Rose, Level: Graduate, Mentor: Thomas Wilson, 2023, Amphibian Ecology and Conservation Project
447. Hunter Smith, Level: Graduate, Mentor: Thomas Wilson, 2023, Amphibian Ecology and Conservation Project
448. Hasan Sabbir, Level: Graduate, Mentor: Thomas Wilson, 2023, Capstone (Co-Supervisor)
449. Erin Gaylord, Level: Graduate, Mentor: Thomas Wilson, 2023, The Wildlife Society Conclave Competition Team

- 450. Daisy McMillion, Level: Graduate, Mentor: Thomas Wilson, 2023, The Wildlife Society Conclave Competition Team
- 451. Mona LatilQuinn, Level: Graduate, Mentor: Thomas Wilson, 2023, Non-Thesis (Chair)
- 452. Elijah Reyes, Level: Graduate, Mentor: Hope Klug, 2018-2019, Social learning and conservation in the Barrens topminnow
- 453. Zach McCoy, Level: Graduate, Mentor: Hope Klug, 2018-2019, Using big data to address questions in evolutionary ecology
- 454. Adrianna Hodges, Level: Graduate, Mentor: Francesca Leasi, 2019-2020, Individual Studies: Freshwater communities in Hamilton County along ecological gradients
- 455. Miguel Turjjilo Garcia, Level: Graduate, Mentor: Hope Klug, 2022-present, PhD underway at Centro Interdisciplinario de Ciencias Marinas, Mexico; Co-Supervisor with Dr. Patty Ceballos; Research focuses on reproductive condition and filial cannibalism in a goby species.

Appendix 4-M Graduate Student Presentations

1. Jared Odell, Graduate, Mentor: Jennifer Boyd, 2018, Wiegand T, Gentry B, McCoy Z, Odell J, Odell H, Bonsall M, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity. Poster. SoCon Undergraduate Research Forum (SURF). Wofford College, Spartanburg, SC. November 2018.
2. Zachary McCoy, Graduate, Mentor: Jennifer Boyd, 2018, Wiegand T, Gentry B, McCoy Z, Odell J, Odell H, Bonsall M, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity. Poster. SoCon Undergraduate Research Forum (SURF). Wofford College, Spartanburg, SC. November 2018.
3. Savanna Wooten, Graduate, Mentor: Jennifer Boyd, 2018, Wooten S, Boyd JN. Ex situ conservation of the rare white fringeless orchid. Poster. Student Conference on Conservation Science. American Museum of Natural History, New York, NY. October 2018. Wiegand T**, Gentry B**, McCoy Z*, Odell J*, Odell H**, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis. Poster. Ecological Society of America. New Orleans, LA. August 2018.
4. Caryn Ross, Graduate, Mentor: David Aborn, 2018, Ross, C. and Aborn, D., The effects of urban extent on avian diversity: a citizen science and GIS study, Oral, Joint meeting of the Association of Field Ornithologists and Wilson Ornithological Society
5. Mary Feely, Graduate, Mentor: David Aborn, 2018, Feely, M and Aborn, D., Passerine occurrence and seed dispersal post-wildfire within the Flipper Bend Woods of Signal Mountain, Tennessee, Poster, Joint meeting of the Association of Field Ornithologists and Wilson Ornithological Society
6. Holland Youngman, Graduate, Mentor: David Aborn, 2018, Youngman, H. Huffines, R. and Aborn, D. Post-fledging habitat use and movements of Worm-eating Warblers (*Helmitheros vermivorum*) in the Tennessee River Gorge, Poster, Joint meeting of the Association of Field Ornithologists and Wilson Ornithological Society
7. Caryn Ross, Graduate, Mentor: DeAnna Beasley, 2018, Ross, C, Menninger, H.L., Hartstone-Rose, A. and Beasley, D.E. (2018). Annual cicada species response to a total solar eclipse. Association of Southeastern Biologists regional conference, Myrtle Beach, SC.
8. Richard Blanton, Graduate, Mentor: Azad Hossain, 2018, Richard B., and Hossain, A., 2018, Mapping the Recovery Process of Vegetation Growth in Copper Basin, Tennessee Using Remotely Sensing Technology, 3rd Annual UTC Research Dialogue, April 3-4, 2017. The University of Tennessee at Chattanooga.
9. Paul-Erik Bakland, Graduate, Mentor: Thomas Wilson, 2018, Bakland*, P.E., Wilson, T.P., Carver, E., Barbosa, J., and B. Reynolds. 2018. Preliminary Results of a Study in Progress Examining the Prevalence of *Batrachochytrium dendrobatidis* (Bd) at Wetlands and Retention Ponds in East Tennessee. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 22, 2018.
10. Kelly Daniels, Graduate, Mentor: Thomas Wilson, 2018, Daniels*, K., Carroll, A., Reynolds, B., and T.P. Wilson. 2018. Comparing Unmanned Aerial Vehicles (UAVs) to Traditional Field Methods in Surveying of Basking Riverine Turtles. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 22, 2018.
11. Tegan Hendricks, Graduate, Mentor: Thomas Wilson, 2018, Hendricks*, T., Team Salamander* and T.P. Wilson. 2018. Comparative Application of Minimally Invasive Identification Methods in *Plethodon dorsalis* and Microhabitat Analysis. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 22, 2018.
12. Nyssa Hunt, Graduate, Mentor: Thomas Wilson, 2018, Hunt*, N., Carroll, A., and T.P. Wilson. 2018. Development and Assessment of Spatial Predictive Models for a Rare Tennessee Anuran: Barking Treefrog (*Hyla gratiosa*). Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 22, 2018.

13. Jared Odell, Graduate, Mentor: Jennifer Boyd, 2019, Boyd JN, Odell J, Rogers W, Anderson JT, Baskauf CJ, Brzyski J, Cruse-Sanders J. Reasons for rarity? Exploring adaptive and acclimatory constraints of southeastern endemics in the face of contemporary environmental change. Talk. Organized Oral Session on History, Current Status, and Future of Biodiversity in the Southeast, a Center of Biodiversity in the United States. Ecological Society of America. Louisville, KY. August 2019.
14. Jared Odell, Graduate, Mentor: Jennifer Boyd, 2019, Cruse-Sanders J. Boyd J, Bonsall M, Anderson JT, Rochford M, Odell J, Rogers W. The role of botanical gardens and partnership in conserving biodiversity in the southeastern U.S. Talk. Organized Oral Session on History, Current Status, and Future of Biodiversity in the Southeast, a Center of Biodiversity in the United States. Ecological Society of America. Louisville, KY. August 2019.
15. Mia Rochford, Graduate, Mentor: Jennifer Boyd, 2019, Cruse-Sanders J. Boyd J, Bonsall M, Anderson JT, Rochford M, Odell J, Rogers W. The role of botanical gardens and partnership in conserving biodiversity in the southeastern U.S. Talk. Organized Oral Session on History, Current Status, and Future of Biodiversity in the Southeast, a Center of Biodiversity in the United States. Ecological Society of America. Louisville, KY. August 2019.
16. Jared Odell, Graduate, Mentor: Jennifer Boyd, 2019, Wiegand T, Gentry B, McCoy Z, Odell J, Odell H, Bonsall M, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity. Poster. World Congress on Undergraduate Research (WorldCUR). Carl Von Ossietzky Universität, Oldenburg, Germany. May 2019.
17. Zachary McCoy, Graduate, Mentor: Jennifer Boyd, 2019, Wiegand T, Gentry B, McCoy Z, Odell J, Odell H, Bonsall M, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity. Poster. World Congress on Undergraduate Research (WorldCUR). Carl Von Ossietzky Universität, Oldenburg, Germany. May 2019.
18. Jared Odell, Graduate, Mentor: Jennifer Boyd, 2019, Wiegand T, Gentry B, McCoy Z, Odell J, Odell H, Bonsall M, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity. Poster. National Conference on Undergraduate Research (NCUR). Kennesaw State University, Kennesaw, GA. April 2019.
19. Zachary McCoy, Graduate, Mentor: Jennifer Boyd, 2019, Wiegand T, Gentry B, McCoy Z, Odell J, Odell H, Bonsall M, Klug H, Boyd JN. Visualizing connectivity of ecological and evolutionary concepts with network analysis: an exploration of research on species rarity. Poster. National Conference on Undergraduate Research (NCUR). Kennesaw State University, Kennesaw, GA. April 2019.
20. Richard Blanton, Graduate, Mentor: Azad Hossain, 2019, Blanton, R., and Hossain, A., 2019, Quantitative Estimation of Sediments in Surface Water of the Tennessee River, ASPRS Annual Conference 2019, Denver, CO, January 28-31, 2019.
21. Richard Blanton, Graduate, Mentor: Azad Hossain, 2019, Hossain, A., Blanton, R., and Adair, W., 2019, Application of Remote Sensing Technology for Surface Water Quality Studies in Southeast Tennessee, 4th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga.
22. Jonah Hall, Graduate, Mentor: Azad Hossain, 2019, Hall, J. and Hossain, A., 2019, Application of Remote Sensing and GIS to Study the Impact of Urbanization on Surface Water Quality in Hamilton County, TN, April 9-10, 2019. 4th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga.
23. Richard Blanton, Graduate, Mentor: Azad Hossain, 2019, Hossain, A., Blanton, R., and Mathias, C., 2019, Quantitative Remote Sensing of Surface Water Quality in Southeast Tennessee. AGU Fall Meeting, 9-13 December 2019, San Francisco, CA.

24. Richard Blanton, Graduate, Mentor: Azad Hossain, 2019, Hossain, A., 2019, Watershed Level Urban Growth Estimation in Tennessee Using National Land Cover Database, 2019 annual meeting of GSA Southeastern Section. 28–29 March, Charleston, South Carolina.
25. Richard Blanton, Graduate, Mentor: Azad Hossain, 2019, Hossain, A., and Blanton, R., 2019, Quantitative Estimation of Surface Water Quality Parameters Using Remote Sensing Technology in Southeast Tennessee. Chattanooga Development Symposium, August 6, 2019.
26. Richard Blanton, Graduate, Mentor: Azad Hossain, 2019, Hossain, A., Blanton, R., and Mathias, C., 2019, Surface Water Quality Monitoring Using Remote Sensing Technology in Chattanooga. SWPBA 46th Annual Meeting in Chattanooga, TN October 14th to 17th, 2019.
27. Richard Blanton, Graduate, Mentor: Azad Hossain, 2019, Hossain, A., Blanton, R., and Mathias, C., 2019, Estimating Surface Water Quality Using Remote Sensing Technology, Research Symposium at Chattanooga State Community College, November 15, 2019.
28. Richard Blanton, Graduate, Mentor: Azad Hossain, 2019, Hossain, A., Blanton, R., and Mathias, C., 2019, 2020, Quantitative Remote Sensing of Surface Water Quality in Southeast Tennessee Utilizing Planet Dove Imagery, 69th Annual Southeastern / 55th Annual Northeastern Section Meeting – 2020, 20-22 March 2020, Reston, Virginia (Abstract accepted). Conference cancelled due to COVID-19.
29. Paul-Erik Bakland, Graduate, Mentor: Thomas Wilson, 2019, Bakland*, P.E., Wilson, T.P., Carver, E.A., Barbosa, J.M., and B.R. Reynolds. 2019. Prevalence Assessment of the Amphibian Chytrid Fungus *Batrachochytrium dendrobatidis* across two habitat types in East Tennessee. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 14-17, 2019, Black Mountain, NC.
30. Kelly Daniels, Graduate, Mentor: Thomas Wilson, 2019, Daniels*, K, Carroll, A., and T.P. Wilson. 2019. Comparing UAVS to Traditional Field Methods in Surveying of Freshwater Turtles. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 14-17, 2019, Black Mountain, NC.
31. Tegan Childers, Graduate, Mentor: Thomas Wilson, 2019, Childers*, T., Team Salamander, and T.P. Wilson. 2019. *Plethodon dorsalis*: Microhabitat Analysis and Individual Identification. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 14-17, 2019, Black Mountain, NC.
32. Rachel Head, Graduate, Mentor: Thomas Wilson, 2019, Head*, R, Team Salamander, and T.P. Wilson. 2019. An ongoing assessment of habitat and species richness at Sequatchie Cave at Sequatchie Cave State Natural Area in Marion County, TN National Speleological Society, 2019 Biospeleology Session, Wednesday, June 19th
33. Rachel Head, Graduate, Mentor: Thomas Wilson, 2019, Head*, R, Team Salamander, and T.P. Wilson. 2019. An ongoing assessment of habitat and species richness at Sequatchie Cave at Sequatchie Cave State Natural Area in Marion County. The Wildlife Society Annual Meeting, Reno NV, Sept. 29 – Oct. 3, 2019.
34. Jared Odell, Graduate, Mentor: Jennifer Boyd, 2020, Rogers, W, Lee D, Platero D, Gentry B, Calles S, Rochford M, Odell J, Anderson JT, Boyd JN, Cruse-Sanders J. Reasons for rarity? Using a common garden approach to investigate the response of rare *Pityopsis ruthii* (Ruth's golden aster) to potential habitat change. Talk. BOTANY. Virtual meeting. August 2020.
35. Mia Rochford, Graduate, Mentor: Jennifer Boyd, 2020, Rogers, W, Lee D, Platero D, Gentry B, Calles S, Rochford M, Odell J, Anderson JT, Boyd JN, Cruse-Sanders J. Reasons for rarity? Using a common garden approach to investigate the response of rare *Pityopsis ruthii* (Ruth's golden aster) to potential habitat change. Talk. BOTANY. Virtual meeting. August 2020.
36. Richard Blanton, Graduate, Mentor: Azad Hossain, 2020, Hossain, A., Blanton, R., and Mathias, C., 2020, Surface water quality estimation in Southeast Tennessee using Sentinel - 2 satellite imagery, 5th Annual UTC Research Dialogue, April 9-10, 2019. The University of Tennessee at Chattanooga., April 14-15, 2020. Abstract accepted. Conference cancelled due to COVID-19.

37. Tegan Childers, Graduate, Mentor: Thomas Wilson, 2020, Childers*, T. and T.P. Wilson. 2020. *Plethodon dosalis* (complex): microhabitat analysis. UTC Research Dialogues
38. Sarah Kelehear, Graduate, Mentor: Thomas Wilson, 2020, Kelehear*, S., Wilson, T.P., and N. Hunt. 2020. Using Geospatial Analysis to Model for The Cryptic Salamander (*Hemidactylium scutatum*) in Tennessee. UTC Research Dialogues
39. Tegan Childers, Graduate, Mentor: Thomas Wilson, 2020, Childers*, T., Team Salamander, and T.P. Wilson. 2020. PLETHODON DORSALIS (COMPLEX): MICROHABITAT ANALYSIS. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 27, 2020.
40. Rachel Head, Graduate, Mentor: Thomas Wilson, 2020, Head*, R.H., Team Salamander, T.P. Wilson. 2020. An investigation of microhabitat partitioning between two species of troglloxenic salamanders, *Eurycea lucifuga* and *Plethodon glutinosus*, at Sequatchie Cave. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 27, 2020.
41. Sarah Kelehear, Graduate, Mentor: Thomas Wilson, 2020, Kelehear*, S., Hunt, N., Team Salamander, and T.P. Wilson. 2020. USING GEOSPATIAL ANALYSIS TO MODEL FOR THE CRYPTIC SALAMANDER HEMIDACTYLIUM SCUTATUM IN TENNESSEE. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 27, 2020.
42. McKenzie Jaynes, Graduate, Mentor: Thomas Wilson, 2020, Jaynes*, M., Team Salamander, and T.P. Wilson. 2020. Discord and Harmony: The Regulation of Amphibians and Reptiles Across Southeastern States. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 27, 2020.
43. Jared Odell, Graduate, Mentor: Jennifer Boyd, 2021, Boyd JN, Odell J, Cruse-Sanders J, Rogers W, Anderson JT, Baskauf C, Brzyski J. Comparative plasticity and genetic diversity of rare *Pityopsis ruthii* and its common congener *P. graminifolia*. Talk. Reasons for Rarity Colloquium. Botany 2021. Virtual meeting. July 2021.
44. William Stuart, Graduate, Mentor: Azad Hossain, 2021, William, S. and Hossain, A., 2021, Seeing the carbon for the trees - using remote sensing to model forest carbon, The Geological Society of America 2021 Annual Meeting in Portland, Oregon, 10-13 October 2021, Abstract # 368262.
45. Connor Firat, Graduate, Mentor: Azad Hossain, 2021, Firat, C. and Hossain, A., 2021, Estimating Suspended Sediment Concentrations in the Tennessee River and the Surrounding Tributaries During a High Precipitation Event Using Planetscope Satellite Imagery, The Geological Society of America 2021 Annual Meeting in Portland, Oregon, 10-13 October 2021, Abstract # 371135.
46. Tegan Childers, Graduate, Mentor: Thomas Wilson, 2021, Nyssa Hunt, Tegan Childers, and Thomas Wilson. 2021. Analyzing MaxEnt Modeling to Assess the Potential Spread of Exotic and Invasive Herpetofauna within the Southeastern US. UTC Research Dialogues
47. Annie Lindsay, Graduate, Mentor: Jennifer Boyd, 2022, Baskauf C, Lindsey A, Rogers W, Boyd J, Anderson J, Brzyski J, Cruse-Sanders J. Comparison of phenotypic plasticity and genetic diversity of a rare and a widespread species of *Boechera* (Brassicaceae), *B. perstellata* and *B. laevigata*. Talk. Botany 2022. Anchorage, AK. July 2022.
48. Thomas Wiegand, Graduate, Mentor: Jennifer Boyd, 2022, Wiegand T, Corlew A, Rogers W, Cruse-Sanders J, Boyd J. Investigating associations between phenotypic plasticity and geographic distribution in *Helianthus*. Poster. Botany 2022. Anchorage, AK. July 2022.
49. Avery Young, Graduate, Mentor: Jennifer Boyd, 2022, Young A, Aborn D, Latta S, Boyd JN. Avian winter habitat selection of avocado farms and intact forest in the Baboruco region of the Dominican Republic. Poster. Ecological Society of America. Montreal, Canada. August 2022.
50. Avery Young, Graduate, Mentor: David Aborn, 2022, Young A, Aborn D, Latta S, Boyd JN. Avian winter habitat selection of avocado farms and intact forest in the Baboruco region of the Dominican Republic. Poster. Ecological Society of America.
51. William Hanson-Regan, Graduate, Mentor: Fernando Alda, 2022, Hanson-Regan W§, Mendoza-Franco EF, Reina RG, Bermingham E, Torchin M, Alda F. Coevolution or geography: What

