Academic Program Review

Engineering Management
Graduate Program Self-Study Report

Academic Years 2015-2020
Table of Contents

Preface and History
A. History of the University of Tennessee at Chattanooga 1
B. Background of the Graduate Engineering Program 1

Part I. Learning Outcomes
1.1 Learning Outcomes 4
1.2 Program Evaluation 4
   A. Capstone Projects 4
   B. Assessment and follow up actions 6
1.3 Use of Evaluation Information 7
1.4 Institution’s Mission 7

Part II. Curriculum
2.1 Curriculum Review 8
2.2 Course Scheduling and Offerings 12
2.3 Comparison with Similar Undergraduate Courses 15
2.4 Alignment with Learning Outcomes 15
2.5 Curricula Structure 16
   A. Engineering Management Program Curricula Samples 16
   B. Certificate Programs 19
2.6 Professional Practice 22
2.7 Online and In-Class Parity 22
2.8 Pedagogical Methods 23

Part III. Student Experience
3.1 MS Engineering Program Enrollment and Peer Identification 23
   A. Admission Requirements 24
   B. Recruitment 25
   C. Enrollment 25
   D. Degrees Awarded 26
3.2 Quality Evaluation 26
3.3 Professional Development Opportunities 26
3.4 Enrichment Opportunities 27
3.5 Diverse Perspectives 29
3.6 Academic Support 29

Part IV. Faculty
4.1 Engineering Management Graduate Coordinator 29
4.2 Faculty Teaching Load 29
4.3 Faculty Diversity 31
4.4 Faculty Professional Development 31
4.5 Improvement Processes 34
4.6 Faculty Evaluation 34

Part V. Learning Resources
5.1 Equipment Evaluation 35
5.2 Learning and Information Resources 35
   A. UTC Library General Information 35
   B. Library Collections and Services 2018-2019 36
   C. Services 37
5.3 Materials and Support Staff 40

Part VI. Support
6.1 Operating Budget 41
6.2 Enrolment and Effectiveness 42
6.3 Program Responsiveness 42
6.4 Graduate Student Data Collection and Placement Evaluation 42
6.5 Procedure Review 42

Appendix
A. Expenditures 43
B. Diversity 44
C. Student Ratings 45
D. Library Information 47
E. Journals 48
F. Example Curriculum Vitae 51
   A. Resume of Seong Dae Kim, Ph.D. 51
   B. Resume of Aldo McLean, Ph.D. 67
G. Undergraduate Syllabi Examples 78
H. Graduate Syllabi Examples 90
I. Oral and Written Communication Rubrics 99
Preface and History

A. History of the University of Tennessee at Chattanooga

The University of Tennessee at Chattanooga is a metropolitan university located in the southeastern corner of the state of Tennessee. Chattanooga’s metro area has a population of approximately 500,000 people that includes not only Chattanooga, but also portions of North Georgia and Northeastern Alabama.

The University of Tennessee at Chattanooga (UTC) became part of the University of Tennessee System in 1969. The System consists of four major campuses located in Chattanooga, Knoxville, Martin, and Memphis. Governance is provided through a UT System President, Chancellors on each campus, and a UT Board of Trustees. The Governor of the State appoints Board members and serves as Chairman of the Board.

Prior to becoming a part of the UT System (in 1969), the university was a private university known as the University of Chattanooga (UC). UC was founded in 1886. It later merged with East Tennessee Wesleyan University of Athens and became Grant University. In 1907 the name was changed to University of Chattanooga. Other institutions in the Chattanooga area, including Chattanooga City College (CCC), a predominately African-American University, became a part of the UT System merger in 1969.

At the time of the merger in 1969, UC’s student population was slightly more than 2,200. Now, UTC, as a public institution, serves more than 11,000 students. Approximately 11 percent of UTC’s students are enrolled in graduate programs. Overall, UTC’s students represent not only Tennessee (coming from 70 Tennessee counties), but they also come from more than 40 states and 60 foreign countries.

B. Background of the Engineering Management Graduate Program

The graduate program in Engineering Management is housed in the College of Engineering and Computer Science at the University of Tennessee at Chattanooga. The program of study leads to a Master of Science degree in Engineering Management.

Chattanooga has a rich history that is deeply rooted in manufacturing, transportation, and electric power production. In the mid-1900s, Chattanooga was often mentioned as being the “dynamo of Dixie,” the “most diversified industrial center of the south,” and the “Pittsburgh of the south.” Although, the manufacturing base of the city has shifted over the years, the city continues to have a diversity of manufacturing activity – from cookies and snack cakes (McKee Baking) to heavy, industrial products (Astec Industries and VW). Chattanooga is also home for the Power Systems Operations Division of the Tennessee Valley Authority (TVA).

As the engineering programs within the college grew and diversified at UTC, it was recognized that many students and practicing engineering professionals were becoming involved in business and management-related activities. There were emerging requirements for training and educational experiences not only in engineering, but also in economics, marketing, product development, human relations, finance, and strategy assessment. This led to the development of the MS Engineering Management (MSEM) degree in the 1980s.

This degree program is intended primarily for people having either engineering or scientific backgrounds and for those people who have moved, or expect to move, into positions having
broad managerial responsibility. The program requires core courses that address concepts and issues associated with globalization, economics, economic decision-making, statistics, marketing, product development, financial analysis, entrepreneurship, quality control and reliability, project management, leadership, value management, and comprehensive strategic management.

The core courses include six, three-semester-hour courses (18 semester hours of credit) that culminate with a capstone course (three semester hours of credit). The capstone course involves an assessment of an approved topic that relates to an important management issue. The goal is to allow the student to analyze a subject and to express, in writing, a clear understanding of the issues along with suggested recommendations for action. A 20/30 - minute oral presentation of the capstone study is also required.

In addition to the core course, there are 15 semester hours of elective courses required to complete the degree. These elective courses are selected from one of three concentrations. The three concentrations include either: (1) Engineering Management, (2) Construction Management, or (3) Power Systems Management.

Currently, the MSEM degree may be completed either in class or through online study (100 percent). This online alternative enables a student to have the flexibility to pursue the graduate degree while continuing to work full-time or engage in activities totally remote from the UTC campus. Courses are offered in a manner that allows students to watch lectures as they are presented (“live”) in class, or to watch the archived lectures at any time of their choosing.

In addition to the MS degree program, there are four Graduate Certificate Programs that provide advanced training and education for busy professionals. These programs include: (1) Construction Management, (2) Logistics and Supply Chain Management, (3) Project and Technology Management, and (4) Quality Management. Each certificate program requires four courses or a total of 12 semester credit hours. These courses, too, may be taken online.

The online program of courses, which includes all courses in the Graduate Engineering Management Program, are delivered using a combination of Blackboard (now Canvas) and Mediasite. This method of delivery allows for a “live” broadcast as well as the storage (archiving) of each lecture for later use on an “as required” basis. This method of delivery has been well-received by both students and faculty.

A significant strength of the program has been the extensive and diverse education and experience of faculty members who teach the courses. Not only is there a major body of knowledge possessed by virtue of academic accomplishment of the faculty, but there is significant managerial experience, also. For example, there are faculty members teaching in the program who have years of senior level executive experience and experience on boards of directors of major companies. Also, there is experience with start-up companies, operations of national-level, federal programs, and overall corporate development issues associated with acquisitions and divestitures. Such experience is not common with many faculties of universities in the United States.

Since the previous visit, the program has sustained its enrollment in Engineering Management, although the enrollment in Construction Management has decreased significantly. We have taken some initiative to address the enrollment issue. A task force made up of Chattanooga area construction industry leaders has been formed and assigned two tasks for AY 2019-2010. The
two tasks are investigating the reasons for the decreased enrollment in the graduate construction management program and trying to devise a plan to promote the program to help with the enrollment. The taskforce will meet as frequent and as long as needed to address these issues. The taskforce was formed with members suggested by the current president and CEO of the AGC of East Tennessee. The group will meet in the third week of February 2020.

One of the main suggestions from the previous visit was ‘to develop an exhaustive plan for the growth of the online program and a justification for requesting additional resources … The College of Engineering and Computer Science has made significant commitment and efforts towards this objective.

In May 2019, The University of Tennessee at Chattanooga (UTC), on behalf of the College of Engineering and Computer Science, entered a three-year agreement with Focus EduVation. Focus EduVation is in the business of providing educational institutions certain bundled services, including: marketing; enrollment, online course design and development; student retention services; and development of industry partnerships. UTC is a leading public university and desires to expand its online distance learning programs, which are expected to be national in scope and appeal, open to both in-state and out-of-state students, and allow international student enrollments where applicable.

In September 2019, the College of Engineering and Computer Science hired Teresa Phillips as the Online Program Coordinator. Her role is to support the online MS programs in engineering, computer science and engineering management. Her duties include marketing the programs, responding to inquiries, reaching out to applicants, onboarding new students, coordinating courses with faculty and working with the partners at Focus EduVation.

To date, new online courses are being developed, we’ve seen a dramatic increase in inquiries, and the greater coordination of communication between prospects, applicants, administration and faculty has been implemented. Processes are being documented and procedures are being streamlined. We plan to increase the applicant population in the next year as well as develop online courses that are currently offered face-to-face only. Current online courses will also be reviewed to include enhancements and Quality Matters attributes so eventually all online courses can be Quality Matters certified.

**Focus EduVation**

FocusEduVation has combined expertly crafted content with innovative media to deliver e-Learning solutions that allow the users to stay on task in memorable and unique way. Their services and learning solutions are personalized and customized to help improve learner outcomes on all levels. With their new processes and techniques, they bring high levels of knowledge, freshness, and talent to the ever evolving of e-Learning.

**Teresa Phillips**

A graduate of the University of Colorado at Colorado Springs, Teresa joined UTC from the University of Texas at Austin. There she was the senior program coordinator for the McCombs School of Business executive MBA program, managing day-to-day operations, admissions and student support. During her time at University of Texas at Austin, the executive MBA program grew to be recognized as a Top 10 program. In supporting the program, Teresa coordinated graduation events for over 1,200 executive MBA students and led cross-functional planning
Part I. Learning Outcomes

1.1. Learning Outcomes

The desired learning outcomes of the MS Engineering Management program graduates are as follows:

- **Application of Engineering Management Principles**: Ability to apply knowledge, techniques, skills, and modern tools of technology and management to solve a broadly-defined engineering and project management problems
- **Effective and Professional Communication**: An ability to apply written, oral, and graphical communication in technical and non-technical environments; and an ability to identify and use appropriate technical literature.

1.2. Program Evaluation

The outcomes of the MS Engineering Management program are regularly evaluated using rubrics developed by the department (see Appendix I) to measure students’ mastery of engineering management principles along with communication and technical writing skills.

Workshops focused on writing and presenting projects are provided each semester to enhance students’ preparation for these assessments. Additionally, students who pursue a master's degree in engineering management without an undergraduate technical degree are required to take additional undergraduate courses prior to beginning graduate-level engineering courses to ensure they acquire vital foundational skills.

Building on the goal to enhance student achievement, the department offers a one-hour Research Methodology course to inform graduate students of the research expectations for this degree and to teach the fundamental skills needed to conduct a research project.

A. **Capstone Projects**

The Capstone Project is the application of engineering management science and theory to real world projects. Rigorous literature review of topics related to the project, data collection, analysis of data, and conclusions, culminating in the submission of the final project documentation of professional quality and oral defense are required.

In order to maintain the high quality and to assist the students in preparation of their projects an organization has been set up in Canvas. Information on the course description, project steps, a report template, resources, such as the library and writing center, previous reports, previous presentations, and online lectures. The last item refers to a recording of the three meetings each semester to aid the students in preparation of their capstone project. These meetings are held live and recorded for online students.

Below are the steps that the graduate student uses toward his/her capstone project:
- Identify potential project areas of interest and discuss with faculty
- Write your project proposal
- Develop a project schedule
- Select your committee members
- Conduct the literature review
- Collect data
- Analyze data
- Write your conclusions and recommendations
- Write the project report and present it

In the last academic year, the Engineering Management graduate students have been involved in a wide variety of capstone projects in various local and regional industries. Table 1 shows a selected list of these capstone projects.

**Table 1. Projects Completed by Engineering Management Students (2018-19)**

<table>
<thead>
<tr>
<th>Student</th>
<th>Project Advisor</th>
<th>Project Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sherrod Munday</td>
<td>Dr. Aldo McLean</td>
<td>Evaluating the FCC’s IBFS Database: A Quantitative and Qualitative Analysis of Satellite Dish Downlink Locations Registered in the IBFS</td>
</tr>
<tr>
<td>Ben Cooksey</td>
<td>Dr. Wolday Abra</td>
<td>A Bamboo Start-up Business</td>
</tr>
<tr>
<td>Khanh Nguyen</td>
<td>Dr. Alexandr Sokolov</td>
<td>A Methodology of Increasing Operational Tempo in Asphalt Plant Field Service Repair</td>
</tr>
<tr>
<td>Robert Matthews</td>
<td>Dr. Ahad Nasab</td>
<td>The Effect of Scope Creep on Company Indigo’s Mechanical Engineering Department Performance Through Utilization of an Engineering Change Notice Process</td>
</tr>
<tr>
<td>Brian Taylor</td>
<td>Dr. Alexandr Sokolov</td>
<td>Method for Improving the Competitive Advantage of the In-House Maintenance Team for a Large Manufacturing Facility</td>
</tr>
<tr>
<td>Sarah Aseltine</td>
<td>Dr. Alexandr Sokolov</td>
<td>Integration of Supply Chain Management Principles into the Department of Defense Acquisition, Technology, and Logistics Process</td>
</tr>
<tr>
<td>Thomas Minwell</td>
<td>Dr. Alexandr Sokolov</td>
<td>The Effects of Solar Generation on Power System Balancing</td>
</tr>
<tr>
<td>Abdulaziz Ghazzawi</td>
<td>Dr. Aldo McLean</td>
<td>Assessing the use of Blockchain in Supply Management</td>
</tr>
</tbody>
</table>
B. Assessment and Follow up actions

The performance of graduate students is assessed using student evaluations given during each semester. These evaluation results are reviewed at the departmental level to make corrective actions, if necessary. In addition, each course has a folder, either electronic or hard copy, where faculty keeps their materials, graded work, student artifacts, etc.

Student learning performance is assessed based on the two learning outcomes, from section 1.1, as follows:

**Application of Engineering Management Principles:** The latest assessment was conducted in Spring 2019. The course ENGM 5540 - Technical Project Management is used as the critical performance indicator for this outcome. Students are graded on their effective application of engineering and management skills to solve a given problem regarding a simulated industry project. Average grade of students in these categories will be at least 80%. The latest assessment data score was greater than 80%. Even though the average grades were above the minimum requirement, a follow up action was deemed necessary for students who did not score well in this course.

**Effective and Professional Communication:** The most relevant courses for this outcome are ENGM 5540, ENGM 5560, and ENGM 5960. Of these three courses, ENGM 5960 - Capstone Project is the one used for assessment purposes since the writing and oral communication aspect of this course is cumulative. Students are graded on their effective written and oral presentation of technical and non-technical issues. Average grade of students in these categories is 80%. The assessment data for Spring 2019 indicates that all students enrolled in this course received grades greater than 80% in both written and oral sections of the course.

The College of Engineering and Computer Science provides project and thesis workshops throughout the semester to prepare students for their final capstone/thesis presentations. The oral communication assessment rubric for graduate students evaluates organization, content, presentation length, visual aids, attention to audience and speaking skills. The written communication assessment rubric for graduate students evaluates drafting, editing, revision, final draft, and timing. These rubrics are shown in Appendix I.

1.3. Use of Evaluation Information
The Engineering Management has a Graduate Curriculum Committee which reviews and makes necessary changes in the graduate curriculum every year based on student evaluations and assessment results.

![Engineering Management Assessment Cycle](image)

**Figure 1. Engineering Management Assessment Cycle**

The process shown in Figure starts in August of every year when the committee meets to modify or ‘establish new learning goals’ for the upcoming academic year based on the ‘gathered evidence’ from the courses designated as performance indicators as previously identified. The decisions of the committee are then condensed into curriculum modification actions by the committee. Currently each department has until November 15th to propose curriculum changes to the College and the University curriculum committees.

After implementing the new action items, all courses including the affected courses are monitored to see if the modified curriculum had the intended effect. Data is gathered in May of each year and analyzed to identify any red flags or issues that need special attention. The faculty and the department administrative assistant are responsible for gathering and organizing the course data. The graduate committee along with the department Head participate in analysis of the data.

### 1.4. Institution’s Mission

The MS Engineering Management program is designed to align directly with the UTC and College of Engineering and Computer Science’s mission, vision, and values, as shown in Table 2.

<table>
<thead>
<tr>
<th></th>
<th>UTC</th>
<th>College of Engineering and Computer Science</th>
<th>Engineering Management</th>
</tr>
</thead>
</table>

Table 2. Alignment of Mission, Vision, and Values
| **Mission** | 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. At UTC we develop a community on campus, enable students to go into the global community and we provide a nurturing environment that connects students, community and opportunity. | The mission of the Engineering Technology Management (ETM) program at UTC is to provide accessible education in the principles and application of technology management, while preparing students to understand and be productive in the work environment. | 1. Educate and train future technical & engineering management workforce for Tennessee, the nation, and beyond. 2. Discover new knowledge in engineering, management, technology, and computer science. 3. Engage communities through scholarship, service and economic development. |
| **Vision** | We Engage Students, Inspire Change and Enrich Community. We nurture students through community connections tied to our values and our region grounded in Chattanooga, a great drawing card and we value our place. | To be a preeminent college of engineering, engineering management, technology, and computer science in education and applied research. | To provide one of the best quality educations in Engineering Management and Construction Management to students nationally and internationally. |
| **Core Values/Goals** | • Students are the primary reason we exist as an institution.  • We live integrity, civility and honesty.  • We relentlessly pursue excellence.  • We embrace diversity and inclusion.  • Creativity, inquiry and scholarship are our culture. We teach, we learn, we interact, we nurture, we grow citizens for tomorrow, and we do the basics and more. | • Enrich Student Experience  • Cultivate excellence in teaching and learning  • Enhance applied research capabilities of the college for broader impact to the society  • Engage community through scholarship and service with leadership and distinction  • Enhance national/international reputation and recognition | In support of the mission, graduates of the ETM program will be able to:  • Demonstrate the necessary understanding of planning, organizing, and problem-solving skills to provide value-added services in technical or management positions;  • Demonstrate good communication skills and be able to function well in multi-disciplinary teams as leaders; and  • Appreciate the need for, and to pursue, self-directed professional development opportunities, such as graduate work, trainings, and participation in professional organizations. |
Part II. Curriculum

2.1 Curriculum Review

The curriculum of the MSEM currently has two concentrations: engineering management and construction management. The number of elective course offerings have recently been modified to facilitate graduation in a timely manner. As stated earlier, curriculum review and proposals take place in August through November of each year. So far, every year, the program has authored many curriculum proposals in an effort to continuously improve the graduate program. The curriculum modification suggestions are initiated by students, faculty, and the Industry Advisory Board. The departmental graduate committee collects all the suggestions and forms them into curriculum proposals. The proposals are then discussed in this committee and action to table or proceed with the proposals is taken.

All graduate core courses are offered at least once a year. All elective courses are offered at least once every other year regardless of enrollment levels. The changes represent a major revision in our curriculum as well as a strong commitment of resources to improve learning opportunities. This new course offering schedule is also very popular within students, employers, and collaborators in the Chattanooga areas and surrounding states.

In the current structure, the requirement of 18 hours core courses and 15 hours elective course stays the same for all concentrations. However, for the construction management concentration, there is a minimum requirement for 9 hours of elective courses to be exclusively from construction elective courses. The additional 6 hours could come from other elective courses available in the curriculum.

Even though the master’s level offering in construction disciplines have had a positive impact on private firms, the enrollment in this program has recently dropped significantly. After consulting with our industry partners, we presume that the decrease in enrollment is due to the booming construction activities in the Chattanooga area where there is a significant shortage of commercial and residential buildings.

The certification programs are a response to the increasing need for engineers to have portable knowledge and skill set responsive to different challenges and environments. Therefore, the new curriculum is designed to provide knowledge and skills needed to function effectively as managers on technical and non-technical processes. The certificate programs accommodates the need of the engineer to focus on particular areas of knowledge through the selection of electives. This focus is important for increased effectiveness within the business as well as for longer-term career development.

Increasingly the students need additional knowledge in areas which cannot be addressed through the former program structure. Additionally, with the varying roles of engineers in industry; i.e., consulting, manufacturing, managerial, etc., the certificate programs allow the student flexibility in a course of study not available with the former structure.

The core courses provide the students a strong foundation in the following areas of engineering management: human resources, engineering economics, project management, leadership and entrepreneurship, and strategic management of technology. A comparison of the old and new
Table 3. Comparison of Engineering Management Graduate Program’s New and Old Curriculum

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core Courses (18 hrs.):</strong></td>
<td><strong>Core Courses (18 hrs.):</strong></td>
</tr>
<tr>
<td>ENGM 5500 - Concepts in Engineering Management (3 Hrs.)</td>
<td>ENGM 5040 - Decision Making and Optimization Techniques (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5540 - Technical Project Management (3 Hrs.)</td>
<td>ENGM 5500 - Concepts in Engineering Management (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5550 - Technical Entrepreneurship and Leadership (3 Hrs.)</td>
<td>ENGM 5540 - Technical Project Management (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5580 - Advanced Engineering Economy (3 Hrs.)</td>
<td>ENGM 5580 - Advanced Engineering Economy (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5830 - Strategic Management and Technology (3 Hrs.)</td>
<td>ENGM 5830 - Strategic Management and Technology (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5960 - Capstone Project (3 Hrs.)</td>
<td>ENGM 5960r - Capstone Project (3 Hrs.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><em><em>Elective Courses</em> (15 hrs.):</em>*</th>
<th><em><em>Elective Courses</em> (15 hrs.):</em>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGM 5040 - Decision Making and Optimization Techniques (3 Hrs.)</td>
<td>ENGM 5510 - Legal and Ethical Perspectives in Engineering (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5510 - Legal and Ethical Perspectives in Engineering (3 Hrs.)</td>
<td>ENGM 5520 - Reliability Engineering (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5520 - Reliability Engineering (3 Hrs.)</td>
<td>ENGM 5550 - Technical Entrepreneurship and Leadership (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5560 - Quality Management Systems (3 Hrs.)</td>
<td>ENGM 5560 - Quality Management Systems (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5570 - Advanced Quality Control (3 Hrs.)</td>
<td>ENGM 5570 - Advanced Quality Control (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5800 - Product Development (3 Hrs.)</td>
<td>ENGM 5800 - Product Development (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5820 - Value Management (3 Hrs.)</td>
<td>ENGM 5820 - Value Management (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5910 - Special Topics in Engineering Management (3 Hrs.)</td>
<td>ENGM 5910r - Special Topics in Engineering Management (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5950 - Research Methods Lab (3 Hrs.)</td>
<td>ENGM 5950 - Research Methods Lab (3 Hrs.)</td>
</tr>
<tr>
<td>ENGR 5920 - Graduate Internship in Engineering (3 Hrs.)</td>
<td>ENCE 5920r - Graduate Internship in Engineering (3 Hrs.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Construction Electives (9 hours)</strong></th>
<th><strong>Construction Electives (9 hours)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGM 5600 - Sustainability and LEED (3 Hrs.)</td>
<td>ENGM 5600 - Sustainability and LEED (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5610 - Construction Law: Contracts and Claims (3 Hrs.)</td>
<td>ENGM 5610 - Construction Law: Contracts and Claims (3 Hrs.)</td>
</tr>
<tr>
<td>ENGM 5620 - Strategic Bidding and Estimating (3 Hrs.)</td>
<td></td>
</tr>
</tbody>
</table>
Graduate Certificate programs are now offered in four distinctive areas of engineering management, each consisting of 4 graduate level courses for a total of 12 hours. Graduate students, who are actively pursuing a master’s degree in the department, can also pursue a graduate certificate by adding a total of 6 graduate hours in the related discipline. The Graduate Certificate programs available in the curriculum are detailed as follow:

- **Project and Technology Management**
  - ENGM 5540  Technical Project Management (3 Hrs.)
  - ENGM 5550  Technical Entrepreneurship and Leadership (3 Hrs.)
  - ENGM 5580  Advanced Engineering Economy (3 Hrs.)
  - ENGM 5820  Value Management (3 Hrs.)

- **Quality Management**

- **Logistics and Supply Management**

- **Construction Management**

- **Certificate Program in Project and Technology Management**
b. Certificate Program in Quality Management

Core Courses
ENGM 5580 Advance Engineering Economy (3 hrs.)
ENGM 5830 Strategic Management and Technology (3 hrs.)

Choice of two Quality-related courses from the below list:
ENGM 5520 Reliability Engineering (3hrs.)
ENGM 5560 Quality Management Systems (3hrs.)
ENGM 5570 Advanced Quality Control (3 hrs.)

c. Certificate Program in Logistics and Supply Chain Management
ENGM 5580 Advanced Engineering Economy (3hrs.)
ENGM 5830 Strategic Management and Technology (3 hrs.)
ENGM 5870 Supply Chain Management (3 hrs.)
ENGM 5880 Global Logistics (3 hrs.)

d. Certificate Program in Construction Management

Core Requirements
ENGM 5540 Technical Project Management (3 hrs.)
ENGM 5580 Advance Engineering Economy (3 hrs.)
Choice of two Construction-related courses from the below list:
ENGM 5600 Sustainability and LEED (3hrs.)
ENGM 5610 Construction Law: Contract and Claims (3hrs.)
ENGM 5620 Strategic Bidding and Estimating (3 hrs.)
ENGM 5630 Advanced Operations and Constructability (3 hrs.)
ENGM 5650 Lean Construction (3 hrs.)

Individuals will be admitted to the Certificate in Engineering Management program if, either:

a. They have a bachelor's degree and significant related professional experience and are approved by the Engineering Management Graduate Committee, or
b. They meet the admission requirements of the Graduate School as stated in the Graduate Catalog, are admitted to the Engineering or Engineering Management M.S. program, and have satisfied all prerequisite courses assigned by the respective Graduate Committee.
2.2. Course Scheduling and Offerings

The curriculum has been designed so students can finish their master’s program in two years, which recommends taking two courses per semester including summers. The department offers at least two core courses and two elective courses per semester in addition to the “Special Topics in Engineering Management” and “Capstone Project” courses, which give adequate options and variety to choose from for Engineering Management graduate students. Table 4 shows the courses that have been offered in the past two years.

<table>
<thead>
<tr>
<th>COURSE INFORMATION</th>
<th>ACADEMIC YR 2017-18</th>
<th>ACADEMIC YR 2018-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGM NO.</td>
<td>TITLE (CREDIT HOURS)</td>
<td>FALL</td>
</tr>
<tr>
<td>5040</td>
<td>Decision Making and Optimization techniques (3)</td>
<td>X</td>
</tr>
<tr>
<td>5500</td>
<td>Concepts in Engineering Management (3)</td>
<td>X</td>
</tr>
<tr>
<td>5510</td>
<td>Legal &amp; Ethical Perspectives in Engineering (3)</td>
<td></td>
</tr>
<tr>
<td>5520</td>
<td>Reliability Engineering (3)</td>
<td></td>
</tr>
<tr>
<td>5530</td>
<td>Advanced Ergonomics (3)</td>
<td></td>
</tr>
<tr>
<td>5540</td>
<td>Technical Project Management (3)</td>
<td>X</td>
</tr>
<tr>
<td>5550</td>
<td>Technology Entrepreneurship &amp; Leadership (3)</td>
<td></td>
</tr>
<tr>
<td>5560</td>
<td>Quality Management Systems (3)</td>
<td>X</td>
</tr>
<tr>
<td>5570</td>
<td>Advanced Quality Control (3)</td>
<td></td>
</tr>
<tr>
<td>5580</td>
<td>Advanced Engineering Economy (3)</td>
<td>X</td>
</tr>
<tr>
<td>5600</td>
<td>Sustainability and LEED (3)</td>
<td>X</td>
</tr>
<tr>
<td>5620</td>
<td>Strategic Bidding and Estimating (3)</td>
<td>X</td>
</tr>
<tr>
<td>5630</td>
<td>Advanced Operations &amp; Constructability (3)</td>
<td></td>
</tr>
<tr>
<td>5800</td>
<td>Product Development (3)</td>
<td></td>
</tr>
<tr>
<td>5830</td>
<td>Strategic Management and Technology (3)</td>
<td></td>
</tr>
<tr>
<td>5870</td>
<td>Supply Chain Management (3)</td>
<td></td>
</tr>
</tbody>
</table>
All courses for the Master of Science in Engineering Management, including Construction Management and Power Systems Management courses, are offered in two sections: The C section for in-class students and the D section for distance learners or online students. Students enrolled in the in-class section have the extra benefit of a face-to-face interaction with faculty and peer students during class meetings. These students are generally (1) able to commute to campus at scheduled class meetings, or (2) students residing in on-campus or near-campus housing. Students enrolled in the distance section have the value of going over lecture topics live or on-demand recordings at their own time and schedule. These students are generally (1) students who cannot commute to campus due to constraints of the places they reside including distance, transportation modes, and others, or (2) be local students but are not able to attend the class as scheduled (e.g. work schedules, others), or (3) students often traveling due to their job responsibilities, or (4) their job positions have been transferred away from the Chattanooga area. Table 5 shows the enrollment in the courses that are offered in the last two years.

**Table 5. Enrollment in the Engineering Management Graduate Courses Offered in the Last Two Years**

<table>
<thead>
<tr>
<th>ENGM NO.</th>
<th>COURSE INFORMATION</th>
<th>ACADEMIC YR 2017-18</th>
<th>ACADEMIC YR 2018-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>5040</td>
<td>Decision Making and Optimization techniques (3)</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>5500</td>
<td>Concepts in Engineering Management (3)</td>
<td>35</td>
<td>15</td>
</tr>
<tr>
<td>5510</td>
<td>Legal/Ethical Perspectives in Engineering (3)</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>5520</td>
<td>Reliability Engineering (3)</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>5530</td>
<td>Advanced Ergonomics (3)</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>5540</td>
<td>Technical Project Management (3)</td>
<td>33</td>
<td>5</td>
</tr>
<tr>
<td>5550</td>
<td>Technical Entrepreneurship &amp; Leadership (3)</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>5560</td>
<td>Quality Management Systems (3)</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>5570</td>
<td>Advanced Quality Control (3)</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>
2.3 Comparison with Similar Undergraduate Courses

The MS Engineering Management course content builds on the principles of engineering management covered at the undergraduate level for both the engineering management and the construction management. In such cases, graduate coursework delves deeper into the conceptual points of the field. Students are encouraged to spend time on key derivations rather than focusing solely on outcomes as a way of illustrating methods they will find useful. The syllabi for two graduate courses (Advanced Engineering Economy and Advanced Quality Control) and their respective undergraduate courses (Engineering Economy and Quality Control and System Reliability) are provided in Appendices H and G, respectively, as examples.