- drives parasite diversification? Poster Communication. UTC ReSEARCH Dialogues. University of Tennessee at Chattanooga, Chattanooga TN, USA. April 12th-14th2022.
52. William Hanson-Regan, Graduate, Mentor: Fernando Alda, 2022, Bagley JC, Bonner RE, Braswell C, Elías DJ, Glick MJ, Hanson-Regan W§, Morrow K, O'Malley K¶, Parker CE, Smith M¶, Alda F. Poster Communication. Joint Meeting of Ichthyologists and Herpetologists, Spokane WA, USA. July 27th-30th2022.
 53. Cole White, Graduate, Mentor: Stephanie DeVries, 2022, †White, C. and DeVries, S. Can we see smaller? Quantifying <100-micron microplastics with photomicrographs. GSA Connects 2022, Denver, CO, October 11, 2022.
 54. Caitlin Jarvis, Graduate, Mentor: DeAnna Beasley, 2022, Jarvis, C. and Beasley, D.E. (2022). Urbanization effects on *Apis mellifera* colonies. Entomological Society of America, Vancouver, British Columbia, Canada.
 55. Caitlin Jarvis, Graduate, Mentor: DeAnna Beasley, 2022, Jarvis, C. and Beasley, D.E. (2022). Urbanization effects on *Apis mellifera* colonies and beekeeper practices. UTC Research Dialogues.
 56. Robert Charles Dixon, Graduate, Mentor: Sean Richards, 2022, Assessing the Effects of the Pharmaceutical Contaminant Atorvastatin on the Growth and. Metabolome of the Red Swamp Crayfish, *Procambarus clarkia*. Abstracts of the 2022 Society of Environmental Toxicologists and Chemists. November 13-17, 2022. Pittsburgh, PA.
 57. Sean Jones, Graduate, Mentor: Azad Hossain, 2022, Jones, S., and Hossain, A., 2022, Potential Impact of Ground Water Depletion on Vegetation in the Mississippi Delta Using GRACE and MODIS NDVI Data, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
 58. William Stuart, Graduate, Mentor: Azad Hossain, 2022, Stuart, W., and Hossain, A., 2022, Spatio-Temporal Analysis of Chattanooga, TN's urban forest from 1984 – 2021 Using Remote Sensing, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
 59. Connor Firat, Graduate, Mentor: Azad Hossain, 2022, Firat, C., and Hossain, A., 2022, Investigating the Potential of PlanetScope Imagery to Study Suspended Sediment Concentration in the Tennessee River, ASPRS 2022 Annual Conference, Virtual, March 21-25, 2022.
 60. Connor Firat, Graduate, Mentor: Azad Hossain, 2022, Firat, C., and Hossain, A., 2022, Modeling the Impact of Land Use and Land Cover Change on the Water Quality of the South Chickamauga Creek of Chattanooga, Tennessee, UTC Research Dialogues 2022, April 12-13, 2022
 61. Sean Jones, Graduate, Mentor: Azad Hossain, 2022, Jones, S., and Hossain, A., 2022, Studying the Potential Impact of Groundwater Depletion on Surface Vegetation in the Mississippi Delta Using Remote Sensing, UTC Research Dialogues 2022, April 12-13, 2022.
 62. William Stuart, Graduate, Mentor: Azad Hossain, 2022, Stuart, W., and Hossain, A., 2022, Mapping the Changes in Urban Forest of Chattanooga, TN from 1984 – 2021, UTC Research Dialogues 2022, April 12-13, 2022.
 63. Hasan Sabbir, Graduate, Mentor: Thomas Wilson, 2022, Md Kamrul Hasan Sabbir, Ignatius Fomunung, Casey Langford, Thomas Wilson, Jejal Reddy Bathi, Patrick Garner, Yu Liang, and Mbaki Onyango. 2022. Quantification and Integration of Social Benefits of Green Infrastructure in Screening Transportation Project Alternatives, The Transportation Research Board (TRB) 102nd Annual Meeting, Washington, D.C , USA (2022)
 64. Hasan Sabbir, Graduate, Mentor: Thomas Wilson, 2022, Jejal Reddy Bathi, Carmen Harvey, Ignatius Fomunung, Mbakisya Onyango, M.K.H. Sabbir, Yu Liang, and Thomas Wilson. 2022. Database of Green Infrastructure in Transportation Projects Planning: Current Guidance and Standards by Transportation Agencies, The Transportation Research Board (TRB) 102nd Annual Meeting, Washington, D.C , USA (2022)
 65. Nicole Cobb, Graduate, Mentor: Thomas Wilson, 2022, Cobb*, N.R., Hunt, N.R. Team Salamander*, and T.P. Wilson. 2022. Green Salamander (*Aneides aeneus*) Abundance and Proximity to Hiking Trails in the Greater Chattanooga Area. Annual Meeting-
 66. Association of Southeastern Biologists, Little Rock AR.

67. Erin Gaylord, Graduate, Mentor: Thomas Wilson, 2022, Gaylord*, E. M., Hunt, N.R., Team Salamander*, and T. P. Wilson. 2022. Developing a Predictive Geospatial Habitat Model for Green Salamanders (*Aneides aeneus*) in East Tennessee. Annual Meeting- Association of Southeastern Biologists, Little Rock AR.
68. E. Palaniyappan, Graduate, Mentor: Thomas Wilson, 2022, Palaniyappan, E., Liang, YU, Bathi, J.B., Wilson, T.P., Owino, J. and I. Fomunung. 2022. Deep Learning-enabled Assessment of Environment, Social and Economic Benefits of Green Infrastructures. No. 7166. TRISTAN 2022 (The 11th Triennial Symposium on Transportation Analysis conference).
69. Carissa Turner, Graduate, Mentor: Thomas Wilson, 2022, Turner*, C.M., Wilson, T.P., Loughry, W.J., and T. J. Gaudin. 2022. Distribution and disease surveys of nine-banded armadillos in Tennessee using roadkill and community science data. Annual Meeting of The Wildlife Society, Tennessee Chapter, 54th Annual Conference, Thursday, 3 March, 2022.
70. Carissa Turner, Graduate, Mentor: Thomas Wilson, 2022, Turner*, C.M., Wilson, T.P., Loughry, W.J., and T. J. Gaudin. 2022. Determining Habitat Preference of Nine-Banded Armadillo in Tennessee with Assistance from Community Science Data. Annual Meeting Southeastern Bat Diversity Network, March 9-10, 2022.
71. Erin Gaylord, Graduate, Mentor: Thomas Wilson, 2022, Erin Gaylord, Nyssa Hunt and Thomas Wilson. 2022. Developing a Predictive Geospatial Habitat Model for Green Salamanders (*Aneides aeneus*) in Tennessee. UTC Research Dialogues
72. Nicole Cobb, Graduate, Mentor: Thomas Wilson, 2022, Nicole Cobb, Nyssa Hunt and Thomas Wilson. 2022. Green Salamander (*Aneides aeneus*) Relative Abundance and Proximity to Hiking Trails in the Greater Chattanooga Metropolitan Area. UTC Research Dialogues.
73. Jeremiah Rhodes, Graduate, Mentor: Thomas Wilson, 2022, Jeremiah Rhodes, Nyssa Hunt, Team Salamander and Thomas Wilson. 2022. Comparing Anuran Diversity and Abundance in Natural and Artificial Wetlands in Tennessee. UTC Research Dialogues.
74. Hunter Smith, Graduate, Mentor: Thomas Wilson, 2022, Hunter Smith and Thomas Wilson. 2022. A Literature Assessment of Using Wildlife Detector Dogs in Turtle Conservation. UTC Research Dialogues
75. Annie Lindsay, Graduate, Mentor: Jennifer Boyd, 2023, Boyd JN, Baskauf C, Lindsay A, Anderson JT, Brzyski J, Cruse-Sanders J. Comparative phenotypic plasticity and genetic diversity of rare *Boechera perstellata* and widespread *B. laevigata*. Talk. Ecological Society of America. Portland, OR. August 2023.
76. Jacob Hart, Graduate, Mentor: Azad Hossain, 2023, Hart, J., and Hossain, A., 2023, Investigating Multiple Turbidity Indices on Parksville Reservoir in Southeastern Tennessee, ASPRS 2023 International Technical Symposium, June 12-16, 2023, Virtual.
77. Mona Latil-Quinn, Graduate, Mentor: Azad Hossain, 2023, Latil-Quinn, M., Eviner, V., and Hossain, A., Remote Sensing of Invasive Barbed Goatgrass in Oak Woodland Savannas Using PlanetScope Imagery, ASPRS 2023 International Technical Symposium, June 12-16, 2023, Virtual.
78. Shleby Campbell, Graduate, Mentor: Azad Hossain, 2023, Hossain, A. and Campbell, S., 2023, Investigating the Changes in Vegetation Coverage in Mega Cities in the World Using Google Earth Engine, ASPRS Mid-South Conference 2023, April 21, 2023, Oak Ridge National Laboratory, Knoxville, TN.
79. Connor Firat, Graduate, Mentor: Azad Hossain, 2023, Firat, C. and Hossain, A., 2023, Analyzing Historical Turbidity in the Tennessee River Using Google Earth Engine, ASPRS Mid-South Conference 2023, April 21, 2023, Oak Ridge National Laboratory, Knoxville, TN.
80. Shleby Campbell, Graduate, Mentor: Azad Hossain, 2023, Hossain, A. and Campbell, S., 2023, Investigating Urban Heat Island Effect of Small Cities in the United States Using Remote Sensing, 2023 ASPRS Annual Conference at Geo Week February 13 – 15, Denver, Colorado, Abstract # 215052.

81. Connor Firat, Graduate, Mentor: Azad Hossain, 2023, Firat, C., Hossain, A. and Chao, X., 2023, Integrating Remote Sensing with Hydrodynamic Models to Investigate Sediment Transport in the Tennessee River Basin, 2023 ASPRS Annual Conference at Geo Week February 13 – 15, Denver, Colorado, Abstract # 214052.
82. Nicole Cobb, Graduate, Mentor: Thomas Wilson, 2023, Cobb*, N.R., Hunt, N.R., and T.P. Wilson. 2023. Concerns about Recreational Impact on Green Salamanders in the Tennessee River Gorge. Southeastern Partners in Amphibian and Reptile Conservation Annual Meeting, Poster, February 22-26, 2023, North Carolina.
83. Nicole Cobb, Graduate, Mentor: Thomas Wilson, 2023, Michelle D. White, Nicole Cobb, Miranda Lighter, Autumn Love, and Thomas Wilson. 2023. Recommending Manual Frog Call Surveys to Monitor Weather Climate Phenomena at UTC: A Student-Centered Approach. UTC Research and Arts Conference
84. Crystal Allen, Graduate, Mentor: Thomas Wilson, 2023, Crystal Allen, Austin Stitner, Katie Hemauer, Morgan Griffin, and Thomas Wilson. 2023. Prevalent Amphibian Diseases of the Southeastern United States & How Humans Can Minimize Their Transmission. UTC Research and Arts Conference
85. Nelson Goodman, Graduate, Mentor: Thomas Wilson, 2023, Imani Gardner, Nelson Goodman, Hunter Smith, Dominick Hazeltine, and Thomas Wilson. 2023. Atrazine! Why So Mean? Atrazine as a Stressor to Frog Reproduction and Life History. UTC Research and Arts Conference
86. Hunter Smith, Graduate, Mentor: Thomas Wilson, 2023, Imani Gardner, Nelson Goodman, Hunter Smith, Dominick Hazeltine, and Thomas Wilson. 2023. Atrazine! Why So Mean? Atrazine as a Stressor to Frog Reproduction and Life History. UTC Research and Arts Conference
87. Brianna Millican, Graduate, Mentor: Thomas Wilson, 2023, Seth Little, Brianna Millican, Emma Madewell, and Thomas Wilson. 2023. Amphibian Pet Trade Affecting Appalachian Mountain Biodiversity: A Public Service Announcement. UTC Research and Arts Conference
88. Avriel Null, Graduate, Mentor: Thomas Wilson, 2023, Avriel Null, Carter Cook, Nicholas Myers, and Thomas Wilson. 2023. Effects Of Introduced Predatory Fish Species On Amphibian Populations: A Literature Review. UTC Research and Arts Conference
89. Rachel Rose, Graduate, Mentor: Thomas Wilson, 2023, Rachel Rose, Hannah Fallon, James Anderson, Micheal Fava, Juliana Mynatt, and Thomas Wilson. 2023. Gaps in Current Wetland Mitigation Policies for Southern Appalachian Amphibians. UTC Research and Arts Conference
90. Hannah Fallon, Graduate, Mentor: Thomas Wilson, 2023, Rachel Rose, Hannah Fallon, James Anderson, Micheal Fava, Juliana Mynatt, and Thomas Wilson. 2023. Gaps in Current Wetland Mitigation Policies for Southern Appalachian Amphibians. UTC Research and Arts Conference
91. Erin Gaylord, Graduate, Mentor: Thomas Wilson, 2023, Erin Gaylord, Nyssa Hunt and Thomas Wilson. 2023. Developing a Predictive Geospatial Habitat Model for Green Salamanders (*Aneides aeneus*) in Tennessee. ERSI User Conference.

Appendix 4-N Graduate Student Publications

1. Leslie Russo, Graduate, Mentor: Jennifer Boyd, 2018, Russo L., Boyd J.N. 2018. Comparative development and growth of *Aedes albopictus* in response to native *Quercus rubra* and invasive *Lonicera maackii* leaf litter. *Ecological Entomology* 43: 850–853. DOI: 10.111/ee.12657
2. Nyssa Hunt, Graduate, Mentor: Thomas Wilson, 2018, Hunt, N., Carroll, A., and T.P. Wilson. 2018. Spatiotemporal Analysis and Predictive Modeling of Rabies in Tennessee. *Journal of Geographic Information System*: 10:89-110. <https://doi.org/10.4236/jgis.2018.101004>
3. Brad Reynolds, Graduate, Mentor: Thomas Wilson, 2018, Reynolds, B.R., and T.P. Wilson. 2018. Factors Leading to the Selection of an Undergraduate Environmental Science Major at the University of Tennessee at Chattanooga. *Journal of Tennessee Academy of Science* 93(3-4): 76-80.
4. Brad Reynolds, Graduate, Mentor: Thomas Wilson, 2018, Reynolds, B.R., Team Salamander, and T.P. Wilson. 2018. A Walk in the Woods: Changing Student Attitudes towards Amphibians and Reptiles. *Creative Education*: 9:182-191. <https://doi.org/10.4236/ce.2018.92014>
5. Colleen Mikelson, Graduate, Mentor: Sean Richards, 2019, Mikelson C*, J. Troisi, Symes S., Gao, L., DiRe, L.M., Adair D., Miller, R.K., Richards, S. 2019. Placental concentrations of essential, toxic, and understudied metals and relationships with birth outcomes in Chattanooga, TN. *Environmental Research* Volume 168, January 2019, Pages 118-129.
6. Zachary McCoy, Graduate, Mentor: Jennifer Boyd, 2020, Wiegand T.P., Gentry B., McCoy Z., Tannis C., Klug H., Bonsall M.B., Boyd J.N. 2020. Visualizing connectivity of ecological and evolutionary concepts – an exploration of research on plant species rarity. *Ecology and Evolution* 10: 9037-90447. DOI: 10.1002/ece3.6633
7. Savanna Wooten, Graduate, Mentor: Jennifer Boyd, 2020, Wooten S., Call G., Dattilo A., Cruse-Sanders J., Boyd J.N. 2020. Impact of forest thinning and white-tailed deer herbivory on translocation of the rare terrestrial orchid *Platanthera integrilabia*. *Diversity* 12: 412. DOI: 10.3390/d12110412
8. Jessica Sanders, Graduate, Mentor: Stylianos Chatzimanolis, 2020, Chatzimanolis, S, W. G. Cofer, H. J. Hightower, M. K. Roy and J. L. Sanders. 2020. New records of beetles (Coleoptera) from the Tennessee Valley of Southeastern USA. *The Coleopterists Bulletin* 74(3): 605-618.
9. Amelia Hudson, Graduate, Mentor: David Aborn, 2020, Hudson, A. and Aborn, D. 2020 Seasonal Correlations Between Kudzu and Avian Species Diversity and Abundance in Southeast Tennessee. *Southeastern Naturalist* 19: 161-178
10. Richard Blanton, Graduate, Mentor: Azad Hossain, 2020, Blanton, R. and Hossain, A., 2020, Mapping the Recovery Process of Vegetation Growth in the Copper Basin, Tennessee Using Remote Sensing Technology. *GeoHazards*, 1, 31-43. <https://doi.org/10.3390/geohazards1010004>.
11. Jonah Hall, Graduate, Mentor: Azad Hossain, 2020, Hall, J. and Hossain, A., 2020, Mapping Urbanization and Evaluating Its Possible Impacts on Stream Water Quality in Chattanooga, Tennessee, Using GIS and Remote Sensing. *Sustainability*, 12 (5), 1980, 1-46. <https://doi.org/10.3390/su12051980>.
12. Jarid Prah, Graduate, Mentor: Thomas Wilson, 2020, Prah, J., Wilson, T. P., Giles, D., & Craddock, J. H. 2020. An overview of research regarding reservoirs, vectors and predators of the chytrid fungus *Batrachochytrium dendrobatidis*. *Acta Herpetologica*, 15(1), 39-45. https://doi.org/10.13128/a_h-8744
13. Emily Davis, Graduate, Mentor: Bradley Reynolds, 2021, Davis, E. A., Wilson, T.P., & Reynolds, B. R. (2021). Self-Interest, Compassion, and Consistency in an Environmental Ethics Class: Would Students Give Up Their Retirement to Stop the Coronavirus? *International Journal of Ethics Education*. DOI 10.1007/s40889-021-00126-2
14. Richard Blanton, Graduate, Mentor: Azad Hossain, 2021, Hossain, A. Mathias, C. and Blanton, R., 2021, Remote Sensing of Turbidity in the Tennessee River Using Landsat 8 Satellite, *Remote Sensing*, 2021, 13, 3785. <https://doi.org/10.3390/rs13183785>.
15. Preyanka Dey, Graduate, Mentor: Azad Hossain, 2021, Dey, P., Roy, S., Bathi, J., Mishra, A., Leasi, F., and Hossain, A., 2021, Parameter Sensitivity Analysis of the HSPF Model on a Pervious Landcover Dominated Watershed, *Proceedings of EWRI Congress 2021*, 561-574, <https://ascelibrary.org/doi/abs/10.1061/9780784483466.051>.
16. Emily Davis, Graduate, Mentor: Thomas Wilson, 2021, Davis, E. A., Wilson, T.P., & Reynolds, B. R. (2021). Self-Interest, Compassion, and Consistency in an Environmental Ethics Class: Would Students

Give Up Their Retirement to Stop the Coronavirus? *International Journal of Ethics Education*. DOI 10.1007/s40889-021-00126-2