2.4 Alignment with Learning Outcomes

The MS Engineering Management program has clear learning outcomes related to application of engineering management principles and effective and professional communication that graduate students must master to successfully complete the program. The outcomes are aligned with the MS Engineering Management curriculum as shown in Table 6.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5580</td>
<td>Advanced Engineering Economy (3)</td>
<td>26</td>
<td>36</td>
</tr>
<tr>
<td>5600</td>
<td>Sustainability and LEED (3)</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>5620</td>
<td>Strategic Bidding and Estimating (3)</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>5630</td>
<td>Advanced Operations &amp; Constructability (3)</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>5800</td>
<td>Product Development (3)</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>5830</td>
<td>Strategic Management and Tech. (3)</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>5870</td>
<td>Supply Chain Management (3)</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5910</td>
<td>Special Topics in ENGM (3)</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>5910</td>
<td>Transportation Management</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>5920</td>
<td>Graduate Internship in Engineering (1)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5960</td>
<td>Capstone Project (1-3)</td>
<td>16</td>
<td>11</td>
</tr>
</tbody>
</table>

**Table 6. MS Engineering Curriculum Alignment with Program Outcomes**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Outcome 1</th>
<th>Outcome 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGM 5040</td>
<td>Decision Making and Optimization Techniques</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>ENGM 5500</td>
<td>Concepts in Engineering Management</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>ENGM 5510</td>
<td>Legal and Ethical Perspectives in Engineering</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ENGM 5520</td>
<td>Reliability Engineering</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
### 2.5 Curriculum Structure

#### A. Engineering Management Program Curriculum Samples

- Sample curricula, requirements, and course descriptions for the program can be found in the Graduate Catalog at [http://catalog.utc.edu/preview_entity.php?catoid=17&ent_oid=745&returnto=567](http://catalog.utc.edu/preview_entity.php?catoid=17&ent_oid=745&returnto=567). The MS Engineering Management program aims to ensure that course offerings and their contents specifically address the student and industry needs and that appropriate level of rigor and skill mastery is incorporated in its curriculum, as can be seen from course syllabi, shown in Appendix H.
Students are required to complete a minimum of 33 semester hours of prescribed courses for a major in engineering management. The student’s program is planned in consultation between the student and adviser. Each program will be designed to meet the needs of the student, taking into consideration background and experience. In some instances, prerequisite courses may be required. The program requires courses in the core and electives.

Core Courses (18 hours)

- ENGM 5040 - Decision Making and Optimization Techniques
- ENGM 5500 - Concepts in Engineering Management
- ENGM 5540 - Technical Project Management
- ENGM 5580 - Advanced Engineering Economy
- ENGM 5830 - Strategic Management and Technology
- ENGM 5960r - Capstone Project

Electives (15 hours)

- ENGM 5510 - Legal and Ethical Perspectives in Engineering
- ENGM 5520 - Reliability Engineering
- ENGM 5550 - Technical Entrepreneurship and Leadership
- ENGM 5560 - Quality Management Systems
- ENGM 5570 - Advanced Quality Control
- ENGM 5800 - Product Development
- ENGM 5820 - Value Management
- ENGM 5910r - Special Topics in Engineering Management
- ENGM 5950 - Research Methods Lab
- ENCE 5920r - Graduate Internship in Engineering

Total (Core and Elective hours): 33 hours
Engineering Management: Construction Management, M.S.

Program Requirements

Students are required to complete a minimum of 33 semester hours of prescribed courses for a major in engineering management. The student’s program is planned in consultation between the student and adviser. Each program will be designed to meet the needs of the student, taking into consideration background and experience. In some instances, prerequisite courses may be required. The program requires courses in the core and electives.

Core Courses (18 hours)
- ENGM 5040 - Decision Making and Optimization Techniques
- ENGM 5500 - Concepts in Engineering Management
- ENGM 5540 - Technical Project Management
- ENGM 5580 - Advanced Engineering Economy
- ENGM 5830 - Strategic Management and Technology
- ENGM 5960r - Capstone Project

Construction Electives (9 hours)
- Take a minimum 3 construction courses.
- ENGM 5600 - Sustainability and LEED
- ENGM 5610 - Construction Law: Contracts and Claims
- ENGM 5620 - Strategic Bidding and Estimating
- ENGM 5630 - Advanced Operations and Constructability

Other Electives (6 hours)
- ENGM 5510 - Legal and Ethical Perspectives in Engineering
- ENGM 5520 - Reliability Engineering
- ENGM 5560 - Quality Management Systems
- ENGM 5570 - Advanced Quality Control
- ENGM 5800 - Product Development
- ENGM 5820 - Value Management
- ENGM 5910r - Special Topics in Engineering Management
- ENGM 5950 - Research Methods Lab
- ETEM 5920r - Graduate Internship in Engineering Management
Total (Core and Elective hours): 33 hours

B. Certificate Programs

The department offers the following four Post-Baccalaureate Certificate programs:

a. Project and Technology Management
b. Quality Management
c. Logistics and Supply Management
d. Construction Management

An example of the admission and course requirements for two of the certificate programs is shown below. The requirements for other certificates can be found at http://catalog.utc.edu/content.php?catoid=17&navoid=567.
Engineering Management Project and Technology Management Post-Baccalaureate Certificate

Admission Requirements

Knowledge of engineering economy is required as demonstrated by the satisfactory completion of ENGR 3520, Engineering Economy, or equivalent. Individuals will be admitted to the Certificate in Project and Value Management program if either: Have a bachelor’s degree and significant related professional experience such as project management, cost accounting, and economic evaluation of projects and are approved by the Engineering Management Graduate Committee.

OR

a. Meet the admission requirements of the Graduate School as stated in the Graduate Catalog, are admitted to the Engineering or Engineering Management graduate program and have satisfied all prerequisite courses assigned by the respective Graduate Committee.

Course Requirements* (12 hours)

- ENGM 5540 - Technical Project Management
- ENGM 5550 - Technical Entrepreneurship and Leadership
- ENGM 5580 - Advanced Engineering Economy
- ENGM 5820 - Value Management

Additional Information and Notes

*With approval of the graduate program coordinator, students may take a graduate-level course in a similar area of topics to substitute one of the courses in the certificate program if the course is not offered during the study period.
Engineering Management Construction Management Post-Baccalaureate Certificate

Admission Requirements
Knowledge of engineering economy is required as demonstrated by the satisfactory completion of ENGR 3520, Engineering Economy, or equivalent. Individuals will be admitted to the Construction Management Certificate if either:

A. Have a bachelor’s degree and significant related professional experience and are approved by the Engineering Management Graduate Committee.

OR

B. Meet the admission requirement of the Graduate School as stated in the Graduate Catalog, are admitted to the Engineering Management graduate program, and have satisfied all prerequisite courses assigned by the respective Graduate Committee.

Additional Information and Notes:
*With approval of the graduate program coordinator, students may take a graduate-level course in a similar area of topics to substitute one of the courses in the certificate program if the course is not offered during the study period.

- Course Requirements
  - ENGM 5540 - Technical Project Management
  - ENGM 5580 - Advanced Engineering Economy
  - Choose two courses from the list below:
    - ENGM 5600 - Sustainability and LEED
    - ENGM 5610 - Construction Law: Contracts and Claims
    - ENGM 5620 - Strategic Bidding and Estimating
    - ENGM 5630 - Advanced Operations and Constructability
    - ENGM 5650 - Lean Construction
  - Total: 12 Hours

2.6. Professional Practice
The MS Engineering Management program engages students in professional practices and training experiences by offering a variety of seminars, local internship opportunities, and job fairs throughout the year. Students are informed of these via email, bulletin boards, and e-boards. In addition, capstone projects also act as professional practice resources. Examples of these can
be seen in Table 1, Section 1.2. A partial list of companies who offered internship opportunities to our students in academic year 2018-2019 is given below:

VW Group of America
Industrial Fabrication Inc.
WAUPACA Foundry Inc.
Woodbridge Inoac Technical Inc.
Marketing Alliance Group
Civil Constructors
Tennessee Department of Transportation (TDOT)
J C Curtis Construction
Heffernin+Kronenberg Architects

2.7. Online and In-Class Parity
In 2001, we began delivering Engineering Management Graduate Program courses by alternative delivery methods. A variety of online techniques were developed and implemented by various faculty members. One method was to produce MS PowerPoint slides with voice over, while another was to post the PowerPoint slides, reading assignments, and homework in Blackboard, by using the online course management system used by the University of Tennessee at Chattanooga, and communicate by phone and e-mail. In 2006, the Engineering Management graduate program was chosen as the pioneer program by the University of Tennessee (UT) System to offer a fully online program by using shared resources among UT campuses that offer similar courses and/or programs.

Blackboard provides a framework for delivering courses online, as well as in class. All course documents, course information, and assignments are available online to both in class and online students. Another important feature of Blackboard is the discussion board. This feature enables students to have online discussions with the instructor and other students in class on assigned topics.

Mediasite has been used to upgrade two of the classrooms (EMCS 231 and EMCS 202) in the College of Engineering, Mathematics, and Computer Science in order to deliver online courses by using this method, which provides both video and audio delivery for online courses. Mediasite is a lecture capture technology, developed by Sonic Foundry, that records video and audio of the instructor and syncs it with the integrated software used in the class. The presentation is archived and made available to watch at any time streamed from a secure server. This program allows students to take classes from a distance or allows the instructor to pre-record a lecture that they know they will miss and aides in maintaining the class’s semester schedule. Mediasite also allows live-streaming of video and is used for broadcasting lectures which allows online students to feel like they are sitting face to face with the instructor.

Online Distance fees are used to support faculty and graduate students to upgrade and deliver all Engineering Management online courses.
The University of Tennessee at Chattanooga (UTC) Walker Center for Teaching and Learning assists in discovering best practices in distance learning and preparing teaching materials for the increasing online environment. It also assists faculty in organizing and designing courses in Blackboard to maximize student learning success. The Walker Center administers course and support service evaluations each semester to allow for the continuous improvement of UTC’s online and hybrid courses, as well as the support services which are funded by Online Distance Fees. These fees fund the additional costs to deliver online and distance courses, including faculty and student support for online programming, training, and resources that are not covered by the student technology and online fees.

UTC Learn, which is powered by Canvas, is UTC's Learning Management System that faculty can use to deliver course content, communicate with students, enable student interaction, and provide online assignments and assessments. The Walker Center also provides training for faculty to utilize UTC Learn in their courses and organizations. Currently, UTC is using Canvas in place of the Blackboard system for course learning management system. UTC is also in process of evaluating a few alternative systems to Mediasite in order to upgrade its lecture capture system. Dr. Dawn Ford of the Walker Center for Teaching and Learning leads these efforts.

In April 2017, our M.S. Engineering Management degree was ranked #12 among the top 50 colleges in the U.S. by SuperScholar.org’s Smart Choice for online Engineering Management degrees. Of the top colleges for online Engineering Management, schools were evaluated and ranked based on academic reputation, special accreditation, student satisfaction, and cost.

MS Engineering Management program was ranked #7 of the 50 Best Master’s in Engineering Management Programs Online for 2018 by BestCollegeReviews.org.

The University of Tennessee - Chattanooga was ranked at #16 for 2019 Most Affordable Online Colleges for Master’s Degrees in Engineering Management.

2.8. Pedagogical Methods

Graduate courses are usually offered in the evenings or late afternoons to accommodate working students. Each course uses Canvas software to display class materials, create discussion boards, and post assignments. This system helps students keep up with coursework if they are unable to attend class due to work or illness.

Online offerings are supported by Mediasite to record lectures both synchronously and asynchronously. The College of Engineering and Computer Science has internal technical support personnel and one staff member who is fully responsible for maintaining Mediasite. In addition, Graduate Assistants are trained to assist faculty in administrating online graduate-level courses.

Part III. Student Experience

3.1. MS Engineering Management Program Enrollment and Peer Identification
The Engineering Management graduate program provides a focus on human resources, engineering economics, quality management, project management, leadership and entrepreneurship, strategy and other management issues. The program also emphasizes decision-making, integration of management and engineering sciences, and communications.

A. Admission Requirements

All applicants for admission to the Engineering Management master’s program at UTC must first be admitted to the graduate program at the University. The Office of the Graduate School is responsible for the administration of the University graduate admission policy. The decision to admit an applicant to pursue graduate study at UTC is based upon evaluations of both qualitative and quantitative information. To ensure adequate consideration, the applicant should submit the completed application and supporting credentials to The Graduate School office by the application dates noted in the Graduate Catalog.

An applicant for admission must furnish the following materials to The Graduate School office:

- A completed online application form
- A Statement of Purpose/Intent
- Payment of the $30 nonrefundable application fee for domestic applicants or $35 for international applicants
- An official transcript from each college or university previously attended
- An official report of the applicant’s score on the prescribed test(s) for admission, such as the GRE or GMAT. Students whose native language is not English are required to provide scores for the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). A minimum of 550 paper-based, or 213 computer-based or 79 internet-based TOEFL score or 6.0 on the IELTS are required from international students.

To be eligible for Degree Regular Admission, an applicant must have a baccalaureate degree from a regionally accredited college or university or foreign equivalent and be in good academic standing at the last institution attended. In addition to the previous two requirements, an applicant for regular admission must meet one of the following requirements from a regionally accredited institution or foreign equivalent. All GPAs are based on a 4.0-point scale and the last two years of undergraduate coursework are equivalent to approximately 60-70 semester hours or 90-100 quarter hours. (Updated GPA requirements approved by Graduate Council spring 2011)

- 2.70 minimum GPA for all undergraduate work taken for the baccalaureate degree or
- 3.00 GPA for the last two years of undergraduate academic coursework or
- 3.00 GPA for 30 or more semester hours undergraduate credit after earning the first bachelor’s degree or
- 2.70 GPA for the last two years of undergraduate academic coursework and a 3.00
- GPA on fewer than 24 hours graduate coursework or
- 3.00 GPA for 24 or more graduate hours or
- An earned master’s degree or higher-level degree with at least a 3.00 GPA.
An applicant who graduated from an unaccredited institution may be considered for admission with a 3.0 cumulative average.

In addition to meeting the above requirements, all applicants for admission to the Engineering Management master’s program must also supply results from the GRE or GMAT taken within the past five years and minimum of two letters of reference from employer(s) or university instructor(s).

B. Recruitment

The recruitment of students into the Engineering Management master’s program is primarily done through marketing efforts directed toward local and regional companies. Faculty members visit companies to inform them about the Engineering Management master’s program at UTC. Alumni of the MS Engineering Management program come also to these recruitment meetings to answer questions asked by prospective students.

The College and Engineering Management websites are always updated, and publications related to the MS Engineering Management program, such as brochures, flyers, posters, etc. are available for prospective students to gain more information about the program, its purpose and availabilities. Local magazines and papers are also used to inform the public about our program and recruit students locally and regionally.

There has been a relative decline in the international recruitment effort due to the decrease in the international recruitment budget. Alumni of the MS Engineering Management play a crucial role in the recruitment efforts by informing their colleagues, friends, and family members about the Engineering Management graduate program at UTC, its availability and flexibility as a 100% online program. This includes local as well as on-line and international graduates.

C. Enrollment

Enrollment in MSEM has decreased since 2014 mostly due to the decrease in the enrollment in the Construction Management concentration. We are currently forming a task force made of active members of the commercial construction industry representatives to address this issue and suggest ways to promote the program. Since there are many courses common to both the Engineering Management and the Construction Management concentrations, there is only a small number of construction management related courses that may have a low enrollment in the course, otherwise, students enjoy the interaction with large enough group of peers in their classes. Figure 3 shows the enrollment data between Fall 2013 and Fall 2019.
Figure 3. Engineering Management Graduate Program Enrollment Data*


D. Degrees Awarded

The number of degrees awarded in the Engineering Management graduate program over the years has also stayed constant over the last six years. Figure 4 shows the number of degrees awarded between 2013-14 and 2018-19.
3.2. Quality Evaluation

Students have the opportunity to provide feedback on the program and evaluate faculty’s teaching effectiveness through surveys conducted online prior to final exams each semester. Students are routinely notified through e-mail and by the instructors in class to login and complete the survey. As an example, Course Learning Evaluation for Fall 2018 is provided in Appendix C.

3.3. Professional Development Opportunities

The MS Engineering Management program provides professional development opportunities through membership in professional associations such as Tau Beta Pi, Associated General Contractors (AGC), Graduate Student Association (GSA), National Society for Black Engineers (NSBE), the Society of Woman Engineers (SWE), etc. These organizations encourage students to attend conferences and workshops, help students network and find jobs, and provide students with opportunities for publication.

The Center for Career and Leadership Development provides free resources to assist students in finding employment opportunities in line with their qualifications. Its mission is to provide students with tools to be successful in their job search and to be prepared with the right documents for an interview. For more information visit https://www.utc.edu/career-student-employment. The College of Engineering and Computer Science also organizes College-level job fairs twice a year, one in the fall and one in the spring, to assist students in finding jobs.
3.4. Enrichment Opportunities

To provide adequate enrichment opportunities, the MS Engineering Management program hosts a variety of seminars conducted by local professional speakers from the Tennessee Valley Authority (TVA), Volkswagen (VW), Coca Cola, etc. These seminars are offered at no cost to students and are held in room EMCS 426 for student convenience. These seminars are also videotaped and made available to students who cannot be present in person. This is a valuable service for online students. These seminars create an environment that facilitates student engagement with local industries and enriches students’ education. The list below outlines a partial list of distinguished speakers for the last two years. (9/2017 – 11/2019)

- **Topic: "The Future of Deep Space Human Exploration"**
  Dr. Paul McConnaughey, Associate Director, Technical, Office of the Center Director NASA Marshall Space Flight Center, September 22nd, UTC SimCenter Auditorium, 11 a.m.

- **Topic: "For Engineers, Does Career Advancement come from Hard Skills or Soft Skills?"**
  Dr. Ryan M. Brewer, Associate Professor of Finance, Indiana University, October 2nd, 5:30 p.m., Card Auditorium

- **Topic: "From Classroom to Corporation: Adventures of a Tech CEO"**
  John P. McNeely, President/CEO, Principal & Co-Founder of Sword & Shield Enterprise Security, Inc., and Principal & Co-Founder – Affenix, LLC, October 30th, 5:30 p.m., Card Auditorium, EMCS 201*

- **Topic: "Indoor Positioning Advances Exploiting GPS and WLAN Infrastructures"**
  Dr. David Akopian, Professor in the Electrical and Computer Engineering, Department of the University of Texas at San Antonio (UTSA), San Antonio, TX, November 17th, SimCenter Auditorium, 10 a.m.

- **Topic: "Crypto-currency Status and Future Perspectives"**
  Dr. Richard Brooks, Professor of Electrical and Computer Engineering, Clemson University December 1st, 10 a.m., UTC SimCenter Auditorium

- **Topic: "Energy, Water, and Climate: Challenges and Opportunities in Africa"**
  Vahid Alavian, Former Water and Hydropower Advisor, Africa Region at The World Bank January 19th, 10:00 a.m., UTC SimCenter Auditorium

- **Topic: "Security Challenges for the Internet of Things: A Semantics-Based View"**
  Csilla Farkas, Professor, Department of Computer Science and Engineering, University of South Carolina, Columbia, February 2nd, 10:00 a.m., UTC SimCenter Auditorium

  Shayne Champion, Cyber Security Professional, February 5th, 2:00 p.m., Maytag Conference Room, EMCS 426

- **Topic: "Security of Additive Manufacturing: Threats and Research Opportunities"**
  Mark Yampolskiy, Assistant Professor, School of Computing University of South Alabama
February 22nd, 2:00 p.m., UTC SimCenter Auditorium

Topic: "The Science of Additive Manufacturing and What the Future Holds"
Amy M. Elliott, Associate Research Staff, Oak Ridge National Lab’s (ORNL) Manufacturing Demonstration Facility (MDF), February 23rd, 10:00 a.m., UTC SimCenter Auditorium

Topic: "Oak Ridge National Lab Capabilities"
Dr. Jeffrey B. Cornett, Manager, Industrial and Economic Development, Oak Ridge National Lab (ORNL)
March 9th, 10:00 a.m., UTC SimCenter Auditorium

Topic: "Petal: Rejuvenation of MPI Applications / Ariadne: Static Analysis Meets Model Checking"
Dr. Peter Pirkelbauer, Assistant Professor, Department of Computer Science at the University of Alabama at Birmingham, March 19th, 2:00 p.m., UTC SimCenter Auditorium

Topic: "Why do some people advance in their career faster than others?"
Scott C. Pierce, Executive Vice President and COO, BlueCross BlueShield of Tennessee
April 12th, 3:00 p.m., Benwood Auditorium EMCS 230*

Topic: "The implicit bias and microaggressions that are often targeted at women in the STEM fields and what we can do about it"
Dr. Christopher Kilmartin, Emeritus Professor of Psychology at The University of Mary Washington in Fredericksburg, VA, March 20th, 3:15 p.m., Benwood Auditorium EMCS 230*

Topic: "Robots that Need to Mislead: Biologically-inspired Machine Deception"
Dr. Ronald Arkin is the Regents' Professor and is the Director of the Mobile Robot Laboratory at the Georgia Institute of Technology., September 7th, - 10:00 a.m., – Maytag Room, EMCS 426

Topic: “After the Engineering Degree: Core Non-Technical Traits that Accelerate Career Success”
Julian Bell is the Executive Vice President of Signal Energy Constructors, one of the top utility scale renewable energy engineering, procurement and construction firms in the United States., October 11th, - 12:15 p.m., – Maytag Room

Topic: The Future of Energy
Hash Hashemian, President & CEO, AMS Corporation and adjunct professor of nuclear engineering at UTK
November 2nd, - 10am, Maytag Room, EMCS 426

Topic: “Product Safety Management and The Human Side of Engineering: Forensics & Manufacturing a Reasonably Safe Product", Tyler Kress, President & Principal Consultant, BEST Engineering Inc and adjunct professor at Virginia Tech, November 16th, - 10:00am; Maytag Room, EMCS 426

Topic: “Maximize Your Value with Diverse Experiences and Views"
John Loudermilk, COO Birla Carbon, February 19th, - 2:00pm; Maytag Room, EMCS 426

Topic: “Engineering Pathways: A Real-World Mix of Engineering and Business”
Tim Barnes, Managing Partner, ByteBackers, April 16th, - 3:00pm; Maytag Room, EMCS 426
Jobs Lost, Jobs Gained: Preparing for the workforce in a time of automation
Rodney Woods is vice president and chief clinical engineer for medical management at BlueCross BlueShield of Tennessee, October 3rd, - 1:45pm; Maytag Room, EMCS 426

Topic: "Oak Ridge National Lab Capabilities"
Dr. Jeffrey B. Cornett, Manager, Industrial and Economic Development, Oak Ridge National Lab (ORNL)
Oct. 17th, - 1:45 pm; Maytag Room, EMCS 426

Topic: “Your Drop Matters: Building a Community of Freshwater Advocates"
Anna George, Tennessee Aquarium Vice President of Conservation Science and Education
Nov. 5th, - 12:30pm; Maytag Room, EMCS 426

Topic: “Problem Solving: A Career Foundation"
Tim Reagan, Chief Operations Officer - Ken Smith Auto Parts Inc., Nov. 12th, - 3:30pm; Maytag Room, EMCS 426

3.5. Diverse Perspectives
The MS Engineering Management program aims to expose students to various perspectives and experiences throughout the program. Field trips to TVA, VW, Electric Power Board (EPB), Amazon, Miller Industries, McKee Foods Corp. and others are held regularly to introduce students to various work environments. Guest speakers from these companies and many others are brought into classrooms by professors every semester to impart practical knowledge and provide opportunities for discussion regarding the diversity of workforce and approaches to technical solutions.

3.6. Academic Support
The availability of instructional resources has improved with the opening of the new library building in January 2015. The program’s instructional equipment and facilities within the College of Engineering are adequate. Most of the classrooms have state-of-the-art technology.

Graduate students also have a study room on the second floor, EMCS 241, which provides a quiet study environment. Technical support is provided by technical personnel staffed by the College of Engineering and Computer Science, along with graduate assistants.

Part IV. Faculty
4.1 Engineering Management Graduate Coordinator
The Engineering Management department has six tenured and tenure-track faculty and one lecturer. All faculty members are qualified to teach graduate level courses and advise graduate students.

The department has a graduate coordinator who is appointed in that position for a two-year renewable term. The main responsibilities of the graduate coordinator is to advise graduate students, review all prospective graduate students’ applications, recruit graduate students to the program, write and propose all graduate curriculum changes, and teach graduate level courses. Additionally, the graduate coordinator represents the graduate engineering management program at the Graduate Council. All graduate coordinators for the College meet at least once per
semester to discuss the curriculum, assistantships, recruitment, resources, and other related issues.

4.2. Faculty Teaching Load

Most graduate level courses, on-campus and online, are taught by full-time graduate faculty in the department. For the MS Engineering Management program, faculty teaching loads are aligned with the highly individualized nature of graduate instruction. In the case of capstone projects, professors with certain specialties are assigned to guide the students on an individual basis.

![Student Credit Hour Production per Total Faculty](image)

**Figure 5. SCH per Total Faculty FTE per Academic Year**

Figure 5 shows the Student Credit Hour production per Full-Time and Adjunct Faculty within the Engineering Management & Technology department for the last 5 years. Table 7 shows the SCH/FTE Faculty in comparison to the College and the University.

| Table 7. SCH/FTE Faculty/Academic Year |
|-------------------------------|---------|---------|---------|
| | UTC  | College | Department |
| 2013-14 | Adjunct | 3071 | 186 | N/A |
| | NTT | 3927 | 507 | 456 |
| | T/TT | 18230 | 1973 | 702 |
| | Total | 25228 | 2666 | 1158 |
| 2014-15 | Adjunct | 1918 | 137 | N/A |
### Faculty Diversity

Students enrolled in the MS Engineering Management Program are increasingly diverse. Studies have shown the importance of faculty diversity to enrolling and retaining students from diverse backgrounds. College faculty members have demonstrated a positive impact in shaping campus culture and encouraging students from multiple groups of minorities and genders as well as academic background and training to enroll and persist through graduation. The diversity of faculty and graduate major enrollment are presented in Appendix B.

### Faculty Professional Development

The MS Engineering Management faculty strive for continuous professional development, which can advance teaching methods, scholarship and practice. Ongoing and past research projects led by faculty members draw external funds such as grants and awards. Annual conferences, workshops, expos, meetings, and a multitude of organizational gatherings are regularly attended by faculty. An example Curriculum Vitae of MS Engineering Management Faculty is shown in Appendix F. Other CVs can be viewed online at [http://www.utc.edu/college-engineering-computer-science/profiles/](http://www.utc.edu/college-engineering-computer-science/profiles/).

The following shows examples of the faculty professional development for a few of the department faculty for the last two years.

#### Publications – 2017 to current
Dr. Endong Wang:

Dr. Aldo McLean

Professor Wolday Abrha
Conference Presentations – 2017 to current

- Wolday Abrha, *Reducing steering gear handling damages – the six sigma way and Application of Lean to Reduce Inter-Plant Logistics: The Marine Industry Perspective* and *Design of a visual board for a manufacturing cell*, ASEM international annual conference, Coeur d’Alene, ID, 10/2018

- Ahad Nasab, *An Experimental Adaptive Teaching Practice*, ASEM international annual conference, Coeur d’Alene, ID, 10/2018

- Seong Dae Kim, *Developing a Manufacturing Process for Home-Based Business*, IBII 2019 International Conference – Management, Leadership, and Business Intelligence, Houston, TX, 3/2019

- Seong Dae Kim, *Effects of Major League Baseball Manager Attributes on Team Performance*, INFORMS Annual Meeting 2018, Phoenix, AZ, 11/2018


Applied Research Presentations – 2017 to current

- **Dr. Seong Dae Kim**
  - Luncheon speech for PMI Chattanooga Chapter “How do we know in what directions a technology-based product will evolve?” scheduled for May 16, 2019.

Awards/Recognition Received by Department – 2017 to current

- **Departmental Awards:**
  - Outstanding Research: Dr. Endong Wang
  - Outstanding Service: Professor Paul Baggett
  - Outstanding Service: Professor Wolday Abrha
  - Outstanding Teaching: Dr. Alexandr Sokolov
  - Outstanding Teaching: Professor Alexandr Sokolov
  - Dr. Ron B. Cox Outstanding Graduate Engineering Management Student Award – Hana Karrar
  - Dr. Ronald B. Cox Outstanding Graduate Engineering Management Student Award – Aaron Rubel
- Carissa Luck
  - Mr. and Mrs. Paul J. Kinser Scholarship
  - Mr. Thomas J. Kline Scholarship
- Barbara Musgrave
  - Outstanding Graduate Student
  - Deans Student Advisory Council
- Outstanding Graduate Student Award – Hind Ahmed
- Outstanding Seniors Award
  - BS ETM: Constr. Mgmt. – Barbara Musgrave
  - BS ETM: Engr. Mgmt. – Anna Kate Tenpenny

- **Dr. Endong Wang**
  - Outstanding Reviewer, Journal of Cleaner Production (Journal: Impact Factor: 5.651), 2018
  - Service Award, University of Tennessee, Chattanooga, 2018
  - First Place in Reusable Abstractions of Manufacturing Process National Competition, 2017, Jointly-Awarded by NIST, NSF, ASTM, ASME (Led by Dr. Chris Yuan at Case Western Reserve University)
  - National Awards:
    - First Place in Reusable Abstractions of Manufacturing Process (RAMP) National Competition Led by Chris Yuan at Case Western Reserve University, Jointly-Awarded by The National Institute of Standards and Technology, National Science Foundation, ASTM International E60 Committee on Sustainability, and ASME Manufacturing Science and Engineering Conference 2017 Organizers

- **Dr. Wolday Abrha**
  - Students’ projects recognized at CECS Tech Symposium 2019
  - 1st place: Overall design in Engineering Management
  - 3rd place: Senior Design at college level

4.5. Improvement Processes
The faculty actively engages in regular planning, evaluation, and improvement activities that measure and advance student success. To enrich and improve the curriculum, which is
maintained at the department level, faculty members may propose changes including curriculum, program goals, and an overall assessment process based on feedback from students and inputs during departmental meetings. The department reviews the proposal and, if approved, submits it to the graduate committee. The committee then reviews and approves the proposed changes. Once approved, the university implements the changes in the following academic year.