17. Devin Edmonds, Graduate, Mentor: Thomas Wilson, 2021, Edmonds, D., Dreslik, M.J., Lovich, J.E., Wilson, T.P., and C.H. Ernst. 2021. Growing as slow as a turtle: unexpected maturational differences in a small, long-lived species. *PLoS ONE* 16(11):e0259978.
<https://doi.org/10.1371/journal.pone.0259978>
18. Brad Reynolds, Graduate, Mentor: Thomas Wilson, 2021, Wilson, T. P., Reynolds, B.R., Nyok P., Chauhun, R., Wilson, P. J., Wilson, T. M., and Team Salamander. 2021. Turtles All the Way Down: An Update on the Asian Turtle Crisis with New Directions. *Education about Asia* 26(1), 28-33.
19. Pelf Nyok, Graduate, Mentor: Thomas Wison, 2021, Wilson, T. P., Reynolds, B.R., Nyok P., Chauhun, R., Wilson, P. J., Wilson, T. M., and Team Salamander. 2021. Turtles All the Way Down: An Update on the Asian Turtle Crisis with New Directions. *Education about Asia* 26(1), 28-33.
20. Rajev Chauhun, Graduate, Mentor: Thomas Wilson, 2021, Wilson, T. P., Reynolds, B.R., Nyok P., Chauhun, R., Wilson, P. J., Wilson, T. M., and Team Salamander. 2021. Turtles All the Way Down: An Update on the Asian Turtle Crisis with New Directions. *Education about Asia* 26(1), 28-33.
21. Emily Davis, Graduate, Mentor: Thomas Wilson, 2021, Davis, E. A., Wilson, T.P., and B.R., Reynolds. 2021. Self-Interest, Compassion, and Consistency in an Environmental Ethics Class: Would Students Give Up Their Retirement to Stop the Coronavirus? *International Journal of Ethics Education*.
doi.org/10.1007/s40889-021-00126-2
22. Jared Odell, Graduate, Mentor: Jennifer Boyd, 2022, Boyd J.N., Odell J., Rogers W., Cruse-Sanders J., Anderson J.T., Baskauf C., Brzyski J. 2022. Phenotypic plasticity and genetic diversity elucidate rarity and vulnerability of an endangered riparian plant. *Ecosphere* e996. DOI: 10.1002/ecs2.3996
23. Andrew Turgeson, Graduate, Mentor: David Giles, 2022, Turgeson A., L. Morley, D. Giles and B. Harris. 2022. Simulated docking predicts putative channels for the transport of long-chain fatty acids in *Vibrio cholerae*. *Biomolecules* 12(9):1269. doi: 10.3390/biom12091269
24. Sean Jones, Graduate, Mentor: Azad Hossain, 2022, Jones, S.M., and Hossain, A., 2022, Studying the Potential Impact of Groundwater Depletion on Surface Vegetation in the Mississippi Delta Using Remote Sensing, *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, Volume XLVI-M-2-2022, pp 53-57, Proceeding of ASPRS 2022 Annual Conference, 6–8 February & 21–25 March 2022, Denver, Colorado, USA & virtual.
25. Annie Lindsay, Graduate, Mentor: Jennifer Boyd, 2023, Boyd J.N., Baskauf C., Lindsay A., Anderson J.T., Rogers W., Cruse-Sanders J., Brzyski J. Phenotypic plasticity and genetic diversity sheds light on endemism of rare *Boechera perstellata* and its potential vulnerability to climate warming. *Ecology and Evolution* 13: e10540.
26. Avery Young, Graduate, Mentor: Jennifer Boyd, 2023, Young A., Aborn D., Latta S., Boyd J.N, In Press. Avian winter habitat selection of avocado farms and intact forest in the Bahrucro region of the Dominican Republic. *Journal of Caribbean Ornithology*.
27. Laura Marsh, Graduate, Mentor: David Aborn, 2023, Marsh, L. K., and D. A. Aborn. 2023. Relationship Between Human Intrusion and Avian Body Condition During Fall Migration. *Cities and the Environment* Vol. 16: Iss. 2, Article 3. DOI: 10.15365/cate.2023.160203
28. Mary Feely, Graduate, Mentor: David Aborn, 2023, Feely, M. and D. A. Aborn 2023. Changes in avian diversity and potential invasive seed dispersal post-wildfire in a southeastern deciduous forest; Flipper Bend woods, Signal Mountain, Tennessee. *Southeastern Naturalist* 22: 445-458
29. Avery Young, Graduate, Mentor: David Aborn, 2023, Young, A., Aborn D. A., Latta, S. C., and Boyd, J. N. 2023. Avian use of avocado farms and intact forest in the Sierra de Bahrucro, Dominican Republic. *Caribbean Journal of Ornithology* 36: 147-161
30. Emily Davis, Graduate, Mentor: Thomas Wilson, 2023, What is the Value of Values and the Environment: The Worth of an Undergraduate Environmental Ethics Course? (IN PREPARATION).
31. Daisy McMillion, Graduate, Mentor: Thomas Wilson, 2023, What is the Value of Values and the Environment: The Worth of an Undergraduate Environmental Ethics Course? (IN PREPARATION).
32. Carissa Turner, Graduate, Mentor: Thomas Wilson, 2023, Carissa M. Turner, W. J. Loughry, Thomas P. Wilson, Timothy J. Gaudin. 2023. Seroprevalence of Hansen's Disease in nine-banded armadillos (*Dasypus novemcinctus*) from Tennessee, USA. *Journal of Wildlife Diseases*. In Review

33. Rachel Head, Graduate, Mentor: Thomas Wilson, 2023, Head, R., and T.P. Wilson. 20XX. *Plethodon glutinosus* (Northern Slimy Salamander) and *Eurycea lucifuga* (Cave Salamander)- Aggressive Interaction. *Herpetological Review*. (Submitted)
34. Paul-Erik Bakland, Graduate, Mentor: Thomas Wilson, 2023, Bakland, P.E., Hedrick, D., and T.P. Wilson. 20XX. Geographic Distribution: *Plethodon serratus* (Southern Redback Salamander). *Herpetological Review*. (In Preparation)
35. Jeremy Hooper, Graduate, Mentor: Thomas Wilson, 2023, Hooper, J.W., Mowry, C.B., Wilson, T.P., and T.J. Gaudin. 20XX. "I Think a Coyote Attacked My Pet: Potential Effects of Assumptions and the Need for Human-Coyote Conflict Investigations". *Human Dimensions of Wildlife: UHDW-2016-0085*. (In Revision)
36. Jeremy Hooper, Graduate, Mentor: Thomas Wilson, 2023, Hooper, J.W., Mowry, C.B., Wilson, T.P., and T.J. Gaudin. 20XX. "Human-Coyote Interactions in an Urban Environment: The Importance of Landscape Characteristics and Scale". *Urban Naturalist: U130*. (In Revision)
37. Carissa Turner, Graduate, Mentor: Thomas Wilson, 2023, Carissa M. Turner, W. J. Loughry, Thomas P. Wilson, Timothy J. Gaudin. 2023. Developing predictive geospatial habitat models for Nine-Banded Armadillo in Tennessee. In Preparation
38. Erin Gaylord, Graduate, Mentor: Thomas Wilson, 2023, Gaylord, E., Hunt, N. and T. P. Wilson. 2023. Mapping Suitable Green Salamander Habitat in Eastern Tennessee: A Predictive MaxEnt Model. *ESRI World Map Book 2024*. In Review.

Appendix 5-A

Asset Description	Cap.date
Millipore Sigma Direct-Q 3 UV Water Filtration Sys	10/4/2023
P/N S5898 Frantz Magnetic Barrier Laboratory	9/28/2023
Thermo Sci TDE500 -40 Freezer	8/31/2023
Dell Mobile Precision Workstation 3581 CTO	8/31/2023
14in MacBook Pro, 2023	8/20/2023
14in MacBook Pro, 2023	8/20/2023
14in MacBook Pro, 2023	8/20/2023
Mac Mini Desktop, M2 Pro, 2023	8/1/2023
Fisher Isotemp Incubator	7/26/2023
IMAC 24" PURPLE	7/1/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
CX33 Compound Microscope	6/22/2023
Precision 5820 Tower XCTO Base	6/15/2023
MacBook Pro 14"	6/15/2023
VWR 10L Incubator Shaker	6/7/2023
VWR Mini Bead Mill Homogenizer	5/31/2023
VWR Advanced Dura Shaker	5/31/2023
Leica DM 750P Microscope	5/28/2023
Apple 14in MacBook Pro M1 (2021)	5/23/2023
LabConco Purifier Logic+ Class II A2 BSC 3ft	5/11/2023
LabConco Purifier Logic+ Class II A2 BSC 4ft	5/9/2023
Leica Cover for Stand Top Incl. Bio Mag.Changer	5/8/2023

RP-4 Shaking Table	4/28/2023
Leica DM750P	4/9/2023
ATS Scientific Receiver 164-167.000 MHz	3/31/2023
Muffle Furnace	1/27/2023
Olympus BX41-TF	12/12/2022
14in MacBook Pro Laptop	11/16/2022
iMac 24"	10/31/2022
Apple 24in iMac desktop, M1, 2021	9/26/2022
Apple 24in iMac desktop, M1, 2021	9/26/2022
Apple 24in iMac desktop, M1, 2021, green	9/26/2022
iMac 24"	8/31/2022
MacBook Pro 14"	7/31/2022
iMac 24"	7/31/2022
iMac 24"	7/31/2022
External Light Source EL 6000	7/1/2022
Biomark IS1001-24V Antenna Control Node	7/1/2022
Biomark IS1001-24V Antenna Control Node	7/1/2022
Top DM6 B, 5-fold, Fluo, 7xM25 Microscope	7/1/2022
Objective N Plan 50x/0.90 Oil	7/1/2022
2022 Ford Expedition XL #6610	6/24/2022
Genesys 50 UV-Visible Spectrophotometer	6/24/2022
Fisher Sonic Dismembrator	6/9/2022
Stuart Shaking Water Bath SBS40	6/7/2022
LabConco Protector Echo Filtered Fume Hood	5/26/2022
MacBook Pro 14"	2/28/2022
ThermoScientific TSX Ultra Low Freezer	1/10/2022
Stuart Reciprocating Shaker SSL2	12/27/2021
Peristaltic Pump Sartorius Stedim Biotech GmbH	11/30/2021
MacBook Pro 13"	11/27/2021
Surface Pro 7+	7/1/2021
Phantom 4 Multispectral System	6/18/2021
RWF 11/13 1100C Chamber Furnace	6/10/2021
Extron DTP CrossPoint 84	6/3/2021
SONY Projector	6/3/2021
2022 Tracker Grizzly 2072CC Boat	5/27/2021
So-Low Freezer U85-22	5/26/2021
WASP LTE Datalogger with String Potentiometer	5/26/2021
MacBook Pro 16"	5/26/2021
Olympus BH2 Polarizing Microscope	5/21/2021
Olympus BH2 Polarizing Microscope	5/21/2021
Accuscope 3076 w/ Boom Stand	5/21/2021
LabRepCo -40 Freezer	5/21/2021
TopoBox Sandbox Kit	5/17/2021
Hydrolab Surveyor HL	5/7/2021
Leica DM750P LED Microscope	5/3/2021
Leica DM6 B	4/30/2021
Leica DMC 4500 Camera	4/30/2021
Entomology Cabinet	4/28/2021
Entomology Cabinet	4/28/2021
Entomology Cabinet	4/28/2021
MacBook Pro 13"	4/27/2021
MacBook Pro 13"	4/27/2021
Servo Precision Sensitive Drill Press	4/27/2021

Leica S9i StereoZoom	4/27/2021
Eppendorf Mastercycler Nexus Gradient	4/27/2021
Spectra/Chrom Fraction Collector CF-2	3/26/2021
MacBook Pro 16"	3/26/2021
Sontek FlowTracker 2 Handheld Display Unit	3/17/2021
Sontek FlowTracker 2 Probe Assembly	3/17/2021
Hach HQ440d pH Meter	2/26/2021
16inch MacBook Pro Laptop Refresh 2/3/2021	2/3/2021
iMac 27"	9/27/2020
Masterflex L/S Digital Dispensing System	7/27/2020
Pika L Hyperspectral Outdoor Kit	7/1/2020
Zeiss Stemi 508 Trinoc-StereoMicroscope	7/1/2020
MacBook Pro 13"	7/1/2020
MacBook Pro 13"	3/27/2020
MacBook Pro 16"	3/27/2020
Aqua TROLL 600, Non-Vented 0-9m	3/13/2020
Prod, Aquion, DG, CM7-SE	3/9/2020
Prod, AS-DV	3/9/2020
YSI Pro Plus Water Quality Meter	2/27/2020
Dell XPS 15 7000 Series-7590	2/27/2020
Herbarium Drying Cabinet	2/25/2020
Satorius Secura Semi-Micro Balance	12/25/2019
AS1310 155 For TRC1300	11/29/2019
MacBook Pro 13.3"	11/27/2019
MacBook Pro 13.3"	11/27/2019
Dell Precision 5820	10/27/2019
MacBook Pro 15"	10/27/2019
Herbarium Storage 10 Cabinet System	9/20/2019
MacBook Pro 15"	8/27/2019
VWR Incubating Mini Shaker	8/27/2019
Eppendorf Vacufuge Concentrator	8/27/2019
Mac Mini	7/27/2019
Dell XPS	7/1/2019
Horiba Water Quality Meter U-5000G	6/10/2019
Biotek 800 TS Microplate Reader	6/3/2019
AnalytikJena UVP GelStudio Imagin System	5/31/2019
Trinoc Microscopew/ Moticam	5/27/2019
Canon EOS Digital Rebl T7i 24MP DSLR Camera	5/27/2019
Luxeo 6Z Trinocular StereoMicroscopewith Tube	5/27/2019
27in iMac w/Retina 5K Display Refresh	5/7/2019
27in iMac w/Retina 5K Display Refresh	5/7/2019
27in iMac w/Retina 5K Display Refresh	5/6/2019
15in MacBook Pro w/Touch Bar - Space Gray Refresh	5/3/2019
Shaker, ORbital MaxQ 6000 Thermo Scientific	4/4/2019
Nikon Eclipse E800	4/2/2019
Beckman Coulter TJ-25 Refrigerated Benchtop	3/27/2019
Freezer Chest Fisher Scientific Ultra Low Temp -86	3/21/2019
Parr Semi-Micro Calorimeter 6725E	3/14/2019
iMac 27"	2/27/2019
ThermoScientific Legend Micro 21 Microcentrifuge	1/27/2019
Benchtop Lab Grinding Mill	1/22/2019
iMac 27"	9/27/2018
Eppendor Rotor FA-45-6-30	7/11/2018

2002 Yamaha G3 1652 DLX Boat	7/6/2018
MacBook Pro 15.4" Space Gray	6/25/2018
27" iMac w/retina refresh	6/22/2018
Apple 13.3 MacBook Pro Laptop	6/11/2018
Tuttnauer Sterilizer and Steam Generator	5/11/2018
MacBook Pro 13"	4/30/2018
MacBook Pro 13"	4/30/2018
MacBook Pro 13"	4/30/2018
MacBook Pro 13"	4/30/2018
MacBook Pro 13"	4/30/2018
Polar King Walk-in Cooler/Freezer 8x10	3/5/2018
Leica DM750P Microscope	2/13/2018
Leica DM750P Microscope	2/13/2018
LI-6800 LEEF Photosynthesis Package	1/26/2018
Hydrolab (Hach) Top Assembly & Chlorophyll Sensor	12/20/2017
Hydrolab (Hach) Surveyor HL	12/20/2017
13" MacBook Pro	12/7/2017
Pika L Hyperspectral Imaging Camera (400-1000nm)	12/6/2017
Axis Translation Stage with Tower	12/6/2017
Fixture High Intensity Lighting System	12/6/2017
Sorvall Legend Micro 21 Centrifuge	9/5/2017
ARES Automatic Resistivity System	8/3/2017
Mettler Toledo XS205DU Analytical Balance	6/25/2017
iMac 21.5 inch	6/6/2017
IMAC 27 INCH	5/17/2017
IMAC 27 INCH	5/17/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Leica DM750 Compound Microscope	3/21/2017
Eppendorf Centrifuge 5804 R	3/8/2017
Disarticulated Human Skeleton	2/25/2017
Leica DM750 Trinocular Microscope	2/22/2017
CFX Connect RT-PCR	2/14/2017
Sharp LC-70LE661U 70" TV	12/12/2016
Sharp LC-70LE661U 70" TV	12/12/2016
Sharp LC-70LE661U 70" TV	12/12/2016
Electrofisher Combo LR-24	10/24/2016

Dell Mobile Precision 7710 XCTO BAS E	10/6/2016
Bertin Minilys	9/20/2016
iMac 27"	9/1/2016
SC Ultra Low Upright Freezer PV85-22	8/31/2016
MSI WS72 M1000 Mobile Workstation (Laptop)	8/30/2016
YSI H2O Qual Meter: DSS-30 Meter & Handheld	8/17/2016
27" iMac	8/12/2016
iMac 27"	8/5/2016
iMac 27"	7/27/2016
iMac 27"	7/27/2016
Craftsman 5200 Riding Lawn Mower	6/25/2016
BioTek Synergy H1 Microplate Reader	3/15/2016
ThermoScientific Spectronic 200	3/15/2016
Jenoptik Dig Scope Camera	2/23/2016
SHEL LAB Reach-In Lab Incubator	1/14/2016
IsoTemp WJ CO2 Incubator	11/17/2015
Meiji Techno Trinocular Polarizing Microscope	9/14/2015
Meiji Techno Trinocular Polarizing Microscope	9/14/2015
High Definition Video/Digital Camera	9/14/2015
High Definition Video/Digital Camera	9/14/2015
Leica S8 APO Stereozoom	8/5/2015
Leica MC170 HD Camera	6/11/2015
Cannon EOS 5D Mark III Digital Camera Body Kit	5/27/2015
Smart Coater DII-2010SCTR with Au Target	5/18/2015
15 inch MacBook Pro for (T J Gaudin)	5/1/2015
21.5 inch iMac (Z0PE)	3/25/2015
Dell XPS 15 Touch for Dr. Loren Hayes	12/31/2014
Convion model PGR15 Plant Growth Chambers: Boyd	12/15/2014
Convion model PGR15 Plant Growth Chambers: Boyd	12/15/2014
Convion model PGR15 Plant Growth Chambers: Boyd	12/15/2014
Convion model PGR15 Plant Growth Chambers: Boyd	12/15/2014
Convion model E7/2 Plant Growth Chambers: Boyd	10/13/2014
Convion model E7/2 Plant Growth Chambers: Boyd	10/13/2014
LabConco Dishwasher	10/1/2014
Percival Scientific Incubator Model I-30BLL	8/19/2014
Percival Scientific Incubator Model I-30BLL	8/19/2014
BioSafety Cabinet	6/30/2014
iMac 27 inch	6/16/2014
Benchtop EDXRF Spectrometer	5/21/2014
Challenger Receiver with nylon case R2000	5/21/2014
Challenger Receiver with comp int R4000	5/21/2014
Mastercycler Nexus Gradient (D-5000-3)	1/27/2014
25 cu ft U700 Premium Freezer (F-4111-25R)	1/21/2014
iMac 27" w/Apple Care App	7/16/2013
Leica DM750P Microscope	6/20/2013
Macbook Air 13" w/AppleCare Protection Plan	5/7/2013
iMac 27" w/Apple Care & Apple Thunderbolt	4/5/2013
iMac 27" 3.2Hz Quad Core	3/20/2013
MaxQ 4000Ref Digital Promo Pkg	1/31/2013
BIO RAD T100 Thermal Cycler	6/26/2012
iMAC 27" Quad-Core	3/22/2012
Single Lane Mouse Treadmill Item 760304	3/2/2012
Dell E6520 LAPTOP	1/17/2012

[illegible]