Another activity that contributes to the program improvement and student success is providing internship opportunities for the students. Our extensive database of companies providing internship positions is professionally maintained and continually updated. The Student Success Center maintains the Handshake database where students and employers have access to its resources. This resource is provided free of charge to students and employers.

4.6. Faculty evaluation

The program uses an appropriate process to incorporate the faculty evaluation system explained in detail in Chapter 3 of the Faculty Handbook (http://www.utc.edu/faculty-senate/handbook.php). Generally, supervisors score their faculty based on overall performance. The annual Evaluation and Development by Objectives (EDO) process is the main tool used to assess faculty at UTC. The process measures quality of teaching, research, and service. The annual EDO evaluation consists of objectives, reports and evaluation. The department head’s EDO sample format can be found at http://www.utc.edu/academic-affairs/pdfs/1-provost-pageforms/dept-head-evaluation-rev6-2015.pdf. Please refer to Section 3.2 for course learning evaluations, as they are another assessment used for evaluation. In the EDO document, faculty are required to articulate specific measurable goals for each section. For example under Research and Scholarly Activities, the faculty may specify the number of conference participation, the number of journal publication, the number of research proposals submitted as a PI or co-PI, etc. This requirement for specificity helps both faculty and the supervisors track the progress of the faculty towards achievement of the specified goals. Examples of EDOs will be provided during the site visit, if requested.

Part V. Learning Resources

5.1. Equipment and Facilities Evaluation

The College of Engineering and Computer Science regularly evaluates its facilities and equipment and makes improvements where necessary. The College is committed to creating an environment that places personal safety and health of the students and faculty first by regularly evaluating laboratories. Room EMCS 334 has been designated as a ‘study’ room for engineering management students. Students can plan group studies, work on their capstone projects, or use the computer facilities which have engineering management related software loaded on them. The department has also recently spent close to $30,000 to remodel EMCS 213 so that it can be used for projects related to logistics and order processing. A Flexible Manufacturing System (FMS) worth $350,000 is purchased to help with studies in process optimization, queuing, order processing, time studies, etc. This laboratory space will be equipped with more facilities which can be used for both on-campus and online students.
The College’s safety manual describes policies and procedures that govern access to labs, including handling of hazardous materials, inspection, and inventory control. Anyone accessing the labs to use equipment or handle materials within the college must follow accepted procedures and adhere to the published policies, which are easily accessible by students and faculty. The Laboratory Safety Manual can be viewed at https://www.utc.edu/college-engineering-computerscience/pdfs/laboratorysafetymanual.pdf.

5.2. Learning and Information Resources

Students and faculty have access to information resources to support teaching and learning primarily through the newly constructed UTC Library. Additionally, The Walker Center for Teaching and Learning supports faculty by offering development sessions and other teaching resources. Section 5.3 provides more information on the Walker Center, and the following subsections provide information on the new UTC Library.

A. UTC Library General Information
Mission
The mission of the UTC Library is to support the teaching and research of faculty and students of the University of Tennessee at Chattanooga through the development of collections and services to promote and enhance the university’s curriculum and research endeavors. Information about the UTC Library is available at http://www.utc.edu/library

Personnel, Budget, and General Overview
The UTC Library has 21 faculty librarians, 14 staff specialists, and over 700 hours of student help to support the UTC community. The total library budget for 2018 was approximately $4.1 million.

UTC opened a new library facility in January 2015. This new 184,725 square foot facility is open 125 hours per week during the academic semester and provides students, faculty, and staff with access to state-of-the-art technology, spaces, and services. The Library boasts access to 37 group study rooms, 2 practice presentation rooms, 8 conference rooms, a theater classroom, and 3 computer classrooms. Furthermore, both group and individual instruction and consultation are provided to students, faculty, and staff at service points throughout the Library including, Library Instruction, Information Commons, Studio, Special Collections, and the Writing and Communication Center. Finally, co-located in the Library are important student and faculty service points including The Center for Academic Support and Advisement that offers advising, supplemental instruction, and tutoring and the Walker Center for Teaching and Learning providing UTC Faculty with instruction and consultation in the areas of teaching, learning, and technology integration.

B. UTC Library Collections
Databases, Serials, and Ongoing Expenditures
The Library makes available 103,530 serial titles, including open access titles, through subscriptions to full-text resources, databases, journal packages, and individual journals. The
Library has identified 3,265 print and electronic journals that support the research and curriculum associated with Computer Science and Computer Engineering. Of these journal titles and databases, the College of Engineering and Computer Science is currently responsible for $196,161.00 of the total $1,212,145.00 spent toward ongoing serial and database subscriptions.


A review of current UTC Library database subscriptions finds the following that support disciplines within Computer Science and Computer Engineering: Association for Computing Machinery Digital Library, IEEE/IET Electronic Library, Safari Tech Books Online, ScienceDirect, Proquest SciTech Premium Collection, Materials Science & Engineering Database, Advanced Technologies & Aerospace Database, ABI Inform Complete, and Business Source Premier. In addition, the Library makes available numerous multidisciplinary databases such as ProQuest Central, Web of Science, and, Academic OneFile, to complement subjectspecific resources.

**Monographs, Audio-Visuals, and One-Time Expenditures**
The Library’s print and electronic book collection consists of 727,541 unique titles. 34,316 fall within the subject classifications HE, QA, T-TP, TS, UG, which are applicable to the study of Computer Science and Computer Engineering. The Library’s collection of physical A/V consists of 23,012 items of which, 128 are appropriate to the study of Computer Science and Computer Engineering. Additionally, the library provides access to over 150,000 streaming music and video files through various service providers like Alexander Street Press, Henry Stewart Talks, Kanopy, and Naxos Music. Each year, a portion of the Library’s materials budget is allocated to purchase books, audio-visual materials, and other one-time resources. In 2017-2018, the Library expended $17,269 out of a total amount of $169,000 towards the acquisition of monographs and A/V materials in support of the College of Engineering and Computer Science.
C. UTC Library Services

Interlibrary Loan and Course Reserves
The Library offers interlibrary loan (ILL) and Document Delivery services at no cost to students and faculty who need to acquire materials that are not owned or accessible by the Library. Patrons can submit and track progress of requests, receive email notification of materials that have arrived, and obtain articles electronically through the electronic ILL management system, ILLiad. The Library also participates in a nationwide program, Rapid ILL that expedites article delivery to the patron. In 2017-2018, 6,284 ILL borrowing and document delivery requests were filled for the UTC community; of those, 413 were filled for faculty and students in the College of Engineering and Computer Science.

The Library offers a well-utilized Course Reserve service for faculty and students allowing faculty to place high-demand materials on reserve to ensure they are available to students. In 2017-2018, no materials were placed on reserve for courses in Computer Science or Computer Engineering. In addition to course reserves, the Library also offers a scanning service for faculty—ensuring access to high-quality and accessible scans of materials related to research and courses.

Circulation of Physical Materials
The Library has generous circulation policies and allows semester-long borrowing of monographs for students and year-long borrowing for faculty members. In 2017-2018, monographs and audio-visual materials circulated 19,955 times. In addition, the Library circulates laptop computers, other tech equipment (cameras, calculators, digital recorders, external hard drives, and more), and group study rooms to patrons. Last year, these items circulated 78,626 times.

Research and Instructional Services
The Library boasts a busy, well-respected, and growing instruction program that combines traditional information literacy and research skills instruction sessions with skills-based workshops on topics ranging from preparing powerful presentations to improving skills with Microsoft Office, Adobe, and statistical software. Course-specific instruction sessions are tailored specifically to the curriculum and include information literacy and research skills tied to assignment objectives. Workshops are open to any UTC student, faculty, or staff member and are developed and taught by skilled librarians and technology trainers.

Instruction
The Library Instruction Team develops and teaches both general and course-specific instructional sessions tailored to specific research needs or library resources. Partnering with UTC Faculty, the Instruction Team teaches students information seeking and evaluation skills necessary to be effective 21st Century researchers. In 2017-2018, Instruction Librarians taught 365 instruction sessions and workshops that reached 5751 participants across all academic departments.
disciplines. Of those 365 instruction sessions and workshops, two were conducted for the College of Engineering and Computer Science with 41 students participating. Instruction Librarians also dedicate time to providing one-on-one individualized attention to students, faculty, and staff seeking research assistance in a particular area. Over the past year, Instruction Librarians participated in 299 individual research consultations.

**Studio**
The UTC Library Studio provides a creative space for the campus community to learn innovative technology and media creation. Located on the 3rd floor, the space provides access to 24 work stations with specialized software including the Adobe Creative Suite, the AutoDesk Suite, Camtasia, and other digital design programs. In addition, the space circulates cameras and other production equipment for students to use as they put their projects together. Last year, these items circulated 9,212 times.

The Studio is staffed by expert Librarians and Staff who provide one-on-one consultations, small group and course-specific instruction, curriculum development, as well as a fully-staffed service point to answer point-of-need questions. In addition to the instructional sessions mentioned below, the Studio taught 25 workshops covering everything from 3D Modeling and Photography to Brainstorming for Creative Assignments and Audio Editing. These workshops were attended by 200 participants.

In 2017-2018, the Studio taught 205 classes across campus that reached 3537 students. While none of these classes were for the College of Engineering and Computer Science in particular, Studio faculty and staff answer questions about the Autodesk Suite and Solidworks as they come up.

**Writing and Communication Center**
The Writing & Communication Center (WCC) is a free service that supports writers of all backgrounds and proficiency levels with any kind of writing or communication project at any stage in the process. The WCC’s goals are for writers to leave with improved confidence and a plan for revising their work. Peer consultants help writers brainstorm, organize ideas, develop or revise arguments, practice speeches, learn citation styles, become better self-editors, and more. In addition to in-person and online consultations, they also offer workshops, a library of writers’ resources, and a supportive environment for working independently. In 2017-2018, the WCC conducted a total of 2,737 individual consultations and 99 workshops and presentations. Four of these presentations were for Engineering and Computer Science classes. The WCC also conducted 165 consultations with 82 Engineering and Computer Science majors for courses outside of their department, and 92 consultations for Engineering and Computer Science courses (87 of these appointments were with majors).
**Information Commons**
The Information Commons provides students, faculty, staff, and community users with the tools and services needed to complete assignments and research. The Information Commons is open 92 hours per week and fields over 12,000 research questions by phone, chat, e-mail, and in-person each year. Within the Information Commons patrons can get individualized research help at the Information Desk, complete research and assignments by utilizing one of 142 Windows and 36 Macintosh computers loaded with tons of software, scan important documents, or simply print out an assignment. Comfortable open seating at tables and loungers also makes the Information Commons a popular spot to complete work within the Library.

**Special Collections**
The Special Collections unit of the Library at the University of Tennessee at Chattanooga is the repository for university’s collections of manuscripts, university records and publications, rare books and maps, theses and dissertations, and other archival material. The repository supports a wide range of researchers including undergraduate and graduate students, faculty, members of the community, and other scholars whose work relies on primary source materials.

Although no specific instructional sessions were requested by the College of Engineering and Computer Science in 2017-2018, Special Collections’ staff conducted 18 instruction sessions that reached 311 students across many departments. Most of these sessions focus on the use of specific collections or primary-source materials available in Special Collections.

**Departmental Liaisons**
A Library Liaison program is in place where a librarian is assigned to each academic department to enhance communication, collection development, and general support. Librarians are matched with departments based on educational background, work experience, and subject expertise. Typical library liaison activities involve attending departmental meetings, distributing information about new services or resources, organizing one-time purchase requests, teaching classes, maintaining the Engineering and Computer Science Subject Guides, creating course guides, meeting with students and faculty, and more. The current Library liaison for the College of Engineering and Computer Science is Bo Baker.

**Library Technology and Spaces**
**Classrooms, Meeting Spaces, and Instructional/Learning Technologies**
As previously mentioned, the UTC Library maintains a state of the art facility that provides students, faculty, and staff with access to 37 group study rooms, two practice presentation rooms, either conference rooms, a theater classroom, and three computer classrooms. Each room is equipped slightly differently, but all have access to overhead projection, podiums with Windows computers and HDMI cables for use with laptops, and white boards. All study rooms contain LCD monitors (HDMI and other cables are available for check out) and whiteboards to aid in group assignments and quiet study. Classrooms contain desktop or laptop computers, presentation podiums, and built in speakers. Conference rooms are set up for hosting and
attending online events. Outside of these reservable spaces, students, faculty, and staff have access to a computer lounge with 142 Windows and 36 Macintosh computers and the Studio where high-spec PC’s and Macs are available. Printers, b&w and color, as well as scanners and micro format readers are available at various points throughout the Library. Additionally, students, faculty, and staff can check out Windows laptops, Chromebooks, high-end A/V equipment, scientific calculators, and an assortment of cables, chargers, and computer accessories at either the main check-out desk or the Studio.

5.3. Materials and Support Staff

The MS Engineering Management program provides adequate materials and support staff to encourage research and publication. The Walker Center for Teaching and Learning promotes excellence in teaching, learning and the use of technology through dialogue, inquiry, and research. To fulfill these goals, the Center maintains a trustworthy environment to those it serves. The Center also offers faculty feedback and opportunities for reflection on their teaching. Please visit https://www.utc.edu/walkercenter-teaching-learning/ for more information.

Administrative Assistance staff are a dependable resource for departments to rely on. Graduate Research Assistants are also hired every academic year to collaborate with the faculty. The Library (section 5.2) provides enough material for almost all areas of research interest.

Part VI. Support

6.1. Operating Budget

The MS Engineering Management program’s internal and external support are consistent with the budget needs of the program. Figure 6 show the internal and external grants received by the faculty in the department. Appendix A shows the operating budget for the department.

![Engineering Management & Technology Awards Received FY 2014-2019 YTD](chart)

*Includes awards as Co-PI with other CECS Departments.
6.2. Enrollment and Effectiveness

Enrollment and graduation rates are key components of accountability at UTC. A high-quality experience has been integrated throughout the graduate program in order to maintain high enrollment rates. Faculty builds strong relationships with students through smaller classes and one-on-one meetings and serves as primary mentors of students. The faculty also encourages local industries to hire MS program students, enabling the maintenance of a high student enrollment and retention rates. Even though the enrollment has declined in the past few years, the number of students in the program is still sufficient to sustain a high quality and cost-effective program. Please see Section 3.1 for recruitment details and enrollment numbers.

6.3. Program Responsiveness

The MS Engineering Management program is responsive to changing local, state, regional and national needs. As mentioned in Section 2.1, the curriculum contents are reviewed regularly, partly to respond to changing regional needs.

Since the last program review, a strategic plan for the College of Engineering and Computer Science has been under development to further propel the responsiveness of programs it contains, including the MS Engineering Management Program. This strategic can be seen at http://www.utc.edu/collegeengineering-computer-science/pdfs/cecs-strategic-plan-approved-09082016.pdf.

6.4. Graduate Student Data Collection and Placement Evaluation
Graduate students are connected to the College’s LinkedIn page (https://www.linkedin.com/groups/6715787) upon graduation. The LinkedIn page helps the College stay connected with alumni and where they currently work. Since 2015, the College has also completed an Annual Review, which is distributed to all alumni in addition to the local and regional businesses. The latest review can be found at http://www.utc.edu/college-engineering-computer-science/about-us/annual-review.php.

6.5. Procedure Review

The MS Engineering Management program’s procedures are regularly reviewed to ensure alignment to institutional policies and mission. This is done every year to comply with and maintain the standards contained in the guidelines of the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC), the recognized regional accrediting body in the eleven U.S. southern states.
### Appendix A. Expenditures

#### Expenditures

<table>
<thead>
<tr>
<th></th>
<th>2014-15&lt;sup&gt;1&lt;/sup&gt;</th>
<th>2015-16&lt;sup&gt;1&lt;/sup&gt;</th>
<th>2016-17&lt;sup&gt;1&lt;/sup&gt;</th>
<th>2017-18&lt;sup&gt;1&lt;/sup&gt;</th>
<th>2018-19&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Expenditures&lt;sup&gt;2,3&lt;/sup&gt;</td>
<td>$674,823</td>
<td>$763,219</td>
<td>$650,860</td>
<td>$760,946</td>
<td>$716,654</td>
</tr>
<tr>
<td>Fall Adjunct Salaries&lt;sup&gt;2&lt;/sup&gt;</td>
<td>$84,000</td>
<td>$62,000</td>
<td>$66,000</td>
<td>$72,000</td>
<td>$69,900</td>
</tr>
<tr>
<td>Spring Adjunct Salaries&lt;sup&gt;2&lt;/sup&gt;</td>
<td>$80,500</td>
<td>$75,250</td>
<td>$84,750</td>
<td>$85,157</td>
<td>$86,700</td>
</tr>
<tr>
<td>FT Faculty FTE&lt;sup&gt;2&lt;/sup&gt;</td>
<td>6.0</td>
<td>5.5</td>
<td>4.5</td>
<td>5.1</td>
<td>6.0</td>
</tr>
<tr>
<td>Total Major Enrollment</td>
<td>77</td>
<td>72</td>
<td>60</td>
<td>59</td>
<td>49</td>
</tr>
<tr>
<td>Fall SCH</td>
<td>533</td>
<td>476</td>
<td>404</td>
<td>427</td>
<td>426</td>
</tr>
<tr>
<td>Spring SCH</td>
<td>547</td>
<td>408</td>
<td>381</td>
<td>418</td>
<td>390</td>
</tr>
<tr>
<td>Expenditures per FT Faculty FTE</td>
<td>$139,887</td>
<td>$163,722</td>
<td>$178,136</td>
<td>$178,967</td>
<td>$145,542</td>
</tr>
<tr>
<td>Expenditures per Student Major</td>
<td>$10,900</td>
<td>$12,507</td>
<td>$13,360</td>
<td>$15,561</td>
<td>$17,822</td>
</tr>
<tr>
<td>Expenditures per SCH</td>
<td>$777</td>
<td>$1,019</td>
<td>$1,021</td>
<td>$1,087</td>
<td>$1,070</td>
</tr>
</tbody>
</table>

<sup>1</sup> FY data is July 1 - June 30
<sup>2</sup> data contains total department (graduate and undergraduate) results from both Engineering (due to some paid from this account) and Engineering Management Technology accounts
<sup>3</sup> Actual Expenditures just reflects expenditures in account E041301006. Expenditures from other accounts are not reflected in this amount.
Appendix B. Diversity

Diversity of Faculty and Graduate Major Enrollment Fall 2018-19

Gender and Ethnicity
(Graduate Major Enrollment)

<table>
<thead>
<tr>
<th>Undergraduate Major Enrollment</th>
<th>Graduate Major Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Multiple Races</td>
</tr>
<tr>
<td>Multiple Races</td>
<td>6</td>
</tr>
<tr>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>American Indian</td>
<td>2</td>
</tr>
<tr>
<td>Asian</td>
<td>3</td>
</tr>
<tr>
<td>Hispanic</td>
<td>5</td>
</tr>
<tr>
<td>African American</td>
<td>11</td>
</tr>
<tr>
<td>White</td>
<td>139</td>
</tr>
<tr>
<td>Total*</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Multiple Races</th>
<th>Unknown</th>
<th>American Indian</th>
<th>Asian</th>
<th>Hispanic</th>
<th>African American</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>0</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total (FT) | 0 | 7
Total (FT & Adjunct) | 3 | 9
## Appendix C. Student Ratings

**Engineering (ENGM) Fall 2018**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree (%)</th>
<th>Agree (%)</th>
<th>Somewhat Agree (%)</th>
<th>Neither Agree nor Disagree (%)</th>
<th>Somewhat Disagree (%)</th>
<th>Disagree (%)</th>
<th>Strongly Disagree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am aware of the learning outcomes of this course, as stated in the syllabus</td>
<td>75</td>
<td>21</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>The course content addresses the learning outcomes of this course.</td>
<td>76</td>
<td>18</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>The course structure assists me in achieving the learning outcomes of this course.</td>
<td>67</td>
<td>22</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I am achieving the learning outcomes of this course.</td>
<td>66</td>
<td>22</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I keep up with all course readings and assigned work.</td>
<td>65</td>
<td>28</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The course encourages my use of critical thinking skills.</td>
<td>64</td>
<td>26</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The way this course is delivered encourages me to be actively engaged.</td>
<td>62</td>
<td>24</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>The instructor is willing to assist me with achieving the course learning outcomes.</td>
<td>73</td>
<td>19</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>The instructor provides constructive feedback on my coursework.</td>
<td>65</td>
<td>21</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The instructor responds to my questions and emails within the time-frame indicated in the syllabus.</td>
<td>7</td>
<td>15</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>College of Engineering &amp; Computer Science</td>
<td>Strongly Agree (%)</td>
<td>Agree (%)</td>
<td>Somewhat Agree (%)</td>
<td>Neither Agree nor Disagree (%)</td>
<td>Somewhat Disagree (%)</td>
<td>Disagree (%)</td>
<td>Strongly Disagree (%)</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>--------------------</td>
<td>----------</td>
<td>-------------------</td>
<td>-------------------------------</td>
<td>-----------------------</td>
<td>-------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>I am aware of the learning outcomes of this course, as stated in the syllabus</td>
<td>64</td>
<td>23</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The course content addresses the learning outcomes of this course.</td>
<td>62</td>
<td>24</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The course structure assists me in achieving the learning outcomes of this course.</td>
<td>56</td>
<td>22</td>
<td>9</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I am achieving the learning outcomes of this course.</td>
<td>53</td>
<td>23</td>
<td>12</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>I keep up with all course readings and assigned work.</td>
<td>57</td>
<td>26</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The course encourages my use of critical thinking skills.</td>
<td>58</td>
<td>23</td>
<td>10</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>The way this course is delivered encourages me to be actively engaged.</td>
<td>52</td>
<td>20</td>
<td>11</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>The instructor is willing to assist me with achieving the course learning outcomes.</td>
<td>62</td>
<td>20</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>The instructor provides constructive feedback on my coursework.</td>
<td>53</td>
<td>20</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>The instructor responds to my questions and emails within the time-frame indicated in the syllabus.</td>
<td>60</td>
<td>20</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total University</th>
<th>Strongly Agree (%)</th>
<th>Agree (%)</th>
<th>Somewhat Agree (%)</th>
<th>Neither Agree nor Disagree (%)</th>
<th>Somewhat Disagree (%)</th>
<th>Disagree (%)</th>
<th>Strongly Disagree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am aware of the learning outcomes of this course, as stated in the syllabus</td>
<td>70</td>
<td>20</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The course content addresses the learning outcomes of this course.</td>
<td>68</td>
<td>21</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The course structure assists me in achieving the learning outcomes of this course.</td>
<td>63</td>
<td>19</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>I am achieving the learning outcomes of this course.</td>
<td>60</td>
<td>21</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>I keep up with all course readings and assigned work.</td>
<td>59</td>
<td>24</td>
<td>11</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>The course encourages my use of critical thinking skills.</td>
<td>60</td>
<td>22</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>The way this course is delivered encourages me to be actively engaged.</td>
<td>58</td>
<td>19</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>The instructor is willing to assist me with achieving the course learning outcomes.</td>
<td>67</td>
<td>18</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>The instructor provides constructive feedback on my coursework.</td>
<td>60</td>
<td>17</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>The instructor responds to my questions and emails within the time-frame indicated in the syllabus.</td>
<td>65</td>
<td>18</td>
<td>5</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
Appendix D. Library Information

New University Library Facts:
• 180,000 square feet
• 5 floors
• Opened January 2015

The new LEED-certified library is chock full of new strategic campus partnerships and is the premier location for student academic needs outside the classroom. New and expanded partnerships represented in the new building include: Art Department, Center for Advisement and Student Success, Copy Services, Information Technology Division, Disability Resources Center, Southern Writers, Walker Center for Teaching and Learning, and Writing and Communication Center. Designed with a robust technological infrastructure and themes of transparency, collaboration, and flexibility, student access and success was at the center of building planning processes.

• 37 study rooms (29 small, 7 medium, 1 large)
• 2 practice presentation rooms
• 24 hour student study space, opened Sunday to Thursday
• 4 lounges (2 quiet, computer and graduate student)
• Starbucks
• Information Commons (research assistance and 175+ computers)
• Studio 305: advanced media studio and creator space
• Seating for over 2,100
• 7 classrooms
• 8 seminar and conference rooms
• 29 faculty and graduate student carrels
• 2 visiting scholar rooms
• Grand reading room
• Moveable compact stacks with storage for ~600,000 volumes
• New material browsing area (think more Barnes and Noble)
• Media viewing room
• Expanded special collections storage with unique climate controls
• New auditorium housing 2 lecture halls of ~225 seats each adjacent to the new library.
Appendix E. Journals

Most journals are available online and can be accessed through the UTC Library Journals Search feature. A sample of the full-text journals (online and print) at UTC Library that include engineering and engineering management-related content are presented below.

<table>
<thead>
<tr>
<th>Full-text Journals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Cement Based Materials ACBM</td>
</tr>
<tr>
<td>Advanced Composites Bulletin</td>
</tr>
<tr>
<td>Advanced Engineering Materials</td>
</tr>
<tr>
<td>Advanced Functional Materials</td>
</tr>
<tr>
<td>Advanced Imaging</td>
</tr>
<tr>
<td>Advanced Materials</td>
</tr>
<tr>
<td>Advanced Materials and Composites News</td>
</tr>
<tr>
<td>Advanced Materials and Processes</td>
</tr>
<tr>
<td>Advanced Materials for Optics and Electronics</td>
</tr>
<tr>
<td>Building Products</td>
</tr>
<tr>
<td>Bulletin of Earthquake Engineering</td>
</tr>
<tr>
<td>Bulletin of Engineering Geology and the Environment</td>
</tr>
<tr>
<td>Bulletin of Materials Science</td>
</tr>
<tr>
<td>Cement and Concrete Composites</td>
</tr>
<tr>
<td>Cement and Concrete Research</td>
</tr>
<tr>
<td>Chemical Vapor Deposition</td>
</tr>
<tr>
<td>Civil Engineering and Environmental Systems</td>
</tr>
<tr>
<td>Design Engineering</td>
</tr>
<tr>
<td>Designing for User Experiences</td>
</tr>
<tr>
<td>Diesel Progress North American</td>
</tr>
<tr>
<td>Dynamics and Control</td>
</tr>
<tr>
<td>Earthquake Engineering and Engineering Vibration</td>
</tr>
<tr>
<td>Earthquake Engineering and Structural Dynamics</td>
</tr>
<tr>
<td>Geomechanics and Geoengineering: An International Journal</td>
</tr>
<tr>
<td>Geomechanics for Energy and the Environment</td>
</tr>
<tr>
<td>Geosystem Engineering</td>
</tr>
<tr>
<td>Granular Matter</td>
</tr>
<tr>
<td>Home Energy</td>
</tr>
<tr>
<td>Hydraulic and Mechanical MRO</td>
</tr>
<tr>
<td>IBM Journal of Research and Development</td>
</tr>
<tr>
<td>Industrial Distribution</td>
</tr>
<tr>
<td>Machine Design</td>
</tr>
<tr>
<td>Machining Science and Technology</td>
</tr>
<tr>
<td>Mainframe Computing</td>
</tr>
<tr>
<td>Manufacturing Engineering</td>
</tr>
<tr>
<td>Materials and Design</td>
</tr>
<tr>
<td>Materials and Structures</td>
</tr>
<tr>
<td>Materials at High Temperatures</td>
</tr>
<tr>
<td>Materials Letters</td>
</tr>
<tr>
<td>Materials Research Innovations</td>
</tr>
<tr>
<td>Materials Science</td>
</tr>
<tr>
<td>Materials Science and Engineering A Review Journal</td>
</tr>
<tr>
<td>Materials Science and Engineering B Solid State Materials for Advanced Technology</td>
</tr>
<tr>
<td>Materials Science and Technology MST: A Publication of the Institute of Metals</td>
</tr>
<tr>
<td>Materials Science in Semiconductor Processing</td>
</tr>
<tr>
<td>Materials Technology</td>
</tr>
<tr>
<td>Materials Today Proceedings</td>
</tr>
<tr>
<td>Polymer Science</td>
</tr>
<tr>
<td>Polymer Testing</td>
</tr>
<tr>
<td>Polymers and Polymer Composites</td>
</tr>
<tr>
<td>Powder Technology</td>
</tr>
<tr>
<td>Power Engineering</td>
</tr>
<tr>
<td>Power Quality Assurance</td>
</tr>
<tr>
<td>Residential Systems</td>
</tr>
<tr>
<td>Field</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Robotics and Autonomous Systems</td>
</tr>
<tr>
<td>Rock Mechanics and Rock Engineering</td>
</tr>
<tr>
<td>Soil Dynamics and Earthquake Engineering</td>
</tr>
<tr>
<td>Soil Mechanics and Foundation Engineering</td>
</tr>
<tr>
<td>Soils and Foundations</td>
</tr>
<tr>
<td>Steel Construction Design and Research</td>
</tr>
<tr>
<td>Strength of Materials</td>
</tr>
<tr>
<td>Structural and Multidisciplinary Optimization</td>
</tr>
<tr>
<td>Structural Concrete Journal of the FIB</td>
</tr>
<tr>
<td>Structural Safety</td>
</tr>
<tr>
<td>Structural Survey</td>
</tr>
<tr>
<td>Structure and Infrastructure Engineering Maintenance Management Life Cycle</td>
</tr>
<tr>
<td>Design and Performance</td>
</tr>
<tr>
<td>Structures</td>
</tr>
<tr>
<td>Super Street bike</td>
</tr>
<tr>
<td>Surface Engineering</td>
</tr>
<tr>
<td>Survey Review</td>
</tr>
<tr>
<td>Surveying and Land Information Systems</td>
</tr>
<tr>
<td>Sustainable Energy Grids and Networks</td>
</tr>
<tr>
<td>Sustainable Energy Technologies and Assessments</td>
</tr>
<tr>
<td>Sustainable Materials and Technologies</td>
</tr>
<tr>
<td>Systems Engineering Theory and Practice</td>
</tr>
<tr>
<td>Wind Energy</td>
</tr>
<tr>
<td>Wind power Monthly Newsmagazine</td>
</tr>
<tr>
<td>Wood Material Science and Engineering</td>
</tr>
<tr>
<td>Wood Science and Technology</td>
</tr>
</tbody>
</table>
Appendix F. Example Curriculum Vitae

A. Resume of Seong Dae Kim

Seong Dae Kim, Ph.D., PMP, aCAP
Phone: 1-423-425-5786
Email: seongdae-kim@utc.edu

EDUCATION

2009 Texas A&M University, College Station, Texas
Ph.D. in Industrial Engineering (degree conferred 2009)
  Dissertation title: “The Tradeoff between Investments in Infrastructure and Forecasting in the face of Natural Disasters: Risk”
  Advisor: Prof. J. Eric Bickel

2002 SungKyunKwan University, Korea (South)
  M.S. in Industrial Engineering (degree conferred 2002)
  Thesis title: “A Study on the Application of TRIZ to the Areas of Management Science - With Regard to Inventory Control and Queuing Models”

1999 SungKyunKwan University, Korea (South)
  B.S. in Industrial Engineering (degree conferred 1999)

EMPLOYMENT HISTORY

08/01/2018-present  Associate Professor of Engineering Management & Technology Department, College of Engineering and Computer Science, University of Tennessee at Chattanooga, Chattanooga, TN.