Compound Microscope (Olympus CX31)	6/20/2011
Compound Microscope (Olympus CX31)	6/20/2011
Compound Microscope (Olympus CX31)	6/20/2011
Compound Microscope (Olympus CX31)	6/20/2011
Compound Microscope (Olympus CX31)	6/20/2011
Compound Microscope (Olympus CX31)	6/20/2011
Stereo Microscope(Olympus SZ-6145TR)	6/20/2011
SH-3000 Swinging Bucket Rotor -Rec'vd 12/30/10	3/25/2011
centrifuge - Allegra X-22	2/18/2011
rotor assembly w/4 buckets SX-4250 (INSIDE 617078)	2/18/2011
Macbook Pro 15"	1/28/2011
seismometer	1/21/2011
Combination nucleic acid workstation	1/6/2011
Leica DM 750 P Polarizing Microscope	10/21/2010
Leica DM 750 P Polarizing Microscope	10/21/2010
Leica DM 750 P Polarizing Microscope	10/21/2010
MacBook Pro, 13-inch	10/1/2010
Soil CO2 Flux Chamber	8/16/2010
Scientific Laboratory Steam Sterilizer	6/21/2010
OLYMPUS BX61 Electron Microscope	4/5/2010
Steam Sterilizer	3/18/2010
StereoMicroscope(Olympus SZ61)	3/3/2010
Confocal Microscope	2/9/2010
Latitude E6500 Laptop	1/14/2010
Combination nucleic acid workstation	9/22/2009
iMac, 24-inch, Intel Core 2 Duo	8/26/2009
VZ-8 Light Document Camera	8/13/2009
Nanodrop 2000C w/cuvette	6/23/2009
Leica DM EP Polarizing Microscope	5/19/2009
IMac, 24-inch, Intel Core 2 Duo	3/6/2009
LI-6400XTR Fluorescence & Gas Exchange System Pkg	12/17/2008
Advanced Co2 Analysis Package (with Flow Meter)	9/22/2008
professional Laser Tech Laser Rangefinder with	9/4/2008
DR2800 SPECTRO W/ATTACHMENTS	7/1/2008
iMac, 24-inch, Intel Core 2 Duo	5/23/2008
Cell Disruption Bomb from Parr Inst	5/21/2008
Velocity Meter	4/18/2008
BioLogic LP System with BioFrac Fraction Collector	3/20/2008
Canon camera (digital camera w/field kit)	3/6/2008
54-Well HotBlock and AirLite HEPA Enclosure	2/13/2008
Olympus SZX10 Stereo Microscope	2/1/2008
Eppendorf Mastercycler Thermal Cycler, Gradient	11/19/2007
Eppendorf Mastercycler Gradient	11/19/2007
Eppendorf Centrifuge (Model 5424)	11/8/2007
Imaging System, Photodoc-it 50	10/31/2007
Optiplex 745 Minitowers	8/1/2007
Optiplex 745 Minitowers	8/1/2007
Revco Ultra low freezer (24.4 cu. ft - upright	6/30/2007
Leica DME Transmitted POL Binocular Microscope	6/28/2007
20 Working Jon Boat (heavy duty; all welded)	6/4/2007
Humminbird 997 SICombo (depth finder)	5/19/2007
Mokai Watercraft	2/8/2007
Unispense Dispenser	12/7/2006

MJ Mini Cyclor, 48-Well	10/10/2006
Dell Optiplex GX620 Minitower Computer	8/22/2006
C25 Incubator/Shaker with Universal Platform	7/31/2006
Spotting Scope: Straight Armor	7/14/2006
Buehler Thin Sectioning System	6/28/2006
Savant Speed-Vac Concentration System	5/16/2006
Leica Binocular Microscope	5/3/2006
Leica Binocular Microscope	5/3/2006
Leica Binocular Microscope	5/3/2006
Leica Binocular Microscope	5/3/2006
Bio-Mini Promo, UV/visible spectrophotometer	4/11/2006
24.4 cubic feet, -86 C freezer	4/11/2006
Inspiron 710m Pentium Laptop computer	4/11/2006
BTX 630 Electroporation System	4/7/2006
Sliding Door Refrigerator (38 cubic feet)	3/29/2006
CoolSnapCF Dig Color Camera	3/28/2006
Leica L5 FL (GFP) Stereozoom	2/22/2006
Centrivap DNA Concentrator 115	1/19/2006
EPPENDORF Mastercycler	1/9/2006
Incubated shaker with universal platform	12/12/2005
Plant Water Studus Console, compact model	12/5/2005
Centrifuge - "Brushless" RC-5C Plus Microcomputer	12/2/2005
WESCOR Dew Point Microvoltmeter	12/2/2005
High Speed Micro Centrifuge	11/22/2005
High Speed Micro Centrifuge	11/22/2005
High Speed Micro Centrifuge	11/22/2005
SS-34 Superspeed Fixed-Angle Rotor	11/22/2005
Stereozoom Seapo Trans Light (Microscope)	11/16/2005
SLA-1500 Super-Lite Rotor	11/14/2005
Foto/Convertible Dual It Trans	11/9/2005
Thermo Hybaid PX2 Thermal Cycler Chassis	11/9/2005
CIRAS-2 Portable Photosynthesis System	11/8/2005
Table Top Zebrafish Rack	11/8/2005
Power Supply 4000V 110 V	10/28/2005
Shimadzu Scientific Bio-Mini UV Spectrophotometer	10/27/2005
Fotodyne FOTO/Analyst Apprentice System	10/18/2005
Eppendorf Mastercycler EP Gradient S	10/6/2005
Fotoanalyst/Apprentice System	10/6/2005
Eppendorf Centrifuge 5415-D	10/6/2005
EPPENDORF Instruments Centrifuge, model # 5415D	10/6/2005
Model 400 Benchtop Centrifuge	10/6/2005
Centrifuge w/Free Rotor and Tubes	9/13/2005
GeoXT Standalone System	1/6/2005
Vertical Pipette Puller	11/17/2004
Zoom stereoMicroscopeACCU-SCOPE	7/16/2004
Compound MicroscopePackage #1	6/22/2004
compound Microscopepackage #1	6/22/2004
compound Microscopepackage #1	6/22/2004
compound Microscopepackage #1	6/22/2004
compound Microscopepackage #1	6/22/2004
Multi Probe System w/Barometer	6/14/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004

Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
Compound MicroscopePackage #2	6/4/2004
PERCIIVAL INCUBATOR	4/20/2004
Trinocular Photo/Observation Tube	4/19/2004
Digital Firewire Camera and SW Kit	4/19/2004
Trinocular HC Photo/Video/Observation Tube	4/19/2004
Trimble Geo XT w/o software	3/30/2004
OptiPlex GX270 Small MiniTower	10/8/2003
Sony VPL-CS5 LCD Projector SVGA 1800 Lumens 5.8	11/27/2002
Dell Latitude C640 Laptops	10/7/2002
Dell Latitude C640 Laptops	10/7/2002
Synergy ABS/FLR w/inc. Reader & KC-4 Software	10/1/2002
Fisher Isotemp Co2 and Three-Gas Incubators	9/13/2002
Biological Safety Cabinet - Class II Type A/B3	8/8/2002
Fluorescence Microscopeand Digital Imaging System	7/29/2002
PowerGen Model 125	7/29/2002
Dell Inspiron 8100 Multimedia Mobile Desktop Comp.	7/1/2002
Multi Probe System Instrument	6/30/2002
Balance - Mettler Toledo AG Series Standard Level	6/25/2002
Power Supply 4000V 110V	6/21/2002
Transillum, Variable Intensity 8" x 16"	6/14/2002
Ashcroft Aerobic Type A Chamber, Automatic Airlock	5/2/2001
X-RAY DIFFRACTOMETER	3/10/2000
WATER 2690 ALLIANCE SYSTEMS	8/1/1999
M32 COMPUTER SINGLE SYSTEM 350MHZ W98	8/1/1999
996 PHOTODIODE ARRAY DETECTOR	8/1/1999
LABCONVO FREEZER DRY W/SHELL & PURG 6L	4/1/1999
NIKON ECLIPSE E600 ADVANCED RESEARCH MICROSCOPE	3/1/1999
LEICA DM LSP POLARIZING Microscope(BY8)	6/1/1998
LEICA DM LSP POLARIZING Microscope(BY8)	6/1/1998
LEICA GZ6 STEREO MicroscopeW/TRANSMITTED LIGHT (D	2/1/1998
GPS /BEACON PROXR CBS FOR EDUCATORS	5/1/1997
LEICA LEITZ LABORLUX II POL S MICROSCOPE	9/1/1996

STEROMicroscopeW/ATTACHMENTS (DR GAUDIA)	3/1/1995
LEICO WILD MZ-8 STEROMicroscopeW/ATTACHMENTS	1/1/1995
HACH DREL/2000 WATER TESTING KIT	6/1/1993
HISTOSTAT CRYOSTAT 220V 50HZ	5/1/1989
SINGLE CHANNEL SEISMOGRAPH (BY10) (CABINET)	6/1/1979

Appendix 5-B.

Biology, Geology & Environmental Science Ranked Equipment Need List

Biology, Geology & Environmental Science Equipment Needs List – 2018 to 2024. Tables 1- 6 below provide details of the ranked equipment for each year, the year the item was added to the list, the justification, cost, the category (described below), and the course impacted by the equipment.

Table 1.

2024 – Carry Over From 2023

CATEGORIES OF EQUIPMENT:

- I. Equipment needed to maintain course instructional integrity**
- II. Equipment needed to meet existing infrastructure deficiencies**
- III. Equipment needs to meet continuing student/faculty research objectives**

Rank	Fiscal Year Added to List	Quantity	Item	Justification	Cost	Category	Courses impacted
1	2019	12	Student Compound Microscopes – such as Olympus CX33	123 Holt has 12 compound scopes. Adding microscopes to this room will make the teaching spaces usable for more courses.	\$25,603 Total (12 X \$2133.60 includes shipping)	I, II	All labs being taught in 123 Holt
2	2019	12	Student Stereoscopes – such as Accuscope 3075-E-LED	123 Holt has 12 stereoscopes scopes. Adding microscopes to this room will make the teaching spaces usable for more courses.	\$14,460 Total (12 X \$1205.00)	I, II	All labs being taught in 123 Holt

3	<u>2017</u>	1	Equipment Needed to Develop Molecular ID Lab Exercise for Microbiology Teaching Labs	ID of bacterial cultures in research and industry is moving towards molecular techniques. Our micro teaching labs need to evolve to include these techniques Committee discussed that once a skeleton of the labs were written, we could move this item back up to #1. Having something written will help determine exactly what equipment will be needed. (February 9, 2022)	\$12,000 (for all equipment necessary)	I, II, III	BIOL 4220, BIOL 4530, BIOL 4430 ESC 4010, ESC 5030, ESC 4430, ESC 5040
4	<u>2008</u>	1	Total Organic Carbon Analyzer	Modernize/improve microbiology & ESC labs	\$34,000	I, III	BIOL 4220L, 4010L, 4040L, + graduate equivalent courses
5	<u>2006</u>	1	Electric Winch	Safety – self rescue from remote sites	\$3,500	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
6	<u>2006</u>	1	Honda Four Trax 4X4	Access to remote field sites	\$7,243	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
7	<u>2014</u>	1		Needed to replace old, broken unit Radioactive Materials Lab	\$45,771.91	I, II, III	

Liquid Scintillation Counter Equipment Committee wants to know if there are ways to demonstrate the same concepts with using smaller/less expensive instruments. Are there different ways to accomplish the same goals? (Feb 2020) <u>October 25, 2021:</u> Rardy to draft a statement inquiring about any faculty wanting to use radioactive isotopes in the next 5 years. Committee considering decommissioning radioactives lab. <u>Feb. 9, 2022:</u> Rardy would like to get the new Dept Head's input into decommissioning this equipment (& radioactives lab). Cheryl asked him to write something up this semester to ask the Department as a whole, so we would know going into a conversation with the Dept Head if others would use this capability in the Dept. He said he would after Spring Break. As of 10/19/2022, Cheryl hasn't received anything from Rardy.					(Price updated from quote 5/28/21)	BIOL 4430, 4530, ESC 5030, 5040, 5997, 5998, 5999	
10	2024	24	New computers in Holt 399	4 years old, more powerful equipment needed to run GIS software	\$33,908.64	I	
			TOTAL		\$176,486.55		

Table 2.

2023 – Carry Over From 2022

CATEGORIES OF EQUIPMENT:

- I. Equipment needed to maintain course instructional integrity**
- II. Equipment needed to meet existing infrastructure deficiencies**
- III. Equipment needs to meet continuing student/faculty research objectives**

Rank	Fiscal Year Added to List	Quantity	Item	Justification	Cost	Category	Courses impacted
1	2019	12	Student Compound Microscopes – such as Olympus CX33	123 Holt has 12 compound scopes. Adding microscopes to this room will make the teaching spaces usable for more courses.	\$25,603 Total (12 X \$2133.60 includes shipping)	I, II	All labs being taught in 123 Holt
2	2019	12	Student Stereoscopes – such as Accuscope 3075-E-LED	123 Holt has 12 stereoscopes scopes. Adding microscopes to this room will make the teaching spaces usable for more courses.	\$14,460 Total (12 X \$1205.00)	I, II	All labs being taught in 123 Holt
3	<u>2017</u>	1	Equipment Needed to Develop Molecular ID Lab Exercise for Microbiology Teaching Labs	ID of bacterial cultures in research and industry is moving towards molecular techniques. Our micro teaching labs need to evolve to include these techniques Committee discussed that once a skeleton of the labs were written, we could move this item back up to #1. Having something written will help determine exactly what equipment will be needed.	\$12,000 (for all equipment necessary)	I, II, III	BIOL 4220, BIOL 4530, BIOL 4430 ESC 4010, ESC 5030, ESC 4430, ESC 5040

				(February 9, 2022)			
4	<u>2008</u>	1	Total Organic Carbon Analyzer	Modernize/improve microbiology & ESC labs	\$34,000	I, III	BIOL 4220L, 4010L, 4040L, + graduate equivalent courses
5	<u>2006</u>	1	Electric Winch	Safety – self rescue from remote sites	\$3,500	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
6	<u>2006</u>	1	Honda Four Trax 4X4	Access to remote field sites	\$7,243	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
			TOTAL		\$96,806.00		

Table 3.

2022 – Carry Over From 2021

CATEGORIES OF EQUIPMENT:

- I. Equipment needed to maintain course instructional integrity
- II. Equipment needed to meet existing infrastructure deficiencies
- III. Equipment needs to meet continuing student/faculty research objectives

Rank	Fiscal Year Added to List	Quantity	Item	Justification	Cost	Category	Courses impacted
1	2019	12	Student Compound Microscopes – such as Olympus CX33	123 Holt has 12 compound scopes (I'm cleaning them currently). Adding microscopes to this room will make the teaching spaces usable for more courses.	\$25,603.20 Total (12 X \$2133.60 includes shipping)	I, II	All labs being taught in 123 Holt
2	2019	12	Student Stereoscopes – such as Accuscope 3075-E-LED	123 Holt has 12 compound scopes (I'm cleaning them currently). Adding microscopes to this room will make the teaching spaces usable for more courses.	\$14,460.00 Total (12 X \$1205.00)	I, II	All labs being taught in 123 Holt
3	2019	1	Trinocular Teaching Compound & Stereo Microscopes with Camera – such as Olympus CX41 and AU-600	Having trinocular scopes in 123 Holt would help instructors show students how to use microscopes and show students what they are supposed to be viewing in their scopes.	\$3,700	I, II	Any labs in 123 Holt
4	<u>2017</u>	1	Equipment Needed to Develop Molecular ID Lab Exercise for Microbiology Teaching Labs	ID of bacterial cultures in research and industry is moving towards molecular techniques. Our micro teaching labs need to evolve to include these techniques	\$12,000 (for all equipment necessary)	I, II, III	BIOL 4220, BIOL 4530, BIOL 4430 ESC 4010, ESC 5030, ESC 4430, ESC 5040

5	2020	30	30 iPads, 30 iPad protector cases, 30 Logitech crayons, 1 storage cabinet	Will allow enhanced student learning of earth systems and processes by allowing students to interact with real-time data imagery. Supports recommendation of 5-year program review to incorporate more tech into courses.	\$12,680 Total	I, II	GEOL 1110; GEOL 3410; GEOL4080; GEOL 3220; Hydrology; GEOL 3530; GEOL 3540
6	<u>2008</u>	1	Total Organic Carbon Analyzer	Modernize/improve microbiology & ESC labs	\$34,000	I, III	BIOL 4220L, 4010L, 4040L, + graduate equivalent courses
7	<u>2006</u>	1	Electric Winch	Safety – self rescue from remote sites	\$3,500	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
8	<u>2006</u>	1	Honda Four Trax 4X4	Access to remote field sites	\$7,243	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
9	<u>2014</u>	1	Liquid Scintillation Counter	Needed to replace old, broken unit Radioactive Materials Lab	\$45,771.91	I, II, III	BIOL 4430, 4530, ESC 5030, 5040, 5997, 5998, 5999
			TOTAL		\$158,958.11		

Table 4.

2021 – Carry Over From 2020

CATEGORIES OF EQUIPMENT:

- I. Equipment needed to maintain course instructional integrity**
- II. Equipment needed to meet existing infrastructure deficiencies**
- III. Equipment needs to meet continuing student/faculty research objectives**

Rank	Fiscal Year Added to List	Quantity	Item	Justification	Cost	Category	Courses impacted
1	2019	24	Student Compound Microscopes – such as Olympus CX33	123 Holt does not have any compound scopes. Adding microscopes to this room will make the teaching spaces usable for more courses.	\$51,206.40 Total (24 X \$2133.60 includes shipping)	I, II	All labs being taught in 123 Holt
2	2019	24	Student Stereoscopes – such as Accuscope 3075-E-LED	123 Holt does not have any compound scopes. Adding microscopes to this room will make the teaching spaces usable for more courses.	\$28,920.00 Total (24 X \$1205.00)	I, II	All labs being taught in 123 Holt

3	2021	24	Stereomicroscopes (Such as Accuscope 3075)	>1/2 of the Stereoscopes in 228 Holt are Parco Scientific and very old. The optics do not allow the correct IDs of observations of invertebrates and make it impossible for students to complete their labs.	\$28,000	I	Any lab taught in 228 Holt (e.g. BIOL 4085, 407, 4130)
4	2019	1	Trinocular Teaching Compound & Stereo Microscopes with Camera – such as Olympus CX41 and AU-600	Having trinocular scopes in 123 Holt would help instructors show students how to use microscopes and show students what they are supposed to be viewing in their scopes.	\$3,700	I, II	Any labs in 123 Holt
5	<u>2017</u>	1	Equipment Needed to Develop Molecular ID Lab Exercise for Microbiology Teaching Labs	ID of bacterial cultures in research and industry is moving towards molecular techniques. Our micro teaching labs need to evolve to include these techniques	\$12,000 (for all equipment necessary)	I, II, III	BIOL 4220, BIOL 4530, BIOL 4430 ESC 4010, ESC 5030, ESC 4430, ESC 5040
6	2020	1	SOMSO Domestic Cat Model (including musculature)	Help with setting up labs. Only have 12 preserved cats to use in lab practical, but 25 stations, so additional models are useful for	\$3,678.00	II	Comp Vert Zoo BIOL 4050L Mammalogy BIOL 4140

				practicals. Provides students with valuable study aide.			Func Human Anat BIOL 2060
7	2020	30	30 iPads, 30 iPad protector cases, 30 Logitech crayons, 1 storage cabinet	Will allow enhanced student learning of earth systems and processes by allowing students to interact with real-time data imagery. Supports recommendation of 5-year program review to incorporate more tech into courses.	\$12,680 Total	I, II	GEOL 1110; GEOL 3410; GEOL4080; GEOL 3220; Hydrology; GEOL 3530; GEOL 3540
8	<u>2008</u>	1	Total Organic Carbon Analyzer	Modernize/improve microbiology & ESC labs	\$34,000	I, III	BIOL 4220L, 4010L, 4040L, + graduate equivalent courses
9	<u>2006</u>	1	Electric Winch	Safety – self rescue from remote sites	\$3,500	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
10	<u>2006</u>	1	Honda Four Trax 4X4	Access to remote field sites	\$7,243	III	Field oriented courses In BIOL, ESC, GEOL
11	<u>?</u>	1			\$50,000	III	Field oriented courses

			UTC Hybrid 4X4 Field Consortium Vehicle	Access to remote field sites (multiple seating required) As of Feb 9, 2022, the vehicle should be delivered in June 2022			In BIOL, ESC, CHEM, GEOL
12	2014	1	Liquid Scintillation Counter	Needed to replace old, broken unit Radioactive Materials Lab	\$45,771.91	I, II, III	BIOL 4430, 4530, ESC 5030, 5040, 5997, 5998, 5999
			TOTAL		\$280,699.31		

Table 5.