05/28/2015-06/30/2018  Program Chair of Engineering & Science Management (ESM)

07/2015-06/30/2018  Associate Professor of Engineering, Science, and Project Management (ESPM) Department, College of Engineering, University of Alaska Anchorage (UAA), Anchorage, AK.

12/2009-06/2015  Assistant Professor of ESPM Department, College of Engineering, UAA, Anchorage, AK.
PUBLICATIONS


• Sowmini Sengupta, Jisun Kim, and Seong Dae Kim (2015), Applying TRIZ and Bass model to forecast fitness tracking devices technology, Proceedings of PICMET 2015, Portland, Oregon, August 2-6, pp. 2177-2186.


MANUSCRIPTS IN PREPARATION

• J.C. Kim and Seong Dae Kim, “Experienced Veteran or Promising Rookie: The Effects of MLB Managers’ Salary and Experience on Team Success”, target journal to be determined.

CONFERENCE PRESENTATION


• Seong Dae Kim (2008), “Investments in Infrastructure and Forecasting in the face of Hurricane Risk,” INFORMS TAMU Student Chapter Seminar, College Station, TX, October 24, 2008.


SEMINARS AND LECTURES


• Invited luncheon speech for PMI Chattanooga Chapter “In what directions will a product/service evolve?”, Chattanooga, May 16, 2019.
• Invited lecture for UTC ENCH 4300 (Chemical System Design) “Project management challenges in engineering projects”, April 4, 2019.
• Graduate seminar: Forecasting Fitness Tracking Devices Technology Using TRIZ and Bass model, Pohang University of Science and Technology (POSTECH), Pohang, Korea, June 22, 2016.
• Graduate seminar: Forecasting Fitness Tracking Devices Technology Using TRIZ and Bass model, Sungkyunkwan University, Suwon, Korea, June 11, 2016.
• Undergraduate seminar: What Engineers Can Do about Incubators in Developing Countries, WBSC Premier 12, and Fitness Tracking Devices, Sungkyunkwan University, Suwon, Korea, June 8, 2016.
• Graduate seminar: Forecasting Fitness Tracking Devices Technology Using TRIZ and Bass model, Pusan National University, Pusan, Korea, June 2, 2016.

**AWARDS AND HONORS**

• 2018 UTC Faculty Grant, $1,500 for presenting a sports analytics research at INFORMS Conference at Phoenix, AZ, on Nov. 4-7, 2018.
• 2017 UNAC Travel Award, $974.20 for travel expenses and registration expenses for travel on Nov. 13-16, 2016 to Nashville, Tennessee for INFORMS 2016 Conference.
• 2015 UNAC Release time Faculty Development Award I, $900 for salary and benefits between May 10th and May 16th, 2015 to prepare for workshop on TRIZ for BPA and Technology Innovation Office, Portland, OR.
• Research Travel Grant, Round 1, FY16, UAA, $615.00 for travel on August 2-6, 2015 to Portland, OR for PICMET conference and special workshop on TRIZ for BPA.
• 2014 UAA Faculty and Staff Longevity Award: 5 years, April 20, 2014.
• Research Travel Grant, Round 2, FY14, UAA, $541.34 for presentation at INFORMS Conference 2014, San Francisco, CA.
• INFORMS Decision Analysis Society (DAS) Student Travel Award, 2008.
• Invited to 2008 INFORMS Future Academician Colloquium in Washington, D.C.
• Department Scholarship, Texas A&M University, 2002 - 2008.
• Toegye Scholarship (four years, 100% tuition and fee), SungKyunKwan University, 1992, 1996 - 1998.

SPONSORED RESEARCH


01/2010- 05/2010 PI, “Prioritization of future Freight Infrastructure Projects within the Anchorage Metropolitan Area Transportation Solutions (AMATS),” research project sponsored by Municipality of Anchorage.

06/2008- 05/2009 Student Technician II, Decision & risk analysis on investment decision associated with hurricane evacuation, supervised by Dr. J. Eric Bickel.

09/2006- 08/2007 Student Technician II, Probability assessment and verification on sports gambling, supervised by Dr. J. Eric Bickel.

09/2005- 08/2006 Research Assistant, “Value of information from 4D seismic technology for oil/gas exploration” sponsored by Schlumberger, supervised by Dr. J. Eric Bickel, Develop economic module to estimate the value of information.

01/2005- 08/2005 Student Technician II, Probability assessment and verification on weather forecast, supervised by Dr. J. Eric Bickel.

06/2004- 12/2004 Research Assistant, “Fee-Based Service for National Association of Wholesaler-Distributors (NAW)” supervised by Dr. Ben Zoghi in the Department of Engineering Technology & Industrial Distribution, Texas A&M University, Develop a model for developing and pricing new services for NAW members.

01/2000-05/2000 Research Assistant, “Reconstruction of Demand Forecasting and Inventory Control System for Automobile Spare Parts” sponsored by HyunDai MOBIS (former HyunDai Precision Industry Company), Korea (South), Generate ideas for various alternative inventory control systems, conduct simulation of the alternatives, and analyze the result.

PROPOSALS

- Center of Excellence in Applied Computational Science & Engineering (CEACSE) Grant proposal “Measuring the Impact of Smart City Technologies to the Performance of Road System Using Agent-Based Simulation” requesting $93,531. Submitted as PI on October 14, 2019.
- Research proposal “Understanding Freight Impacts on Tennessee Communities” submitted to TDOT as Co-PI in April 2019. Not funded.
- Research proposal “Investigation on wrong-way prevention technologies and systems” requesting $180,394, submitted to Tennessee Department of Transportation (TDOT) as PI on September 4, 2018. Not funded.

TEACHING

Spring 2019 Decision Making and Optimization Techniques (ENGM 5040)
Spring 2019 Technical Project Management (ENGM 5540)
Fall 2018, 2019 Project Management and Practice (ETEM 3550)
Spring 2018 Engineering Economy (ESM 605)
Spring 2017 Economic Analysis and Operations (ESM 450)
Fall 2016, Spring 2017 Engineering Practices II (ENGR 161): MATLAB course for engineering students
Fall 2015 Introduction to Engineering (ENGR 151)
Springs 2015 – 2016 Total Quality Management (ESM 623), with emphasis on Lean Six Sigma and TRIZ
Falls 2013 – 2016 Operations Research (ESM 621)
Springs 2013 – 2018 Project Management Application Tools (PM 653), developed and taught this course
Falls 2012 – 2017 Project Definition and Research Methods (PM 652), developed and taught this course
Fall 2011 – 2015 Capstone Project: Initiating and Planning (PM 686A)
Spring 2012 – 2015 Capstone Project: Executing, Controlling and Closing (PM 686B)
Fall 2012 – Summer 2018 Final Project/Thesis (ESM 684/699)
Falls 2010, 2011 Project Risk Management (PM 624)
Springs 2010 – 2012  Project Quality Management (PM 616)
Spring 2010  – Spring 2012  Case Study and Research (PM 685)
Fall 2007  Teaching Assistant for Prof. J. Eric Bickel’s Engineering Analysis for Decision Making “Decision Analysis I” (ISEN627). Assist the instructor during the class, grade homework, quizzes, and tests, make test problems, teach problem sessions (TAMU).
2007  Teaching Assistant Training and Evaluation Program (TATEP), August 22 - August 23 (TAMU).

ACADEMIC SERVICE

• Chair, Construction Management Faculty Search Committee, UTC, September 27, 2019 – present.
• Chair, Department of Engineering Management & Technology (EMT) Curriculum Committee, September 24, 2019 – present.
• Member, EMT Scholarship and Awards Committee, September 24, 2019 – present.
• Member, EMT Distance and Online Education Committee, September 24, 2019 – present.
• Member, College of Engineering and Computer Science (CECS) Graduate Curriculum Committee, October 8, 2019 – present.
• Chair, Engineering Management Faculty Search Committee, UTC, September 9, 2019 – present.
• Technical program committee for IEEE TEMS International Conference TEMSCON 2020.
• Graduate Program Coordinator for EMT, UTC, August 23, 2019 – present.
• Journal paper reviewer, Energies, July 2019.
• Conference paper reviewer, ASEM 2019 International Annual Conference, June 2019.
• Journal paper reviewer, Risks, December 2018.
• Technical program committee for IEEE TEMS International Conference TEMSCON 2019.
• Technical program committee for IEEE TEMS International Conference TEMSCON 2018.
• Chair, local organizing committee of 11th International Green Energy Conference (IGEC 2016), Anchorage, AK, May 8-11, 2016. Served September 2015 – May 2016. Took lead in weekly committee meeting, fund raising, finding invited speakers, recruiting volunteers, soliciting papers, finding support from the university and the municipality, technical support during the conference, master of ceremony, advertising the conference, scheduling all the sessions, updating conference website, creating conference mobile app, editing and producing conference proceedings, producing conference program and other materials, etc.
• Member, College of Engineering Assessment Committee, UAA, Spring 2014.
• Member, Faculty Senate Committee on Research & Creativity Activity, UAA, Fall 2013 – present.
• Chair, Engineering, Science, and Project Management (ESPM) Bylaws project committee, UAA, Spring, 2013.
• Member, Faculty Senate Ad-Hoc Committee on Research & Creativity Activity, UAA, Fall 2012 – Spring 2013.
• Member, College of Engineering Peer Review Committee, UAA, Fall 2015 – present.
• Member, College of Engineering Curriculum Committee, UAA, Fall 2011 – present.
• Member, Faculty Grants & Leaves Committee, UAA, Fall 2011 – Spring 2012.
• Journal paper reviewer, Computer and Industrial Engineering, October 2010.
• Session Chair, Session: Decision Analysis of Major Capital Investments, Cluster: Decision Analysis, INFORMS Southwest Regional Conference 2008, College Station, TX, April 18, 2008.
• Supervisory experience, Supervised a master student. Assisted in his master project on probability verification of hurricane forecasts from National Hurricane Center (Sep. 2007 - Aug. 2008)
• Supervisory experience, Supervised a master student. Assisted in his master project on probability assessment and verification in baseball betting market (Sep. 2006 - Aug. 2007)

STUDENT ADVISING (as primary advisor)

• 2019
  - Adam Needham, MS Engineering Management student
  - Brad Grubb, MS Engineering Management student
  - Mohammad Aman Ullah Al Amin, MS Engineering Management student
  - Jose Martinez, MS Engineering Management student
  - Ramon Williams, MS Engineering Management student
• 2018
  - Fabiha Durrani, MS Science Management: “Decision to buy or rent in Municipality of Anchorage Alaska”
  - Marko Lemtukei, MS Science Management: “The enabling technologies in fifth generation cellular networks and their application in the Internet of Things”
  - Katie Johnson, MS Engineering Management: “Lessons learned mechanism for Coffman Engineers”
  - Jon Sinclair, MS Engineering Management: “A look at photovoltaics and the economics of residential applications in Alaska”
  - Forest Walker, MS Engineering Management: “Replacement option for foundations of structures on melting permafrost and erosion in rural Alaska”
  - Andrew Tarnas-Raskin, MS Science Management: “Technical talent retention strategies and the cost of turnover in an Alaskan science and engineering firm”
  - Stefanie Armstrong, MS Engineering Management: “Analysis of multi-use drone capabilities in Alaska”
- Dustin Campbell-Hutchinson, MS Engineering Management: “Biomass system feasibility study using reclaimed wood waste products”
- Tom Riley, MS Engineering Management: “Developing home-based business manufacturing processes”
- Jennifer Sanders, MS Engineering Management: “A single case demonstration of the implementation of marginal analysis on the project planning structure process”
- Kean Finnegar, MS Science Management: “Port of Alaska TRIZ analysis: a technical study of the Port of Alaska with an emphasis on a stable and reliable seismic design”
- Michael Ulroan, MS Engineering Management: “Redefining college readiness: acceleration model Alaska Native Science & Engineering Program (ANSEP)”
- Patrick Horst, MS Engineering Management: “Comparison between physical and cloud infrastructure for a small business technology upgrade”
- William Dale Hardcastle, MS Engineering Management: “The seismic risks associated with burying electric lines in Anchorage, Alaska”

• 2017
  - Saara Altervo, MS Science Management: “Massive Multiplayer Online Roleplaying Game (MMORPG) Final Fantasy XIV: User assessment & intent towards real money transfers (RMT)”

• 2016
  - Susan Giedt, MS Project Management: “Internal audit of Juland incorporated’s ISO 9001 quality management system”
  - Jasen Kintner, MS Engineering Management: “Economic optimization of fiber optic network design in Anchorage”

• 2015
  - Elliot Jae Yi, MS Project Management: “Anchorage therapeutic court drug testing policy & procedure training manual project”
  - Scott You, MS Project Management: “Differentiation strategy for marketing of Sung Sim Dang bakery & latte art espresso coffee shop plan”
  - Yolima Florez, MS Engineering Management: “Analysis of the journal voucher process in the budget department at the University of Alaska Anchorage”

• 2013
  - Andrew Ray, MS Project Management: “Emergency preparedness and response plan for community groups”
  - Charles Wagner, MS Project Management: “A synthesis of traffic signal timing practices”
  - Tristen Kim, MS Project Management: “Wells Fargo Home Mortgage (WFHM) Alaska Servicing Center microfilm conversion project”

• 2012
  - Robert O’Neal, MS Project Management: “Will standardizing training impact worker performance on a drilling rig?”
- Owen Rose, MS Project Management: “A project management approach to improving the issues generation and submittals process of the Army Family Action Plan (AFAP)”
- Nicholas Ricketts, MS Project Management: “Implementing project management at Alaska Glazing Inc., and similar small business construction subcontractors in Alaska”

  2011
- Alicia Marie Belardi, MS Project Management: “Conflict management in project management: Do project managers use dispute resolution techniques?”
- Mandy Kämpf, MS Project Management: “Risk complexity: The Arctic offshore as a case study”
- Frederick “Rick” Williams, MS Engineering Management: “A risk assessment of delivering cutting edge communications technology to rural Alaskan communities”

  2010
- Donghwoon Kwon, MS Project Management: “How to apply project management in research and development”
- Hyeon Ki Lee, MS Project Management: “Implementing PMIS for reorganizing project team”
- Hyuk Chun Kwon, MS Project Management: “Calculating the optimal contingency and management reserves for project budget”
- Mi Young Shin, MS Project Management: “Approach for maximizing the use of timesheet benefits”
- William Thompson, MS Project Management: “A course titled “project management with an emphasis on capital projects and Alaska’s petroleum industry”

**RESEARCH INTERESTS**

- Characterizing and identifying hidden risks
- Decision & Risk Analysis for energy technologies
- Emergency management modeling regarding natural disasters
- Value of Information and Response Speed in multi-stage setting
- Efficiency of sports betting market
- Sports analytics for baseball teams and managers
- Data analytics for decision making
- Technology forecast using TRIZ method
- Forecast verification for weather information
- Creative problem solving methods for system improvement
TEACHING INTERESTS

- Project risk management
- Lean Six Sigma process improvement
- IT project management (Agile focused)
- Decision analysis
- Operations research / management science
- Operations management
- Computer simulation of systems (discrete/continuous event, agent-based, and system dynamics)
- Business intelligence and analytics
- Creative problem solving methods including TRIZ
- Human-centered innovation (design thinking)
- Research methods
- Project management application tools

ACTIVITIES

- Member, American Society for Engineering Management (ASEM), October 2016-present.
- Member, Korean Community of Anchorage Scholarship Committee, Spring 2012-2015.
- Member, Alaska Chapter of National Unification Advisory Council (NUAC) of South Korea, July 2011 – June 2015.
- Member, Project Management Institute (PMI), September 2009-present.
- Member, INFORMS, November 2006-present.
- Member, Society of Petroleum Engineers (SPE), U.S.A., August 2005-2006. 
  Member, Council of Logistics Management (CLM), U.S.A., February 2004-2005.