2020 – Carry Over From 2019

CATEGORIES OF EQUIPMENT:

- I. Equipment needed to maintain course instructional integrity**
- II. Equipment needed to meet existing infrastructure deficiencies**
- III. Equipment needs to meet continuing student/faculty research objectives**

Rank	Fiscal Year Added to List	Quantity	Item	Justification	Cost	Category	Courses impacted
1	2	1	Multiprobe water quality field kits Purchased via PO 4500055173 April 20, 2021	Modernize/improve environmental science labs	\$6,000	I	BIOL 3070 BIOL/ESC 4520

				Is this really needed still? For what particular courses would it be used for? As of March 18, 2021 – Yes it is needed			ESC 1500L, 1510L
2	<u>2017</u>	1	Leica Microscope Purchased via PO 4500055005 March 23, 2021	Updating Geology lab abilities	\$5,000	I,II,III	GEOL 1120, 3410, 3420, 3540, 4500, 4800
3	<u>2016</u>	1	Fisher Isotemp Ultra-low (-80 C), undercounter freezer As of March 26, 2021, Nanda did not think it was needed. Requested some hot plates, etc instead. Did not hear back from Rardy. This should be taken off of list	For long-term storage of our bacterial culture collection – many of these cultures should not be stored with other teaching & research materials from diff. disciplines	\$8,884	I, II, III	BIOL 2100, 4220, 4280, 4530, 4430, ESC 4010, 4430, 5030, 5040
4	<u>2017</u>	1	Insect Cabinet for the Natural History Museum Purchased via PO 4500055034 March 2021	The insect teaching collection is at capacity and cannot accommodate any new specimens. These cabinets are vital for the growth and well being of the collection.	\$3,883 (shipping incl.)	I, II, III	BIOL4070, BIOL4130, BIOL4999 (Parasitology)
			Equipment Needed to Develop Molecular ID Lab Exercise for Microbiology Teaching Labs	ID of bacterial cultures in research and industry is moving towards molecular techniques. Our micro teaching labs need to evolve to include these techniques Committee would like to know if this is for one lab unit or entire course? Would like to have further justification.	\$12,000 (for all equipment necessary)		BIOL 4220, BIOL 4530, BIOL 4430 ESC 4010, ESC 5030, ESC 4430, ESC 5040
6	2019	10	Microscope Cabinets/Cubbies		\$9,845.00	I, II	All labs being taught in 123 Holt, 321 Holt

			Purchased via PO 4500055232 April 29, 2021 for 123 Holt	In order to have all teaching labs equipped with microscopes for each student to use during lab, there needs to be a place to store the microscopes. The cubbies purchased in 2017 seem to be working well.	(10 X 984.50)		321 Holt has cabinets to store microscopes already
7	2019	1	Futura PLUS+ Series 9.0 cuft -40 chest freezer Purchased via PO 4500055231 April 28, 2021	Critical for pest control of Natural History Museum and Herbarium collections. Current -40 freezer isn't large enough to accommodate the amt. of specimens that need to be processed before placement in the collections. Committee would like to know if this is still needed.			
8	2019	1	U85-22 -80 Freezer Purchased via PO 4500055200 April 26, 2021	Natural History Museum and Herbarium currently do not have a -80 freezer for long-term maintenance of DNA/biological samples. Needed to establish a permanent freezer collection for future DNA extractions and DNA library.	\$9000 (shipping estimate included)	II, III	All zoology and botany courses
9	2019	35	Student Compound Microscopes – such as Olympus CX33	321 Holt does not have enough compound scopes in the lab for every student to be using one. 123 Holt does not have any compound scopes. Adding microscopes to these rooms will make the teaching spaces usable for more courses.	\$74,676 Total (35 X \$2133.60 includes shipping)	I, II	All labs being taught in 123 Holt and 321 Holt

10	2019	35	Student Stereoscopes – such as Accuscope 3075-E-LED	321 Holt does not have enough compound scopes in the lab for every student to be using one. 123 Holt does not have any compound scopes. Adding microscopes to these rooms will make the teaching spaces usable for more courses.	\$42,175 Total (35 X \$1205.00)	I, II	All labs being taught in 123 Holt and 321 Holt
11	2019	8	Trinocular Teaching Compound Microscopes with Camera – such as Olympus CX41 and AU-600 Purchased Trinocular Scopes for 120 Holt, 321 Holt, and Grote 206, 208, 210 Via Neil Bingham May 21, 2021	Most teaching labs do not have this technology in the room. Having this would help instructors show students how to use microscopes and show students what they are supposed to be viewing in their scopes.	\$16,000 Total (8 x \$2000)	I, II	All labs being taught in about 8 different teaching labs. Mark did not reply soon enough to my inquiry in April 2021 – he would like compound&stereo in 123 Holt when possible
12	2020	1	SOMSO Domestic Cat Model (including musculature)	Help with setting up labs. Only have 12 preserved cats to use in lab practical, but 25 stations, so additional models are useful for practicals. Provides students with valuable study aide.	\$3,678.00	II	Comp Vert Zoo BIOL 4050L Mammalogy BIOL 4140 Func Human Anat BIOL 2060
13	2020	30	30 iPads, 30 iPad protector cases, 30 Logitech crayons, 1 storage cabinet	Will allow enhanced student learning of earth systems and processes by allowing students to interact with real-time data imagery. Supports recommendation of 5-year program review to incorporate more tech into courses.	\$12,680 Total	I, II	GEOL 1110; GEOL 3410; GEOL4080; GEOL 3220; Hydrology; GEOL 3530; GEOL 3540
14	2020	1	Front podium stereomicroscope with camera		\$4,680	II, III	Meiofauna, limnology, entomology, parasitology, etc.

			Purchased via P-Card Feb 26, 2021	Observation, description and instruction of live organisms is very difficult without everyone seeing the same images at the same time as the organisms move across views. Having something students can take pictures with, etc. would greatly improve instruction.			
15	<u>2008</u>	1	Total Organic Carbon Analyzer	Modernize/improve microbiology & ESC labs	\$34,000	III	BIOL 4220L, 4010L, 4040L, + graduate equivalent courses
16	<u>2006</u>	1	Electric Winch	Safety – self rescue from remote sites	\$3,500	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
17	<u>2006</u>	1	Honda Four Trax 4X4	Access to remote field sites	\$7,243	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
18	<u>?</u>	1	UTC Hybrid 4X4 Field Consortium Vehicle John Tucker attempted to purchase this in Spring 2021, but there was a shortage of vehicles and process was started too late. Need to follow-up on this	Access to remote field sites (multiple seating required)	\$38,535	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
19	<u>2014</u>	1	Liquid Scintillation Counter	Needed to replace old, broken unit Radioactive Materials Lab	\$34,744	I, II, III	

				Equipment Committee wants to know if there are ways to demonstrate the same concepts with using smaller/less expensive instruments. Are there different ways to accomplish the same goals?			BIOL 4430, 4530, ESC 5030, 5040, 5997, 5998, 5999
20	2016	24	Apple MacBook laptop computers	Est. of a mobile computer lab that could be checked out by BGES faculty	\$38,376 (24 x \$1,599)	I, II, III	Any BGE course, especially: BIOL 3250, 3260, 3350, 3060, 3070
21	2021	24	Stereomicroscopes	NA	NA	NA	Any lab taught in 228 Holt
			TOTAL		\$370,639.00		

Table 6.

2019 – Carry Over From 2018

CATEGORIES OF EQUIPMENT:

- I. Equipment needed to maintain course instructional integrity**
- II. Equipment needed to meet existing infrastructure deficiencies**
- III. Equipment needs to meet continuing student/faculty research objectives**

Rank	Fiscal Year	Quantity	Item	Justification	Cost	Category	Courses impacted

	Added to List						
1	?	1	Multiprobe water quality field kits	Modernize/improve environmental science labs	\$6,000	I	BIOL 3070 BIOL/ESC 4520 ESC 1500L, 1510L
2	?	1	Analytical balances	Modernize/improve toxicology labs	\$6,000	I, II	BIOL/ESC 4380
3	? Cheryl decided we didn't need any more in the intro labs – we received some from STEM in Fall 2018	2	Electronic balances	Modernize/improve intro biology labs	\$1000 total (2 x \$500)	II	BIOL 1110
4	<u>2017</u>	1	Leica Microscope	Updating Geology lab abilities	\$5,000	I,II,III	GEOL 1120, 3410, 3420, 3540, 4500, 4800
5	?	1	Utility building	Space to store teaching & research field equipment	\$1,951	II, III	Field oriented courses In BIOL & ESC
6	<u>2008</u>	1	Total Organic Carbon Analyzer	Modernize/improve microbiology & ESC labs	\$30,000	III	BIOL 4220L, 4010L, 4040L, + graduate equivalent courses

7	<u>2006</u>	1	Electric Winch	Safety – self rescue from remote sites	\$3,500	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
8	<u>2006</u>	1	Honda Four Trax 4X4	Access to remote field sites	\$7,243	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
9	<u>?</u>	1	UTC Hybrid 4X4 Field Consortium Vehicle	Access to remote field sites (multiple seating required)	\$38,535	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
10	<u>2014</u>	1	Liquid Scintillation Counter	Needed to replace old, broken unit Radioactive Materials Lab	\$34,744	I, II, III	BIOL 4430, 4530, ESC 5030, 5040, 5997, 5998, 5999
11	<u>2016</u>	24	Apple MacBook laptop computers	Est. of a mobile computer lab that could be checked out by BGES faculty	\$38,376 (24 x \$1,599)	I, II, III	Any BGE course, especially: BIOL 3250, 3260, 3350, 3060, 3070
12	<u>2016</u>	1	Fisher Isotemp Ultra-low (-80 C), undercounter freezer	For long-term storage of our bacterial culture collection – many of these cultures should not be stored with other teaching & research materials from diff. disciplines	\$8,884	I, II, III	BIOL 2100, 4220, 4280, 4530, 4430, ESC 4010, 4430, 5030, 5040
13	<u>2017</u>	1	Insect Cabinet for the Natural History Museum	The insect teaching collection is at capacity and cannot accommodate any new specimens. These cabinets are vital for the growth and well being of the collection.	\$3,883 (shipping incl.)	I, II, III	BIOL4070, BIOL4130, BIOL4999 (Parasitology)
14	<u>2017</u>	1	Equipment Needed to Develop Molecular ID Lab Exercise for Microbiology Teaching Labs	ID of bacterial cultures in research and industry is moving towards molecular techniques. Our micro teaching labs need to evolve to include these techniques	\$12,000 (for all equipment necessary)	I, II, III	BIOL 4220, BIOL 4530, BIOL 4430 ESC 4010, ESC 5030, ESC 4430, ESC 5040

15	<u>2018</u>	1	Petro Thin Section Machine	Replace the existing thin-section machine which is 13 years old and having troubles being maintained.	\$19,590	I,II,III	Petrology, Sed Stratigraphy, Econ Geol, Hist Geol, Geol of TN
16	<u>2018</u> Purchased May 3, 2019	1	Gel Documentation System	This instrument is used with most molecular assessments of gels demonstrating presence or absence of DNA bands. It is absolutely critical to research and teaching. The old unit is no longer working.	\$12,000	I,II,III	Genetics, Molecular Genetics, and others
17	2019	10	Microscope Cabinets/Cubbies	In order to have all teaching labs equipped with microscopes for each student to use during lab, there needs to be a place to store the microscopes. The cubbies purchased in 2017 seem to be working well.	\$9,845.00 (10 X 984.50)	I, II	All labs being taught in 123 Holt, 321 Holt
18	2019	1	Futura PLUS+ Series 9.0 cuft -40 chest freezer	Critical for pest control of Natural History Museum and Herbarium collections. Current -40 freezer isn't large enough to accommodate the amt. of specimens that need to be processed before placement in the collections.	\$5740 + shipping	I, II, III	All zoology and botany courses
19	2019	1	U85-22 -80 Freezer	Natural History Museum and Herbarium currently do not have a -80 freezer for long-term maintenance of DNA/biological samples. Needed to establish a permanent freezer collection for future DNA extractions and DNA library.	\$9000 (shipping estimate included)	II, III	All zoology and botany courses
20	2019	35		321 Holt does not have enough compound scopes in the lab for	\$74,676 Total	I, II	

			Student Compound Microscopes – such as Olympus CX33	every student to be using one. 123 Holt does not have any compound scopes. Adding microscopes to these rooms will make the teaching spaces usable for more courses.	(35 X \$2133.60 includes shipping)		All labs being taught in 123 Holt and 321 Holt
21	2019	35	Student Stereoscopes – such as Accuscope 3075-E-LED	321 Holt does not have enough compound scopes in the lab for every student to be using one. 123 Holt does not have any compound scopes. Adding microscopes to these rooms will make the teaching spaces usable for more courses.	\$42,175 Total (35 X \$1205.00)	I, II	All labs being taught in 123 Holt and 321 Holt
22	2019	8	Trinocular Teaching Compound Microscopes with Camera – such as Olympus CX41 and AU-600	Most teaching labs do not have this technology in the room. Having this would help instructors show students how to use microscopes and show students what they are supposed to be viewing in their scopes.	\$16,000 Total (8 x \$2000)	I, II	All labs being taught in about 8 different teaching labs.
			TOTAL		\$386,142.00		

Table 7.

2018 – Carry Over From 2017

CATEGORIES OF EQUIPMENT:

- I. Equipment needed to maintain course instructional integrity**
- II. Equipment needed to meet existing infrastructure deficiencies**
- III. Equipment needs to meet continuing student/faculty research objectives**

Rank	Fiscal Year Added to List	Quantity	Item	Justification	Cost	Category	Courses impacted
1	?	1	Multiprobe water quality field kits	Modernize/improve environmental science labs	\$6,000 total	I	BIOL 3070 BIOL/ESC 4520 ESC 1500L, 1510L
2	2012	1	Clear View Storage Cabinet	Nat. History. Museum – Replacement of old wooden shelves	\$470	I, II, III	BIOL 4070, 4130, 4050, 4090, 4110, 4140, 4170
3	?	5	Analytical balances	Modernize/improve toxicology labs	\$30,000 total (5 x \$6,000)	I, II	BIOL/ESC 4380
4	?	1	UTC Hybrid 4X4 Field Consortium Vehicle	Access to remote field sites (multiple seating required)	\$38,535	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
5	?	6	Electronic balances	Modernize/improve intro biology labs	\$3000 total (6 x \$500)	II	BIOL 1110
6	?	1	Utility building	Space to store teaching & research field equipment	\$1,951	II, III	Field oriented courses In BIOL & ESC
7	2008	1	Total Organic Carbon Analyzer	Modernize/improve microbiology & ESC labs	\$30,000	III	BIOL 4220L, 4010L, 4040L, + graduate equivalent courses
8	?	1	Electric Winch	Safety – self rescue from remote sites	\$3,500	III	Field oriented courses

							In BIOL, ESC, CHEM, GEOL
9	?	1	Honda Four Trax 4X4	Access to remote field sites	\$7,243	III	Field oriented courses In BIOL, ESC, CHEM, GEOL
10	2017	1	Leica Microscope	Updating Geology lab abilities	\$5,000	I,II,III	GEOL 1120, 3410, 3420, 3540, 4500, 4800
11	2014	1	Liquid Scintillation Counter	Needed to replace old, broken unit in Spratt's lab	\$34,744	I, II, III	BIOL 4430, 4530, ESC 5030, 5040, 5997, 5998, 5999
12	2016	24	Apple MacBook laptop computes	Est. of a mobile computer lab that could be checked out by BGES faculty	\$38,376 (24 x \$1,599)	I, II, III	Any BGE course, especially: BIOL 3250, 3260, 3350, 3060, 3070
13	2016	1	Fisher Isotemp Ultra-low (-80 C), undercounter freezer	For long-term storage of our bacterial culture collection – many of these cultures should not be stored with other teaching & research materials from diff. disciplines	\$8,884	I, II, III	BIOL 2100, 4220, 4280, 4530, 4430, ESC 4010, 4430, 5030, 5040
14	2017 Purchased January 22, 2019	1	Eppendorf 5424 Microcentrifuge	Microbiological labs needing to use microcentrifuges must use the Genetics equipment. Increasing number of Microbiology labs require a dedicated unit	\$2,500	I, II, III	BIOL 4220, 4280, 4530, 4430, ESC 4010, 4430, 5030, 5040
15	2017 Acquired New Brunswick system from STEM February 15, 2019	1	Eppendorf I 2500 Series, Floor Model Incubating Platform shaker + Accessories	Microbiology labs must use shaking incubators for many culture needs. The units now in the lab are old and too small for growing lab needs.	\$17,000	I, II, III	BIOL 2100, 4220, 4280, 4530, 4430, ESC 4010, 4430, 5030, 5040

16	<u>2017</u>	1	Insect Cabinet for the Natural History Museum	The insect teaching collection is at capacity and cannot accommodate any new specimens. These cabinets are vital for the growth and well being of the collection.	\$3,883 (shipping inc.)	I, II, III	BIOL4070, BIOL4130, BIOL4999 (Parasitology)
17	<u>2017</u>	1	Equipment Needed to Develop Molecular ID Lab Exercise for Microbiology Teaching Labs	ID of bacterial cultures in research and industry is moving towards molecular techniques. Our micro teaching labs need to evolve to include these techniques	\$12,000 (for all equipment necessary)	I, II, III	BIOL 4220, BIOL 4530, BIOL 4430 ESC 4010, ESC 5030, ESC 4430, ESC 5040
18	<u>2018</u>	1	Petro Thin Section Machine	Replace the existing thin-section machine which is 13 years old and having troubles being maintained.	\$19,590	I,II,III	Petrology, Sed Stratigraphy, Econ Geol, Hist Geol, Geol of TN
19	<u>2018</u>	1	Gel Documentation System	This instrument is used with most molecular assessments of gels demonstrating presence or absence of DNA bands. It is absolutely critical to research and teaching. The old unit is no longer working.	\$12,000	I,II,III	Genetics, Molecular Genetics, and others
20	2019	10	Microscope Cabinets/Cubbies Ask if geology teaching labs would need something like this.	In order to have all teaching labs equipped with microscopes for each student to use during lab, there needs to be a place to store the microscopes. Ones purchased in 2017 seem to be working well.	\$9,845.00 (10 X 4984.50)	I, II	All labs being taught in 123 Holt, 228 Holt and 330 Holt
21	2019	11	Futura PLUS+ Series 9.0 cuft -40 chest freezer	Critical for pest control of Natural History Museum and Herbarium collections. Current -40 freezer isn't large enough to accommodate the amt. of specimens that need to be processed before placement in the collections.	\$5740 + shipping (Qty=1)	I, II, III	All zoology and botany courses

22	2019	12	U85-22 -80 Freezer	Natural History Museum and Herbarium currently do not have a -80 freezer for long-term maintenance of DNA/biological samples. Needed to establish a permanent freezer collection for future DNA extractions and DNA library.	\$9000 (shipping estimate included) (Qty=1)	II, III	All zoology and botany courses
			TOTAL		\$317,475		

Appendix 5-C

Last Name	First Name	Purpose	Manufacturer	Model	Type	Purchase Date
Tucker	John	Secondary	Dell	Inspiron 8100	Laptop	1-Jul-02
Barbosa	Jose	Lab	Dell	Latitude C640	Laptop	7-Oct-02
Wilson	Thomas	Lab	Dell	Latitude C640	Laptop	7-Oct-02
Spratt	Henry		Dell	Optiplex GX270	Desktop	8-Oct-03
Bramblett	Jeremy	Secondary	Dell	Inspiron 710	Laptop	11-Apr-06
		Dept-Equipment	Dell	Optiplex GX620	Desktop	22-Aug-06
Shaw	Joey	Lab	Dell	Optiplex 745	Desktop	1-Aug-07
Shaw	Joey	Lab	Dell	Optiplex 745	Desktop	1-Aug-07
Tucker	John	Secondary	Apple	iMac 24"	Desktop	23-May-08
Spratt	Henry	Secondary	Apple	iMac 24"	Desktop	6-Mar-09
		Dept	Apple	iMac 24"	Desktop	26-Aug-09
Craddock	Hill	Secondary	Dell	Latitude E6500	Laptop	14-Jan-10
Richards	Sean	Secondary	Apple	MacBook Pro 13"	Laptop	1-Oct-10
Tucker	John	Secondary	Apple	MacBook Pro 15"	Laptop	28-Jan-11
Klug	Hope	Lab	Apple	iMac 27"	Desktop	19-Sep-11
Hayes	Loren	Lab	Dell	Latitude E6520	Laptop	17-Jan-12
Klug	Hope	Lab	Apple	iMac 27"	Desktop	22-Mar-12
Spratt	Henry	Lab	Apple	iMac 27"	Desktop	20-Mar-13
Barbosa	Jose	Lab	Apple	iMac 27"	Desktop	5-Apr-13
Boyd	Jennifer	Secondary	Apple	MacBook Air 13"	Laptop	7-May-13
Carver	Ethan	Secondary	Apple	iMac 27"	Desktop	16-Jul-13
Spratt	Henry	Secondary	Apple	iMac 27"	Desktop	16-Jun-14
Hayes	Loren	Secondary	Dell	XPS 15"	Laptop	31-Dec-14
Murphy	Cheryl	Chemical Inventory Compt	Apple	iMac 21.5"	Desktop	25-Mar-15
Gaudin	Timothy	Primary	Apple	MacBook Pro 15"	Laptop	1-May-15
Chatzimanolis	Stylianios	Lab	Apple	iMac 27"	Desktop	7-Jul-16
Brock-Hon	Amy	Secondary	Apple	iMac 27"	Desktop	8-Jul-16

Beasley	DeAnna	Secondary	Apple	iMac 27"	Desktop	5-Aug-16
Taylor	Jennifer	Secondary	Apple	iMac 27"	Desktop	12-Aug-16
Hossain	Azad	Secondary	MSI	WS72 6QJ-026US 17.3"	Laptop	30-Aug-16
		Lab	Apple	iMac 27"	Desktop	1-Sep-16
Hossain	Azad	Secondary	Dell	Mobile Precision 7710	Laptop	6-Oct-16
Kinnear	Katherine	Secondary	Apple	iMac 27"	Desktop	17-May-17
Beasley	DeAnna	Lab	Apple	iMac 21.5"	Desktop	6-Jun-17
Boyd	Jennifer	Secondary	Apple	MacBook Pro 13"	Laptop	7-Dec-17
Boyd	Jennifer	Lab	Apple	MacBook Pro 13"	Laptop	30-Apr-18
Boyd	Jennifer	Lab	Apple	MacBook Pro 13"	Laptop	30-Apr-18
Boyd	Jennifer	Lab	Apple	MacBook Pro 13"	Laptop	30-Apr-18
Klug	Hope	Lab	Apple	MacBook Pro 13"	Laptop	30-Apr-18
Qin	Hong	Lab	Apple	MacBook Pro 13"	Laptop	30-Apr-18
Sharma	Ritu	Lab	Apple	MacBook Pro 15"	Laptop	3-May-18
Tucker	John	Primary	Apple	MacBook Pro 13"	Laptop	11-Jun-18
Gaudin	Timothy	Secondary	Apple	iMac 27"	Desktop	22-Jun-18
Leasi	Francesca	Primary	Apple	iMac 27"	Desktop	23-Aug-18
		Dept	Apple	iMac 27"	Desktop	18-Feb-19
Adams	Callie	Primary	Apple	MacBook Pro 15"	Laptop	3-May-19
Bramblett	Jeremy	Secondary	Apple	iMac 27"	Desktop	6-May-19
Hayes	Loren	Primary	Apple	iMac 27"	Desktop	7-May-19
Salazar	Wendy	Primary	Apple	iMac 27"	Desktop	7-May-19
Chatzimanolis	Stylianios	Lab	Apple	Mac Mini	Destop	27-Jul-19
Jarvis	Caitlin	Primary	Apple	MacBook Pro 15"	Laptop	21-Aug-19
Hayes	Loren	Lab	Apple	MacBook Pro 15"	Laptop	23-Sep-19
Shaw	Joey	Lab	Dell	Precision 5820	Desktop	23-Sep-19
Leasi	Francesca	Lab	Apple	MacBook Pro 13"	Laptop	20-Nov-19
Boyd	Jennifer	Primary-prior	Apple	MacBook Pro 13"	Laptop	27-Nov-19
		Dept	Dell	XPS 15 7000 Series-7590		27-Feb-20
Leasi	Francesca	Office	Apple	MacBook Pro 15"	Laptop	19-Mar-20
		Dept	Apple	MacBook Pro 13"	Laptop	27-Mar-20

Hossain	Azad	Lab	Dell	XPS 15"	Desktop	15-May-20
Bramblett	Jeremy	Primary	Apple	iMac 27"	Desktop	27-Sep-20
Richards	Sean	Secondary	Apple	MacBook Pro 16"	Laptop	3-Feb-21
Shaw	Joey	Primary	Apple	MacBook Pro 16"	Laptop	15-Mar-21
Boyd	Jennifer	Primary	Apple	MacBook Pro 13"	Laptop	22-Mar-21
Klug	Hope	Primary	Apple	MacBook Pro 13"	Laptop	30-Mar-21
Manning-Berg	Ashley	Secondary	Microsofft	Surface Pro 7+	Tablet	20-Apr-21
Hayes	Loren	Lab	Apple	MacBook Pro 16"	Laptop	17-May-21
Locke	Kelly	Primary	Apple	MacBook Pro 13"	Laptop	26-May-21
		Geology Teaching Computer	Apple	MacBook Pro 13"	Laptop	22-Oct-21
		Dept	Apple	MacBook Pro 14"	Laptop	13-Jan-22
Klug	Hope	Lab	Apple	iMac 24"	Desktop	25-May-22
Klug	Hope	Lab	Apple	iMac 24"	Desktop	25-May-22
Ferdoush	Jannatul	Primary	Apple	MacBook Pro 14"	Laptop	1-Jun-22
Murphy	Cheryl	Primary	Apple	iMac 24"	Desktop	25-Aug-22
Beasley	DeAnna	Primary	Apple	iMac 24"	Desktop	26-Sep-22
Brock-Hon	Amy	Primary	Apple	iMac 24"	Desktop	26-Sep-22
Giles	David	Primary	Apple	MacBook Pro 14", 2021	Laptop	26-Sep-22
Taylor	Jennifer	Secondary	Apple	iMac 24"	Desktop	26-Sep-22
Richards	Sean	Primary?	iMac	24"	Desktop	31-Oct-22
Spratt	Henry	Primary	Apple	MacBook Pro 14", 2021	Laptop	16-Nov-22
Giles	David	Lab	Apple	iMac 24"	Desktop	24-May-23
Taylor	Jennifer	Primary	Apple	MacBook Pro 14"	Laptop	26-May-23
Manning-Berg	Ashley	Lab	Dell	Precision 5820 Tower XCTO Base	Desktop	7-Jun-23
Hossain	Azad	Lab	Dell	Precision Workstation 3581	Laptop	22-Aug-23
Hayes	Loren	Research Computer	Apple	Mac Mini A2626	Desktop	7-Sep-23
Craddock	Hill	Lab	Apple	iMac 27"	Desktop	Spring 2017

Appendix 5-D

**Department of Biology, Geology and
Environmental Science**

Chemical Hygiene Plan

Revised: July 2023

Table of Contents

List of Department and University Contacts.....	2
Purpose of the Chemical Hygiene Plan.....	3
Personnel Responsibilities.....	4
Applicable Areas.....	5
Standard Operating Procedures.....	7
Chemical Labeling.....	12
Laboratory Safety Controls.....	13
Hazardous Waste Disposal.....	16
Record Keeping.....	17
Training.....	18
Chemicals Requiring Approval For Use.....	19
Medical Consultations and Examinations.....	20
Radiation Safety.....	21
Glossary.....	24
References.....	25
Biosafety.....	26
Biohazard Waste.....	27

I. LIST OF DEPARTMENT AND UNIVERSITY CONTACTS

In case of imminent danger to life and safety, **dial 911** from any campus phone, or 423-425-HELP (4357) from any cell phone. Do not dial 911 from a cell phone, as this is routed to the Hamilton County Dispatch, which must then reroute the call to UTC and will result in a delayed response.

Contact	Position	Office/Location	Phone Number	Email
Jessica Sanders	Dept. Chemical Hygiene & Safety Officer; Dept. Emergency Management Officer	214 Holt	423-362-9088	Jessica-Sanders@utc.edu
Dr. Gretchen Potts	Head, Dept. BGES	215 Holt	423-425-4341	Gretchen-Potts@utc.edu
Mr. Robert Mullins	UTC Health & Safety Supervisor	103 Admin. Services	423-425-5820	Robert-Mullins@utc.edu
Mr. Tim Pridemore	UTC Emergency Management Specialist	103 Admin. Services	423-425-2297	Tim-Pridemore@utc.edu
Office of Safety and Risk Management (main office)		103 Admin. Services	423-425-5741	
Mr. Jack Pitkin	UTC Radiation Safety Officer	215A Grote	423-425-4518	Jack-Pitkin@utc.edu
Poison Control Center			800-222-1222	

In case of emergency, the faculty member in charge of the room or area where the situation exists should be contacted. This information is required to be posted on the door placard outside of all laboratory rooms in the Department of Biology, Geology & Environmental Science.

II. PURPOSE OF THE CHEMICAL HYGIENE PLAN

(29 CFR 1910. 1450 (e)) The development and implementation of a written Chemical Hygiene Plan (CHP) is the foundation of compliance required by the Occupational Safety and Health Administration (OSHA) as stated in the publication Occupational Exposure to Hazardous Chemicals in Laboratories (Federal Register, January 31, 1990, pages 3327-3335, part of CFR 1910)
(https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=Standards&p_id=10106).

These rules have also been adopted by the Tennessee Occupational Safety and Health Administration (TOSHA). Additionally, The University of Tennessee at Chattanooga shall be subject to any rules on this subject adopted by TOSHA at a subsequent time.

This rule and standard apply to all persons, including University employees, students, and visitors, authorized to be present in laboratories maintained by the Department of Biology, Geology and Environmental Science (BGE). All persons subject to the CHP shall be informed of the locations of the CHP, the availability of Safety Data Sheets (SDS), and other pertinent reference materials relating to their health and safety while in the laboratory. Application of the CHP follows University of Tennessee Policies on Safety and Health, Subject H, Laboratory Safety.

The CHP shall be reviewed and evaluated for its effectiveness annually by the Department Chemical Hygiene Officer (CHO) and the Chief Chemical Hygiene Officer for the University of Tennessee at Chattanooga (UTC).

The University of Tennessee at Chattanooga is committed to providing a safe working environment and believes employees have a right to know about health hazards associated with their work. All employees have access to pertinent safety information through their supervisory staff. When safety concerns arise, employees are encouraged to contact their supervisor.

It is important that employees assume responsibility for laboratory safety. The people who work in each laboratory are best able to detect potential hazards. So that employees can make knowledgeable decisions about the personal risks of employment, this Chemical Hygiene Plan includes policies, procedures, and responsibilities designed to encourage an awareness of potential hazards in the workplace and to train employees in the development of appropriate, safe working conditions. A training program has been designed for the benefit and protection of all laboratory employees.

III. PERSONNEL RESPONSIBILITIES

A. University Chemical Hygiene Officer

The University CHO for UTC coordinates the Campus Chemical Hygiene Program within University guidelines and has the responsibility to:

- Perform periodic reviews, at least annually, of department CHPs and help prepare revisions to keep the CHP current relative to changes in regulations and University safety policy.
- Conduct annual safety inspections of the laboratories and report their findings to the Departmental CHO. As part of these inspections, the University CHO will test emergency equipment, including fume hoods, eyewash stations and safety showers.
- Coordinate the necessary activities required to ensure that an adequate emergency reaction response capability exists within each department.
- Coordinate a program to ensure that all hazardous materials information resources required by regulations are available to department employees and that the contents of these materials are current.
- Oversee training of department employees to ensure compliance with safety regulations. Laboratory employees should have adequate job orientation so that they may protect themselves against the potential adverse effects of exposure to hazardous chemicals.
- Coordinate necessary medical consultations to satisfy the requirement of the medical consultation and medical examination sections of the standard.
- Coordinate the arrangements of all required employee monitoring to satisfy the requirements of the employee exposure determination section of the standard.
- Coordinate the implementation of the approval procedure for those substances that are designated as requiring prior approval before use.
- Coordinate all other activities that are shown to be necessary to ensure compliance with all aspects of the standard.

To assure compliance with the University of Tennessee Safety Policies, the University CHO has the authority to initiate actions closing down a laboratory if the safety requirements of the Departmental CHP are not met.

B. Department Chemical Hygiene Officer

The Department CHO has the primary responsibility of ensuring the implementation of the provisions of the Chemical Hygiene Program within the Department and perform duties to include:

- Know and understand the requirements of the OSHA Laboratory Standard regulation (29CFR 1910.1450) and the Department CHP.
- Work with Laboratory Supervisors and other employees to develop and implement appropriate chemical hygiene policies and practices.
- Monitor the proper procurement, use and disposal of chemicals in the Department.
- Inform Laboratory Supervisors of chemical-related health and safety requirements and assist with the selection of appropriate safety controls, including laboratory and other workplace practices and procedures, training, and personal protective equipment.
- Seek ways to improve the CHP.
- Know the current legal requirements concerning regulated substances.
- See that appropriate audits are maintained.
- Conduct periodic inspections and take immediate steps to abate hazards that may pose a risk to life or safety upon discovery of such hazards.
- Certify the performance of protective equipment.
- Conduct hazard assessments upon request.
- Annually review and evaluate the effectiveness of the CHP and make updates as appropriate.

C. Laboratory Supervisors

Safety responsibilities for a specific laboratory rest with the faculty or staff member designated by the Department CHO and approved by the Department Head. The designated person must:

- Work with the Department CHO and other employees to develop and implement appropriate chemical hygiene policies and practices.
- Monitor the proper procurement, use, and disposal of chemicals in the laboratory.
- See that appropriate audits are maintained.
- Help project directors develop precautions and adequate facilities.
- Seek ways to improve the CHP.
- Provide regular chemical hygiene and housekeeping inspections including routine inspections of emergency equipment.
- Know the current legal requirements concerning regulated chemicals and the need for protective equipment.
- The laboratory supervisor has the overall responsibility to ensure that students and employees working in their laboratory:
 1. Understand and follow the chemical hygiene rules.
 2. Have working protective equipment available.
 3. Are provided with adequate training.

D. Laboratory Employees, Students and Visitors

All laboratory employees, students and visitors working in the laboratory must:

- Receive training at the time of their initial assignment to a work area where hazardous chemicals are present.
- Conduct each laboratory operation in accordance with the institutional chemical hygiene procedures.
- Develop good personal chemical hygiene habits.
- Follow exactly his or her supervisor's safety instructions, provided it does not conflict with established safety guidelines.
- Be aware of the hazards of the chemicals they are working with and how to handle those chemicals in a safe manner.
- Report any spills, accidents, or conditions that could lead to an accident involving hazardous chemicals to the Laboratory Supervisor or Department CHO.

IV. APPLICABLE AREAS

The rules, regulations, and guidelines set forth in this Chemical Hygiene Plan shall apply to all teaching and research laboratories and any spaces that contain hazardous chemicals within the Department of Biology, Geology and Environmental Science at University of Tennessee at Chattanooga.

V. STANDARD OPERATING PROCEDURES

General precautions for handling all laboratory chemicals should include minimizing exposure because few laboratory chemicals are without hazard. Any mixture of hazardous chemicals is assumed to be more toxic than the most toxic component.

A. Procedures for Working with Chemicals

1. Accidents and spills.

In all cases, consult the SDS for the respective chemicals. The SDS may be found in the SDS notebook within the laboratory. Safety Data Sheets can also be found in the master SDS file, located in 214 Holt.

- **Eye contact:** Promptly flush eyes with water for 15 minutes and seek medical attention.
- **Ingestion:** Consult the SDS or Poison Control Center. Each chemical will affect the body differently. Seek immediate medical attention.
- **Skin contact:** Promptly flush the affected area with water for 15 minutes. In case of a spill over a large portion of the body, use the safety shower. Remove affected clothing. If symptoms persist after washing, seek medical attention.
- **Clean-up:** *The Department CHO is to be immediately notified of any large spills.* Promptly clean up spills using appropriate spill control materials and personal protective equipment. Dispose of clean-up materials properly. If possible, spill containment and remediation should be performed by the Laboratory Supervisor. If there is any question about how to clean a spill, consult the chemicals' SDS and the Department CHO. In case of severe health hazards, notify the Department CHO, who will contact the UTC CHO, as necessary.

2. Avoid unnecessary exposure to hazardous chemicals.

- Never eat, drink, smoke, vape or apply cosmetics in areas where laboratory chemicals are present.
- Storing, handling, or consuming food or beverages in a laboratory or chemical storage area is prohibited. The use of laboratory glassware, utensils, or refrigerators for foodstuff that will be consumed is also prohibited.
- Ensure that appropriate eye protection is worn by all persons, including students and visitors, in areas where chemicals are stored or used.
- Wear appropriate gloves when the potential for contact with toxic chemicals exists. Inspect the gloves before each use, wash before removal (where appropriate), and replace as needed.
- Use properly fitted respiratory equipment when air contaminant concentrations are not sufficiently restricted by fume hoods. Inspect the respirator before each use.
- Do not smell or taste chemicals.
- Use only those chemicals for which an adequate ventilation system is available. Apparatus that discharges toxic chemicals (vacuum pumps, distillation columns, etc.) should be vented into local exhaust devices.
- Do not use mouth suction for pipetting or to start a siphon.
- Use protective and emergency apparel and equipment when appropriate.
- If contact lenses are worn in the laboratory, inform the Laboratory Supervisor so special precautions can be taken in the event of eye injury.
- Remove laboratory coats immediately upon contamination and dispose of properly.
- Wash areas of exposed skin before leaving the laboratory.

3. Follow standard laboratory safety protocols.

- All chemicals should be properly labeled and stored.
 - *Keep all oxidizing agents at least 10' away from flammables and solvents.* All chemicals should be stored in secure containers within enclosed cabinets, if possible.
 - Flammables and acids should be stored in authorized, appropriate storage cabinets.
 - Store flammable solvents and acids separately.
 - Keep all large quantity containers within appropriate storage cabinets. After removing the needed amount from a large container, return the container to the appropriate storage cabinet.
 - All chemicals should be monitored monthly to ensure effective status and continued safety measures. For example, picric acid crystals should be kept moist. *Immediately request disposal of expired chemicals.*
 - Keep the work area clean and uncluttered; clean up the work area on completion of an operation or at the end of each day.
 - Do not use damaged glassware. Handle and store laboratory glassware with care to avoid damage.
 - Dispose of broken or damaged glassware in a designated broken glass receptacle. Broken glassware may not be discarded in the regular trash.
 - Use a fume hood for operations that might result in the release of toxic chemical vapors or dust. Use a fume hood or other local ventilation device when working with any moderately volatile substance with a TLV of less than 50 ppm.
 - Keep materials stored in fume hood to a minimum; do not allow materials to block vents or air flow. Leave the fume hood on if toxic substances are stored in it or if needed to augment laboratory ventilation.
-
- Always wear close-toed shoes in the laboratory.
 - Confine long hair or loose clothing.
 - Horseplay, disorderly conduct, or use of abusive language in the laboratory is prohibited.
-
- Seek information about hazards and plan appropriate protective procedures before beginning a new operation. Consult the SDS or laboratory manual if in doubt about appropriate procedures for a specific chemical.
 - In the event of failure of a utility service, leave lights on, place an appropriate sign on the door, and notify the Department CHO.
 - If questionable hazardous conditions are found, immediately notify the Laboratory Supervisor and/or Department CHO to remedy the situation.
 - Properly label all chemicals before placing in Hazardous Waste Room (108 Holt), including a list of all chemicals in the container. Do not mix questionable agents (e.g., organics with nitric acid or oxidizers).
 - Requests for ordering chemicals should be submitted to the Department CHO. The Department CHO must be aware of all chemicals entering the department so that proper handling, monitoring, record keeping, and training can be accomplished in a timely manner.
 - A current SDS manual is maintained in 214 Holt. Review the appropriate SDS regarding any question about handling, storage or disposal of a specific substance.
 - Be aware of unsafe conditions and see that they are corrected.
 - Unauthorized persons, children or pets are prohibited in laboratories.

B. Housekeeping

Custodial employees of UTC Facilities Planning & Management should not be entering BGE laboratories for housekeeping purposes. Housekeeping for each laboratory is the responsibility of the Laboratory Supervisor.

The Laboratory Supervisor should conduct regular housekeeping inspections to assess the following:

- Non-hazardous trash is deposited in appropriate receptacles. Once the receptacles are full, they are placed in the hallway for custodians to empty.

- Broken glass and sharps must be placed in a separate labeled receptacle. Once the receptacle is $\frac{3}{4}$ full, completely seal the receptacle. The Laboratory Supervisor should take the receptacle to the nearest dumpster. Custodians do not dispose of broken glass.
- Chemical spills are promptly reported to the Department CHO. Custodians DO NOT clean up any type of chemical spill.
- Proper storage of chemicals, equipment and supplies are maintained to minimize clutter.
- Custodians do not clean counter tops. It is the responsibility of the Laboratory Workers, Students and Laboratory Supervisor to clean all counter tops and upper surfaces in the laboratory area.
- Hazardous and biohazardous waste should be disposed of properly. See sections VIII and XVII for further information.

C. Chemical Inventory

A current chemical inventory for each laboratory is maintained by the Department CHO. When the Department CHO receives the ordered chemical, the container is labeled with a receive date, and pertinent information is added to the department chemical inventory.

Annually, in coordination with the Department CHO, the Laboratory Supervisor will update the chemical inventory in their laboratories and provide the Department CHO with a copy. The Department CHO will forward a complete department chemical inventory to the UTC CHO within the Office of Safety and Risk Management (OSRM), annually, no later than January 31st of each year.

A chemical inventory is performed annually, listing all the hazardous chemicals in the laboratory. Chemicals listed are those classified as hazardous by the Department of Transportation (DOT), the Environmental Protection Agency (EPA), or displaying a 2 or greater in any section of the National Fire Protection Association (NFPA) diamond.

Chemicals are listed alphabetically along with the CAS, manufacturer's name, catalog number, container size and type, location, storage designation, receive date and expiration date. Chemicals stored in secondary containers are not included on the chemical inventory.

Inventories are currently listed in excel spreadsheets. There is one file per building in BGE and within each file, a worksheet for each room. A complete chemical inventory is in the office of the Department CHO, the UTC CHO, as well as the local fire department and the State Department of Labor (TOSHA).

When chemical inventories are kept current it serves the purpose of keeping tighter control over chemicals within laboratory areas, prevents excessive stockpiling of chemicals, thereby reducing the hazards involved, as well as saving money by purchasing only needed chemicals.

D. Safety Data Sheets

Each laboratory (and any other spaces with hazardous chemicals) will have a current SDS notebook. The SDS notebook needs to be easily found and accessible to anyone working in the laboratory. Upon request by the Laboratory Supervisor, an electronic folder that contains the SDSs may be uploaded to a laboratory computer. This is in addition to the SDS notebook and not a substitute for the hard copy. The electronic copy should be easily

available to anyone working in the laboratory at any time. The SDSs are kept in alphabetical order within the notebook.

A master department SDS folder is in 214 Holt. The SDSs are kept in alphabetical order within the folder. The Department CHO is responsible for updating the SDS file (both master and laboratory) as new materials are procured.

Whenever a new chemical is introduced into the laboratory, immediately notify the Department CHO so that proper training may be completed prior to the use of the chemical. In most cases, this will only involve the review of the SDS to determine the proper handling of the chemical. At this time the Department CHO will determine if any special protective devices or procedures are required.

E. Chemical Storage

BGE Chemical Storeroom is in 106 Holt. This is also the location where newly purchased and inventoried chemicals are located. The Department CHO notifies the Laboratory Supervisor when the item is available for retrieval and relocation to their laboratories.

1. General Chemical Storage

- Chemical storage areas within laboratories should be minimized. Each chemical in the laboratory must be stored in a specific location and returned there after each use. Acceptable storage locations may include:
 - o Flammable cabinets
 - o Corrosive cabinets
 - o Laboratory shelves: with $\frac{3}{4}$ " lip on open shelving, otherwise within shelving that has doors to prevent falling off the shelf.
 - o Appropriate laboratory refrigerators or freezers: *no food is permitted where chemicals are stored.*
- Fume hoods should not be used as permanent chemical storage areas. Not only does this create potentially unsafe conditions by having extraneous chemicals stored near chemical reactions and processes, excess chemical bottles in the hood may also seriously impair the ventilating capacity of the hood. Only chemicals being used in the process or experiment being conducted in the hood are allowed to be stored in the hood. They should also be removed when the process or experiment is complete.
- Chemicals should not be permanently stored on bench tops. Avoid storing any chemical containers on the floor. Chemical containers should not be stored in aisles, corridors or in front of doors.
- Chemicals should not be stored above eye level.
- Periodic clean-outs of expired or unneeded chemicals should be conducted to minimize the volume of hazardous chemicals stored in the laboratory.
- Always follow the chemical manufacturer's storage instructions, if provided.

2. Hazard Classes for Chemical Storage

Chemicals can be stored in alphabetical order only if they are in compatible chemical categories (hazard classes). Special attention must be paid to ensure that oxidizing agents and other reactive chemicals are not stored close to interactive agents. As of 2016, many manufacturers designate on container labels which hazard class the chemicals belong to via a color-coding system and GHS pictograms (29 CFR 1910.1200) (See Figures 1 & 2).

- Flammables
 - o Storage Code = Red; Pictogram = Flame
 - o No more than 10 gallons of flammable liquid is permitted to be stored outside of a flammable storage cabinet.

- Corrosives (Acids and Bases)
 - o Storage Code = White; Pictogram = Corrosion
 - o Caustic (corrosive) materials are defined as substances that cause destruction of living tissue by chemical corrosion at the site of contact and can be acidic or basic.
 - o Corrosives should be stored within a corrosive storage cabinet in which acids and bases are always segregated.
 - o Organic acids (e.g., acetic acid, formic acid) must be stored away from oxidizing acids (e.g., nitric acid, perchloric acid) as these are incompatible with each other.
 - Segregation is achieved by either physical distance (preferred method) or by secondary containment.

- Oxidizers
 - o Storage Code = Yellow; Pictogram = Flame Over Circle
 - o Oxidizers are materials that may cause or contribute to the combustion of other materials by yielding oxygen.
 - o Oxidizers should be stored in a designated storage cabinet.
 - o *Keep all oxidizing agents at least 10' away from flammables and solvents.*

- Poisons and Acutely Toxic Materials
 - o Storage Code = Blue; Pictograms = Health Hazard, Exclamation Mark and/or Skull and Crossbones
 - o Appropriate storage locations for poisonous and toxic materials include desiccators, designated storage cabinets and non-domestic refrigerators and freezers. These locations should be clearly posted.
 - o Best management practice dictates that acutely toxic materials should be always stored in secondary containment.
 - o A separate inventory list of carcinogens and suspected carcinogens is maintained by the Chemical Hygiene Officer to comply with federal and state regulations.

- Compressed Gases
 - o Pictogram = Gas Cylinder
 - o Gas cylinders of compressed gases will be strapped or chained to a wall or bench top.
 - o When not in use, gas cylinders should be capped.
 - o Cylinders that are in use, must be individually secured.

Figure 1. OSHA GHS Pictograms

Health Hazard  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	Flame  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	Exclamation Mark  • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder  • Gases Under Pressure	Corrosion  • Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	Exploding Bomb  • Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle  • Oxidizers	Environment (Non-Mandatory)  • Aquatic Toxicity	Skull and Crossbones  • Acute Toxicity (fatal or toxic)

OSHA Accepted, Industry Standard Labeling System

GHS Compliant Label
Color-coded labels make safe storage simple

Pictograms:
Conveys specific information about the hazard(s) of a chemical

Signal Word:
Level of severity
of hazard.

Hazard Statements:
Describe the nature of hazard(s) associated with a chemical.

Precautionary Statements:
Recommended measures to take to prevent adverse effects

Health Hazard

- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizers
- Target Organ Toxicity
- Aspiration Toxicity

Gas Cylinder

- Gases Under Pressure

Flame Over Circle

- Oxidizers

Flame

- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides

-  **Corrosion**
 - Skin Corrosion/Burns
 - Eye Damage
 - Carnivore to Metals
-  **Environment (non mandatory)**
 - Aquatic Toxicity
-  **Exclamation Mark**
 - Irritant (skin & eye)
 - Skin Sensitizer
 - Acute Toxicity (harmful)
 - Narcotic Effects
 - Respiratory Tract Irritant
 - Hazardous to Ozone Layer (non mandatory)
-  **Exploding Bomb**
 - Explosives
 - Self Reactives
 - Organic Peroxides
-  **Skull & Crossbones**
 - Acute Toxic (if fatal or toxic)

Emergency: **911**
Poison Control Center: _____
Location of SDS: _____
CHEMTREC: **800-424-9300**
Nearest Telephone Location: _____



Figure 2. Example of color-coding system for hazard classes. Low hazard storage codes are either green or gray (e.g., chemicals from Fisher Scientific have storage code gray).

VI. CHEMICAL LABELING

Specific labeling requirements are defined in the OSHA Hazard Communication Standard. Labels for primary containers (original chemical container) must not be removed or defaced. Every hazardous chemical used in the laboratory that is not in its original container (secondary container) must be labeled. At a minimum, these labels must contain the following information:

- Chemical name: Written, DO NOT use abbreviations or chemical symbols/formulas.
- Hazard class: Written or via GHS pictograms.
- User's name and date

VII. LABORATORY SAFETY CONTROLS

Laboratory safety controls include engineering controls, administrative controls and personal protective equipment (PPE). These controls should be used in a layered approach to minimize exposure to all personnel working in the laboratory. A best practice technique is based on the idea that the best way to control a hazard is to systematically eliminate it from the workplace or substitute a less hazardous technique, process or material. If elimination or substitution are not feasible options, incorporating these controls into everyday laboratory practice must be used. All personnel are responsible to follow administrative controls, use engineering controls and wear PPE correctly and effectively.

There are four primary routes of exposure in which hazardous substances can enter the body: inhalation, absorption, ingestion, and injection. The most likely of these routes of exposure in the laboratory are by inhalation and/or skin absorption (Purdue CHP 2014).

All chemical hygiene-related equipment is monitored by the Department CHO.

A. Engineering Controls

Engineering controls help reduce or eliminate exposures to hazardous chemicals via several routes, including:

- Substitution with less hazardous equipment, chemicals or processes (e.g. chemical storage cabinets for open shelving).
- Isolation of the operator or the process (e.g., use of glove-box).
- Use of forced ventilation systems (e.g., chemical fume hood, biological safety cabinet).

1. Chemical Fume Hoods

Chemical fume hoods are designed to limit exposure to hazardous or toxic fumes or vapors. To determine if a chemical is required to be used inside a chemical fume hood, first check the SDS for the chemical. In section 2 of the SDS, statements such as 'do not breathe dust, fumes or vapors' or 'toxic by inhalation' indicate a need for using a fume hood. The following guidelines for using chemical fume hoods must be always followed:

- Only chemicals and equipment essential to a specific procedure should be placed in the chemical fume hood. Once finished with the procedure, all chemicals and equipment should be removed.
- Chemical fume hoods should NOT be used for storage of chemicals and equipment.
- Do not block the vents or air flow baffles.
- Never put your head inside an operating chemical fume hood.
- Fume hoods are not designed to be used with biological materials.

All fume hoods are inspected annually and certified by OSRM. Any hood not passing inspection is taken out of service immediately and not used until the hood has passed inspection. It is the responsibility of the employer to purchase the parts and replace the unit in a timely fashion so that the risk to employees is minimized.

2. Biosafety Cabinets

Biosafety cabinets (BSC) are enclosed, ventilated laboratory workspaces for safely working with biological materials. The primary purpose of a BSC is to protect the laboratory worker and the surrounding environment from pathogens. Air is filtered as it exits the biosafety cabinet, removing harmful particles. BSCs are not designed to be used with chemicals.

All biosafety cabinets are inspected annually and certified by Department CHO via certification contractor. Any BSC not passing inspection is taken out of service immediately and not used until the BSC has passed inspection.

3. Safety Showers & Eyewash Stations

All laboratories using hazardous chemicals must have immediate access to safety showers and/or eyewash stations. Safety showers must always have a minimum clearance of 24 inches from the centerline of the spray pattern in all directions. Access must be always unobstructed. All lab personnel must be able to locate and properly use the safety shower and eyewash station.

When using the safety shower or eyewash station, flush the affected area for 15 minutes or until emergency personnel have arrived and begin treatment.

Safety showers and eyewash stations are inspected by the Department CHO and annually inspected, flushed and tested by OSRM; records are maintained by the OSRM.

4. Fire Extinguishers

All fire extinguishers should be mounted on a wall in an area free of clutter. Fire extinguishers are inspected monthly by the OSRM.

All lab personnel should know the location of the fire extinguishers in the laboratory.

5. Fire Doors

Laboratories may contain fire doors as part of the building design. These doors are an additional component of the fire containment system and should remain closed unless they are on a magnetic self-closure device. Never disable a fire door closure.

If you are unsure if your laboratory door is fire rated or not, contact the Department CHO.

B. Administrative Controls

Administrative controls are procedures that can be taken to reduce or eliminate hazards associated with the use of hazardous materials. The Laboratory Supervisor is responsible for the safe operation of the laboratories and will work with the Department CHO to provide appropriate administrative controls in their laboratories, which can include the following:

- Ensure that all personnel working the laboratory are provided with adequate documented training for safe work with hazardous materials.
- Development of SOPs for experiments that include safety measures.
- Restricting access to areas where hazardous materials are used.
- Labeling all chemicals.
- Use of safety signs and placards, including Emergency Contact Door Postings outside each laboratory door.
- Good housekeeping and good personal hygiene (e.g., hand washing, regular decontamination of work spaces).
- Prohibit eating and drinking where chemicals are used or stored.

Environmental monitoring is required in all laboratories that use any of the following chemicals (as listed in 29 CFR 1910 Sub-part Z) three or more times per week.

- 1910.1001 asbestos, tremolite, anthophyllite, and actinolite
- 1910.1002 coal tar pitch
- 1910.1003 4-Nitrobiphenyl
- 1910.1004 alpha-Naphtylamine
- 1910.1006 Methyl chloromethyl ether
- 1910.1007 3, 3'-dichlorobenzidine (and its salts)
- 1910.1008 bis-chloromethyl ether
- 1910.1009 beta-naphtylamine
- 1910.1010 benzidine
- 1910.1011 4-aminodiphenyl
- 1910.1012 ethyleneimine
- 1910.1013 beta-propiolactone
- 1910.1014 2-acetylaminofluorene
- 1910.1015 4-dimethylaminoazobenzene
- 1910.1016 N-nitrosodimethylamine
- 1910.1017 vinyl chloride
- 1910.1018 inorganic arsenic
- 1910.1025 lead
- 1910.1028 benzene
- 1910.1029 coke oven emissions
- 1910.1043 cotton dust
- 1910.1044 1, 2-dibromo-3-chloropropane
- 1910.1045 acrylonitrile
- 1910.1047 ethylene oxide
- 1910.1048 formaldehyde
- 1910.1101 asbestos

All spills are contained according to OSHA guidelines, and appropriate spill kits used. Spill kits are stored in BGE Chemical Storeroom (106 Holt) and laboratories, where appropriate.

Assessment of significant risk of all operations is made by the Laboratory Supervisor or Department CHO. Chemical Hygiene and safety policies will be established for each task performed and engineering controls for personal protective equipment assigned.

C. Personal Protective Equipment

Personal protective equipment (PPE) should be used to supplement engineering controls but is not a substitute for engineering controls when they are required. PPE must be worn at all times in the laboratory when handling hazardous materials.

Refer to Section 8 'Exposure Controls/Person Protection' of the SDS for the chemical(s) being used. This will provide basic information on the PPE recommended for use with that chemical.

1. Eye Protection

- **Safety Glasses/Safety Goggles:** Eye protection meeting ANSI Standard Z87.1-2003 is required in all laboratories when hazardous chemicals are in use.
- **Contact Lenses:** BGE does not prohibit the wearing of contact lenses in the laboratory. However, lab personnel should notify their supervisor that they wear contacts. Lab personnel should be made aware of the risks of wearing contacts in areas where hazardous chemicals are used, so they may make their own educated decision about continuing to wear them.

2. Skin Protection

- **Hand Protection:** Laboratory personnel are required to wear impervious gloves when the potential for contact with blood, bloodborne pathogens, infectious materials and/or hazardous chemicals exists. These gloves must be compatible with the type of hazard present.
- **Bodily Protection:** Where the potential for splashes/aerosols from blood, bloodborne pathogens, infectious materials hazardous chemicals exists, an impervious apron or lab coat appropriate for the task must be worn.
- **Clothing and Footwear:** In general, flat close-toed shoes with rubber soles and leather uppers should be worn in the laboratory. Open-toe shoes, flip flops, canvas shoes and sandals should be avoided. Long pants are preferable to shorts and skirts as these garments provide no protection to the legs from spills.

VIII. HAZARDOUS WASTE DISPOSAL

To ensure minimum harm to people and the environment from the disposal of waste laboratory chemicals, OSRM has created a waste disposal program specifying how waste should be collected, stored, and transported. All disposal is done in accordance with the Tennessee Department of Health and the Environment (TDEC).

BGE is responsible for properly storing and separating hazardous waste within the Department until it is picked up by OSRM (via contractor). Within each laboratory, containers collecting hazardous waste will be properly labeled and stored.

To dispose of hazardous waste, the laboratory supervisor notifies the Dept CHO which containers should be disposed. The Dept CHO places the labeled container in 108 Holt (Hazardous Waste Room) in the appropriate storage cabinet. Once hazardous waste is placed in 108 Holt, the weekly log needs to be maintained until pick-up.

Hazardous waste cannot be stored in 108 Holt longer than 180 days. The Dept CHO will notify OSRM (via a hazardous waste pick-up form) there is hazardous waste ready for pick-up at 120 days to allow time for scheduling. The OSRM will coordinate with the Dept CHO to schedule the hazardous waste pick-up.

IX. RECORD KEEPING

Records of environmental monitoring and examinations (including tests and written opinions) for each employee are required.

- Accident investigations: Records written and retained by OSRM.
- Chemical inventory: Each laboratory supervisor is responsible for keeping an accurate inventory of chemicals in his/her laboratory. This inventory will be added to the Department master inventory, maintained by the Dept CHO. A duplicate copy is sent to the OSRM annually.
- Environmental monitoring: Records written and maintained by the Dept CHO and OSRM.
- Training records: Maintained by the Dept CHO and an annual report is provided to the UTC Chief CHO.

In BGE, the Faculty Associate shall serve as the designated Dept CHO and the Custodian of Record. All records are kept, transferred, and made available in accordance with 29 CFR 1910.20.

X. TRAINING

A. Training Requirements

Training is a necessary and important part of the Chemical Hygiene Plan. The OSRM provides training for hazardous materials in the workplace. All laboratory supervisors, employees and students are trained at the time of their initial assignment to work in an area where hazardous chemicals are present. Additional training is required if new assignments involve exposure to different risks. All training is documented in writing by attendance records.

B. CHP Training

All laboratory employees and students must receive documented CHP training prior to any work with hazardous materials. The Laboratory Supervisor is responsible for providing CHP training. CHP training should include the following:

1. **Review the lab-specific CHP in its entirety.**
2. **Review of the lab-specific safety controls.**
3. **Review lab-specific SOPs.**
4. **Review any other lab-specific protocols or requirements.**
5. **Covered Topics Should Include:**
 - Content and location of the CHP
 - Location of the SDS and its component parts
 - Location of emergency contact information
 - Identification of chemical hazards
 - Location of a chemical
 - Proper labeling of a chemical
 - Procedures for handling hazardous chemicals
 - Permissible exposure limits (PEL) for specific chemicals used in the laboratory.
 - Work practices
 - Proper moving, storage, and use of hazardous materials
 - Visual appearance of chemicals used.
 - Signs and symptoms of exposure
 - Protective equipment used to prevent overexposure.
 - Conditions to avoid.
 - Emergency procedures
 - Spill containment
 - Medical consultation procedures
6. **Upon completion of the Chemical Hygiene Training Program the lab employee/student should be able to:**
 - Locate the potentially hazardous chemicals in the workplace.
 - Recognize the chemical labeling and its meaning.
 - Locate the SDS in the workplace.

- Locate the hazard identification, first-aid measures, handling & storage, exposure controls/personal protection, and disposal consideration sections of the relevant SDS.
- Identify the person responsible for the CHP by name and title.
- Discuss the major components of the facility's standard labeling system.
- Identify the appropriate safety controls for the area and demonstrate its proper use.
- Demonstrate emergency procedures in the event of a hazardous chemical spill.

XI. CHEMICALS REQUIRING APPROVAL FOR USE

There are several hazardous chemicals that require an evaluation of proposed protective procedures before any activity involving the handling of the chemical is commenced. If you plan to work with any of the chemicals on the list below, you must contact the Dept CHO. The Dept CHO will then submit a recommendation for approval or rejection to the Department Head, who makes the final decision. Approval must be obtained in advance before purchase or usage of any chemical listed below. It is the responsibility of the Dept CHO to determine through inventory which chemicals are placed on the Acutely Hazardous Chemicals List.

The person responsible for the CHP should review the chemical inventory listing and designate the acutely hazardous materials present. The listing should be reviewed and updated as necessary. Examples for each category of acutely hazardous chemicals are listed below and should not be considered a complete list.

A. Toxic Gas

- Arsine
- Carbon Monoxide
- Fluorine
- Hydrogen Cyanide
- Hydrogen Selenite
- Phosphine

B. Acutely Toxic Compounds

- Cyanide Compounds
- Dioxan
- Pesticides
- Plutonium
- Ricin

C. Shock Sensitive Compounds

- Acetyl Peroxide
- Benzoyl Peroxide
- Nitroglycerine (and other nitro- compounds)
- Picramide
- Picric acid

D. Highly Corrosive Compounds

- Benzenesulfonic Acid
- Benzotrichloride
- Hydrofluoric Acid
- Methanoic Acid\ Ethanoic Chloride

E. Extremely Flammable Compounds

- Arsine
- Carbonyl Sulphide
- Dipropylamine

XII. MEDICAL CONSULTATIONS AND EXAMINATIONS

All employees needing medical attention must use the University Worker's Compensation procedures defined by the UTC Human Resources.

Non-University employees and students shall bear the expense for medical surveillance and treatment in the event of an accidental exposure to a hazardous chemical. These individuals may contact the OSRM to request information about filing appropriate claims for compensation pursuant to the guidelines set forth by the Tennessee Claims Commission.

XIII. RADIATION SAFETY

The purpose of this section of the CHP is to present regulations and recommended procedures for work with radiation sources at UTC to protect the individual, prevent the spread of contamination and to assist in fulfilling the responsibilities of the University to its students, its staff, and its neighbors.

Radiation is an invaluable tool in teaching and research and, when properly used, can provide great benefits to mankind with little or no attendant risk. However, improper use can bring risk of radiation exposure resulting in chronic illness, injury, or even death. The known hazards in the order of their importance, are the deposition of radioactive materials in the body, external exposure to neutrons, to gamma and x-rays, and to beta radiation.

Use of radiation sources implies acceptance by the user of some increased exposure above the natural background radiation to which everyone has always been exposed. Common sense dictates that such increase in personnel exposures and contamination levels should be kept to a minimum consistent with reasonable effort and expense. Minimums considerably lower than the so-called "Maximum Permissible Levels" can be maintained provided the user has adequate knowledge, adequate equipment, and the skill and disposition to use them. Proper disposition means a balanced perspective towards radiation entailing a healthy respect, free of both the blind fear of the novice and the familiar contempt one sometimes encounters in the "old hand."

This section is designed to help University staff in performing teaching and research with radiation sources in a safe, legal, and efficient manner without imposing unnecessary restrictions on anyone's work. Some of the rules come from Federal and State Regulations which, having the force of law, permit no modifications unless specifically permitted by law.

In general, it is the responsibility of the individual radiation user to understand and conduct their operations in an acceptable manner to minimize hazards to themselves and others. It is the responsibility of the laboratory supervisor to ensure that all personnel, particularly new personnel, in their area are properly instructed with respect to the nature of the radiation hazards and the necessary radiation safety procedures in their laboratory and that they possess the necessary skills and disposition to cope with radiation safety problems safely. The Radiation Safety staff is responsible for assisting all users and supervisors by providing consultation and certain services in matters of radiation safety.

The Radiation Safety Committee is responsible for establishing policies for the Radiation Safety Program, for reviewing the work of the Radiation Safety staff, and advising both them and the radiation users on particular problems.

A. Radiation Laboratory Procedures

- The use of radioisotopes is restricted to approved areas.
- Before using any radioisotope in the laboratory, you must be familiar with limitations placed on this institution regarding isotope use.
- To prevent accidental entry of radioactive materials into the body, high standards of cleanliness and good housekeeping must be maintained in all laboratories where radioactive material is present.
- Always use gloves. Remove gloves before leaving the work area. Wear protective clothing (lab coats, masks, shoe covers) as needed.
- Wash hands and arms thoroughly before handling any object which goes to the mouth, nose, or eyes (e.g., cosmetics, foods). Keep fingernails short and clean.

- Smoking and eating in radioisotope laboratories is prohibited. No food or drink may be stored in laboratory refrigerators.
- One or more trial runs with non-radioactive materials are recommended for new procedures and new personnel to test effectiveness of procedures and equipment.
- Use double containers for storage of working solutions of radioisotopes. For example, if the radioisotope solution is in a liquid scintillation vial, place the vial in a small beaker.
- Never pipette by mouth. Use rubber bulbs, syringes, or mechanical devices.
- Clean up minor spills immediately. For major spills, follow emergency procedures.
- Whenever possible, operations with radioactive materials should be conducted in a hood, dry box, or some other type of closed system. Operations with materials susceptible to atmospheric distribution, such as boiling, evaporating, distilling or ashing, must be done in a fume hood with an air flow of approximately 100 linear feet per minute. Work with activities of more than a few hours half-life should be done over a tray. Work with finely divided powder must be done in a fume hood or closed system.
- Table and bench tops should be made of non-porous, chemical resistant material. Working surfaces shall be covered with absorbent paper regardless of the type of surface.
- When work is completed, each person will clean up their own work area and arrange for disposal or proper storage of all radioactive materials and equipment.
- Vacuum pumps used in systems containing radioisotopes must not be permitted to exhaust into the room air or out windows. Use a double trap mechanism on any vacuum system.
- Exhaust stacks must not be vented near windows that can open or building air intake vents.
- Laboratories shall provide special radioactive waste containers. These shall bear the words "Caution, Radioactive Waste".
- Laboratory personnel are responsible for all housekeeping within the laboratory.
- Repairs such as plumbing, etc., should not be undertaken unless Radiation Safety has been notified.
- When use and storage of radioactive materials will be terminated at a facility, notify the Radiation Safety Officer, who must make a terminal survey before an area can be released for other uses.

B. Radioactive Waste Management

Researchers must ensure, prior to the procurement of any radioactive materials, that a method of disposal of the materials either presently exists or can be worked out to the satisfaction of the Radiation Safety Officer.

- Each Radioisotope Laboratory Supervisor must maintain accurate records of the types, quantities, and forms of radioisotopes placed in the radioactive waste which is released from their radioisotope laboratory. Records kept by the Laboratory Supervisor may be based on either calculations or on measurements.
- Radioactive waste containers should be stored as close to the work area as possible to minimize the probability of spillage during the transfer of waste to the containers.
- Waste containers shall not be stored in hallways, stairwells, or other uncontrolled areas.
- Radioactive waste containers should be always covered when not in use.
- Each radioactive waste container shall be labeled with a "Caution Radioactive Materials" label or sticker.
- When handling or transferring radioactive waste, the individual should wear a laboratory coat and disposable gloves.
- Radioactive wastes containing carcinogens, biohazards, or very hazardous chemicals must be inactivated, if possible, and packaged in such a way that they present minimal hazards to people who handle the wastes.

C. Radiation Emergency Procedures

In all emergencies, the UTC Radiation Safety Officer and UTC CHO should be contacted as soon as possible.

1. Extreme Hazards.

Defined as high radiation levels or the possibility of airborne contamination from dry or volatile radioactive materials.

- Evacuate the laboratory immediately. Close and lock the door.
- Summon the UTC CHO and the Radiation Safety Officer (RSO) immediately.
- Remove shoes if contamination is suspected. Do not touch anything unnecessarily.

2. Other Hazards.

Examples: spills or suspected spills of radioactive materials where the material is not airborne.

Keep calm. Assume that you are contaminated until a survey proves otherwise

- Confine contamination.
 - o Localize the spill. Right a tipped container, then drop absorbent material on the spill.
 - Do not try to clean up entirely
 - o Damp down a dry spill.
 - o Do not track contamination around the laboratory. Call for help if possible.
 - o Close the door to prevent the spread of airborne contamination.
 - o Check shoes before leaving the area after a spill has been cleaned up.
- Protect personnel.
 - o Remove contaminated clothing and wash contaminated parts of the body with detergent.
 - o Warn other workers.
- Decontaminate.
 - o If thorough washing does not remove contamination from the body, consult the UTC CHO.
 - o Do not spread radioisotopes to clean areas.

XIV. GLOSSARY

The following terms are used as part of the Chemical Hygiene Plan:

Acute: An adverse effect with symptoms of high severity coming quickly to a crisis.

Carcinogen: A substance capable of causing cancer.

Chemical Hygiene Officer (CHO): The person responsible for the chemical hygiene program and the content in the chemical hygiene plan.

Chemical Hygiene Plan (CHP): "A written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment, and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workspace." 29 CFR 1910.1450.

Combustible: Able to catch on fire and burn.

DOT: Department of Transportation

EPA: Environmental Protection Agency

Flammable: Capable of being easily ignited and burning with extreme rapidity.

Infectious: Sources that cause infections either by inhalation, ingestion, or direct agents contact with the host material.

OSHA: Occupational Safety and Health Administration, the regulatory branch of the Department of Labor concerned with employee safety and health.

PEL: Permissible Exposure Limit: The legally allowed concentration in the workplace that is considered a safe level of exposure for an 8-hour shift, 40 hours per week.

PPE: Personal protective equipment: Clothing and other equipment worn by the personnel used to minimize the risk of coming into bodily contact with a hazardous material.

SDS: Safety Data Sheet

XV. REFERENCES

THE FOLLOWING SOURCES WERE USED TO PREPARE THIS PLAN:

1. U.S. Department of Labor, final rule part II. Federal Register 29 CFR Part 1910. Occupational Exposure to Hazardous Chemicals in Laboratories, Wednesday, January 31, 1990.
2. National Research Council. Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press, 1981.
3. National Research Council. Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press, 1983.
4. A Model Chemical Hygiene Plan for Laboratories, Terry Jo Gile, MT(ASCP), MA Ed. Clinical Laboratory Management Association, Inc. 1990.
5. Purdue University Chemical Hygiene Plan and Hazardous Materials Safety Manual. July 2014.

XVI. BIOSAFETY

Below is information regarding use with biohazardous materials and biologicals. Note: UTC facilities cannot currently support activities requiring BSL-3 or higher containment.

Further information will be provided here. Resources for information include the UTC IBC <https://www.utc.edu/research/research-integrity/institutional-biosafety-committee-ibc>

And the UTK biosafety program.

<https://biosafety.utk.edu>

A. Biosafety Levels

BSL-1: Not known to consistently cause disease in healthy adult humans, and of minimal potential hazard to laboratory personnel and the environment. Examples: *Saccharomyces cerevisiae*, *E. coli* K-12, and non-infectious bacteria.

BSL-2: Moderate potential hazard to personnel and the environment. Includes bacteria and viruses that cause mild disease to humans or are difficult to contract via aerosol in the lab setting. Examples: Hepatitis A virus, *Streptococcus pyogenes*, *Borrelia burgdorferi* (Lyme disease), *Salmonella* species.

BSL-3: Microbes that are either indigenous or exotic, and they can cause serious or potentially lethal disease through respiratory transmission. Examples: *Yersinia pestis* (plague), *Mycobacterium tuberculosis*, SARS, rabies virus, West Nile Virus, hantaviruses.

BSL-4: Dangerous and exotic, posing a high risk of aerosol-transmitted infections. Infections caused by these microbes are frequently fatal and without treatment or vaccines. Examples: *Ebola* virus, smallpox virus.

B. Biosafety Practices

Basic Elements of standard microbiological practices at BSL-1:

- Restricting access to laboratories using biological hazards to appropriate personnel.
- Wash hands after handling biologicals and potentially hazardous materials, after taking off gloves and before leaving the lab.
- Avoid hand-to-face (or mouth) contact. No eating, drinking, smoking or applying cosmetics in the labs.
- Disinfect work surfaces daily and decontaminate after spills.
- Handle, manage and dispose of sharps appropriately.
- Use procedures that minimize the formation of aerosols and splashes; engineering controls for aerosol release may be required.
- Wear appropriate PPE.
- Use primary and secondary containment when transporting materials.
- Dispose of non-sharps solid biological waste in proper container (see below). Liquid biological waste must be disinfected or autoclaved before sink disposal.

Biosafety Level 2 practices consist of BSL-1 PLUS:

- Hazard communication through door signs/placards and biohazard labelling
- More stringent PPE requirements.
- Aerosol control and containment.
- Enhanced engineering controls via biosafety cabinets and emergency eyewashes.

XVII. BIOHAZARD WASTE

Solid Biohazard Waste:

Solid biohazard waste will be placed in a red biohazard bag. Tie off the bag to make sure it is closed and place in a biohazard cardboard box.

- Biohazard bags and boxes are found in 108 Holt (Hazardous Waste Room).
- Maximum weight per box = 40lb.
- Use packing tape to seal the biohazard box, both top and bottom.
- Do not close the biohazard boxes using an 'over/under' technique.
- On the box, write your name and the contents.

When the biohazard box is ready for pick-up, take the box to 108 Holt. There is a designated location for the biohazard boxes.

Notify the Dept CHO there are boxes in 108 Holt ready for pick-up.

If new biohazard bags and boxes are needed in 108 Holt, please notify Dept CHO.

Prior to placement in 108 Holt, biohazard waste should be contained within each faculty's research space or teaching lab in which it was generated. DO NOT place biohazard waste in the hallways.

Biohazard Waste for Non-Preserved Specimens: If biohazard waste is not preserved, it will biodegrade and start smelling very quickly, which makes for unsafe working conditions.

- If you have biohazard waste that is not preserved (or has not been sterilized prior to pick-up), keep specimens in the refrigerator/freezer.
- Inquire with Dept CHO when the next biohazard waste pick-up is scheduled for BGE.
- When the Dept CHO lets you know when the pick-up is scheduled, box the biohazard waste according to the guidelines above and place in 108 Holt within 24 hours of the scheduled pick-up (Ideally 12 hours).
- This will help ensure that the biohazard waste does not biodegrade and smell for prolonged periods of time.

108 Holt is card swipe access for BGE Faculty and Staff only. Students are not allowed card swipe access to this room.

Liquid Biohazard Waste:

- Liquid biological waste must be disinfected (e.g., using Decon disinfectant, bleach or 70% ethanol overnight) or autoclaved before sink disposal.