PROFESSIONAL DEVELOPMENT

- Attended Supply Chain Lunch and Learn “Managing Risk in the Supply Chain” by Dr. Thomas J. Goldsby on August 9, 2019.
- Took online training “My Mocs Degree Learning Module” by UTC on January 3-4, 2019.
- Attended open house / plant tour by Colonial Chemical Inc. on December 14, 2018.
- Took pedagogy course for new faculty by UTC Teaching and Learning Institute on September 5 – December 7, 2018.
• Observed and participated in PEAK Program by City of Chattanooga on November 26 – December 5, 2018.
• Took online training “Title IX” by UTC on November 11, 2018.
• Attended and presented at conference INFORMS Annual Meeting 2018 at Phoenix, AZ on November 4-7, 2018.
• Attended UTC CECS Distinguished Speaker Series by Dr. Hashemian on November 2, 2018.
• Attended seminar in UTC Department of Chemistry and Physics on October 26, 2018.
• Attended StartUp Week CHA: UTC Entrepreneurship Breakfast 2018 by College of Business on October 24, 2018.
• Attended ASEM International Annual Conference in Coeur d’Alene, Idaho on October 18-20, 2018.
• Attended Lunch & Learn workshop by Center for Innovation and Entrepreneurship “Building an Exceptional Startup Team” by UTC College of Business on October 17, 2018.
• Attended EPB Green Business Expo on October 12, 2018.
• Attended seminar and lunch “Manufacturing as a Service” by UTC College of Business on October 8, 2018.
• Attended Chattanooga Regional Manufacturers Association (CRMA) Annual Meeting Luncheon on October 5, 2018.
• Attended UTC CUIP Information Session on October 5, 2018.
• Attended Search Committee Training by UTC Office of Equity and Inclusion on October 5, 2018.
• Attended Community Engagement Panel by UTC on October 2, 2018.
• Attended IRB Basics 101 training by UTC on September 27, 2018.
• Attended workshop “Research & Funding for New Faculty” by UTC CECS on September 28, 2018.
• Attended Tenure Information Session by UTC CECS on September 13, 2018.
• Attended CECS Faculty Forum on September 7, 2018.
• Attended Supply Chain Lunch and Learn seminar by UTC Center for Professional Education on September 7, 2018.
• Attended CEACSE workshop on September 7, 2018.
• Took IT Security Awareness Training online on August 28, 2018.
• Attended CECS new faculty orientation on August 17, 2018.
• Attended Teaching and Learning Orientation by UTC on August 10, 2018.
• Attended HR onboarding session by UTC on August 9, 2018.

CREDENTIALS

• Associate Certified Analytics Professional (aCAP), June 2017 - present.
• Lean Six Sigma Green Belt, January 2016 - present.
• Project Management Professional (PMP), December 2010 - present.
SOFTWARE SKILLS

- AnyLogic
- Palisade DecisionTools (PrecisionTree, @Risk, TopRank)
- MS Office (especially, Excel)
- MS Project
- SPSS
- MATLAB
- Tableau • R
- Hadoop
B. Resume of Aldo McLean

ALDO A. McLEAN, Ph.D., P.E.
Tenured Assistant Professor
University of Tennessee at Chattanooga
College of Engineering and Computer Science
615 McCallie Avenue
Chattanooga, TN 37403
Office 326E, CECS Building
Voice: (423) 425-5328
E-mail: aldo-mclean@utc.edu
Faculty Website: Aldo McLeanPhD

EDUCATION

Doctor of Philosophy (PhD) in Industrial Engineering, 2008
University of Louisville, Louisville, KY
Dissertation: “Discrete-event Simulation Approach for the Analysis of Liner Shipping Services of Containerized Cargo.” Advisor: Dr. William E. Biles

Master of Engineering in Engineering Management, 2000
University of Louisville, Panama City, Panama

Bachelors of Science in Electronic Engineering, Concentration in Telecommunication, 1996
Universidad Santa Maria la Antigua, Panama City, Panama

PROFESSIONAL LICENSURE
Professional Engineer (PE), License No. 31132, Commonwealth of Kentucky

REFERRED PUBLICATIONS

3. Swalen, M., McLean, A., and Helms, M. “Can Clusters Survive: A Case Study of the Flooring Industry’s Evolution”, (submitted for review and publication to the Journal of Competitiveness Studies, office.asc@gmail.com to Abbas Ali at Indiana University of Pennsylvania)


**PRESENTATIONS & INVITED MEETINGS**


ACADEMIC EXPERIENCE

Tenured Assistant Professor, Fall 2016 – Present
Department of Engineering Management & Technology, University of Tennessee Chattanooga, TN

Program Coordinator, M.S. in Engineering Management, May 2017 – August 2019
UT Chattanooga Graduate School and Department of Engineering Management & Tech.

Tenure-Track Assistant Professor, Fall 2010 – Spring 2016
Department of Engineering Management and Technology, University of Tennessee Chattanooga, TN


Faculty Advisor, Engineering Management Club, University of Tennessee at Chattanooga, 2014 - present.

Faculty Advisor, UTC-AGC Student Chapter, University of Tennessee at Chattanooga, 2011 – 2013, 2015

Adjunct Assistant Professor, Summer 2008 – Summer 2010
Department of Industrial Engineering, University of Louisville
Louisville, KY

Teaching topics: Engineering Management, Quality Control, Project Management, transportation management, Engineering Financial management. Also IE 541 Methods for Simulation Analysis (undergraduate), IE 525 Project Management (undergraduate), IE 360 Probabilities and Statistics for Engineers (undergraduate). Guest lecturer for EM 57, Engineering Statistics I (graduate), IE 550 Fundamental of Logistics Systems (undergraduate)

President, Toastmaster Club, University of Louisville, 2009 - 2010
Vice-president of Public Relations, Toastmaster Club, University of Louisville, 2008-2009
Advisor for Membership, Institute of Industrial Engineering (IIE), University of Louisville, 2008 - 2010

Faculty Co-Advisor, INFORMS Student Chapter, University of Louisville, 2008 - 2010

Future Faculty Program, August 2006
College of Education & Human Development, University of Louisville, Louisville, KY
- Program designed to train Ph.D. candidates to learn teaching techniques and methodologies, research, service, mentoring skills, and faculty life.

Graduate Teaching Assistant, Summer 2005 – Spring 2008
President, INFORMS Chapter of the University of Louisville, 2006 – 2007
Vice-president, 2005 -2006
Graduate Research Assistant, Fall 2003 – Spring 2005
Department of Industrial Engineering, University of Louisville, Louisville, KY
– GRA responsibilities included: assisting in preparation of reports and conferences; designing and analyzing discrete-event and continuous simulation models in logistics and production systems; processing research data.
Internship in Micro-satellite Technology, January – March 1995
Universidad Tecnológica de Madrid, Madrid, Spain.

GRANTS AND OUTREACH ACTIVITIES


D. Loveless (PI), D. Reising (Co-PI), A. McLean, N. Sisworahardjo, R. Ahmed, L. Elliott, A, “REU Site: An Interdisciplinary CubeSat Research and STEM Education Platform at the University of Tennessee at Chattanooga (UTChattSat),” $359,783, agency: National Science Foundation (NSF), 2017 Funded (2018-202121)


D. Loveless (PI), D. Reising (Co-PI), A. McLean, N. Sisworahardjo, R. Ahmed, L. Elliott, A, “REU Site: An Interdisciplinary CubeSat Research and STEM Education Platform at the University of Tennessee at Chattanooga (UTChattSat),” $322,155, agency: National Science Foundation (NSF), 2016. Not Funded

I. Fomunung (PI), J. Ellis, N. Alp, R. Ahmed, A. McLean, B. Harris, T. Elliot, “UTC Academic Scholarship to Inspire and Recruit Engineers (UTC ASPIRE)”, $998,489, agency: National Science Foundation (NSF), 2016. Not Funded


I. Fomunung (PI), R. Ahmed (Co-PI), J. Ellis (CO-PI), T. Elliot (Co-PI), B. Harris (Co-PI), A. McLean (Co-PI), “UTC ASPIRE: Academic Scholarship Program to Inspire and Recruit Engineers,” $991,725, agency: National Science Foundation (NSF), Engineering S-STEM, 2015. Not Funded


M. Onyango (PI), J. Owino (CO-PI), I. Fomunung (Co-PI), N. Sisworahardjo (Co-PI), W. Wu (Co-PI), A. McLean (C-PI), ‘Securing the Pipeline for Undergraduate Engineering Education (SPUE) Using Data Analytics”, $249,936, agency: National Science Foundation, 2014. Not Funded


Ben Taylor (PI), A. McLean (Senior Personnel), “Safe Routes to School Program – Woodmore Elementary,” $250,000, agency: Tennessee Department of Transportation (TDOT) and The City of Chattanooga, 2014. Funded

Ben Taylor (PI), A. McLean (Senior Personnel), “Safe Route to Schools Program – Lakeside Academy,” $243,222, agency: Tennessee Department of Transportation (TDOT) and The City of Chattanooga, 2014. Funded


A. McLean (PI), “Efficiency of Pharmacy Flow and Inventory Analysis,” Erlanger Hospital System, 2016, Outreach program.

A. McLean (PI), “Food Court Process and Flow Improvement at Medical Mall,” Erlanger Hospital System, 2016, Outreach program.


A. McLean (Program Leader), “Improve your Construction Projects with ArchiCAD BIM applications: Sixteen hours of professional seminar,” 2013, Outreach program
A. McLean (PI), “Columbus McKinnon, Material Flow & Inventory Analysis at Columbus McKinnon,” 2013, Outreach program.

PROFESSIONAL LEADERSHIP

Certifications
- Professional Engineer (PE), License No. 31132, Commonwealth of Kentucky
- Certified Professional Engineer Management (CPEM), American Society for Engineering Management (ASEM), 2019 – present
- Certified Six Sigma Green Belt (CSSGB), American Society for Quality (ASQ), 2019 - present
- Certified Manager of Quality/Organizational Excellence (CMQ-OE), Cert. No. 14826, American Society for Quality (ASQ), 2011 - present
- OSHA-10 General Industry Safety and Health, 2017
- OSHA-10 Construction Safety and Health, 2013

Societies Affiliation
- Institute of Industrial and Systems Engineering (IISE), 2006 – present
- American Society Engineering Management (ASEM), 2010 – present
- American Society for Quality (ASQ), Senior Member, 2010 – present
- American Production and Inventory Control Society (APICS), 2012 - present
- Institute for Operation Research and Management Science (INFORMS), 2005 – 2015

Community
- President, American Society for Quality (ASQ) Chattanooga Section 1101 (2018 - present)
- Senior Member, East TN Freight Advisory Committee (FAC), Tennessee DOT 2017 – present
- Faculty Mentor, The Company Freight (CoLab), 2017 - 2018
- Leader and Coordinator, UTC’s Process Improvement at Erlanger and Children’s Hospital at Erlanger, 2013 – present
- Volunteer, Erlanger Hospital and Children’s Hospital at Erlanger, 2013 – present.
- Enterprise Center – UTC Committee, City of Chattanooga (2013-2015)
- Coordinator Education Committee, American Society for Quality (ASQ) Section 1101 (2014-present)
- UTC Faculty committee member, Enterprise Center - City of Chattanooga (2013-2016)
- Technology Chair, Tri-State APICS (American Production and Inventory Control Society) (2014-2016)
- Director, “Student Award” program for Middle Schools, Ricardo Miro Elementary School, Panama City, Panama, 2006 – 2012.
- Lead faculty, Secured $500/year student scholarship fund from APICS from 2016 to 2018

ACADEMIC SERVICE ACTIVITIES
- ASEM Translation Committee, EMBOK translation Project: Translating the EMBOK into Spanish, 2019 – present.
○ Committee member, Faculty Search for Engineering Management & Tech., Construction Management faculty, 2019-2020
○ Search Committee member, Faculty Search for Engineering Management & Tech., Engineering Management faculty, 2019-2020
○ Faculty Member/Main Contact Global Zone, Center of Goal Education 2018 – present
○ Search Committee Chair, 2 faculty for the BAS Mechatronics Engineering Technology, Engineering Management & Tech., 2018-2019
○ Search Committee member, Department Head search for Engineering Management & Tech., 2017-2018
○ Search Committee member, 2 faculty search for Engineering Management & Tech., 2017-2018
○ Main Faculty Contact in Engineering Management & Tech, for Rank & Tenure Committee 2017-2018
○ Faculty Coordinator, E-week participation for Engineering Management & Tech., 2017-2018
○ Faculty member, College Level Undergraduate Curriculum Committee, 2017-2018
○ Represented the Dept. of Engineering Management & Tech in college level meetings and requirement, 2016-2018
○ Faculty Member, THEC New Program External Review Visit - BAS Mechatronics Engineering Technology, 2018
○ Faculty Member, Graduate Counsel 2018-2019
○ Faculty member, Search Committee for Director of Student Success, 2016-2017
○ Faculty member, Search Committee for Accounting Assistant III, 2016-2017
○ Member, UTC Parking Task Force, UT Chattanooga (2015-present)
○ Rank and Tenure Committee, Civil Engineering Dept. (2017 – 2019)
○ Committee Member, ABET Task Force, College of Engineering and Computer Science (2014-present)
○ Undergraduate Curriculum Committee, College of Engineering and Computer Science (2014-present)
○ Faculty Adviser, Engineering Management Club (EMClub), EM&T (2015-present)
○ Enterprise Center – UTC Committee, City of Chattanooga (2013-2016)
○ Education Committee Officer, American Society for Quality (ASQ) Section 1101 (2013-present)
○ Education Committee Officer (2016-present), Technology Chair (2014-2016), Tri-State APICS (American Production and Inventory Control Society)
○ Committee Member, Strategic Planning Steering Committee, UT Chattanooga (2014-2015)
○ Committee Member, Accessible Technology Committee, UT Chattanooga (2014-2015)
○ Planning Committee Member, Library Grand Opening Committee, UT Chattanooga (2014-2015)
○ Senator, Faculty Senate. UT Chattanooga (2012-2014)
Committee Member, Department Honor (DHON), Adrienne Welch, Economics Department (2014-2015)
Committee Member, Graduate Council, UT Chattanooga (2011-2013)
Faculty Advisor, UTC-AGC Student Chapter, UT Chattanooga (2011-2013)
Faculty Advisor, ASC Construction Student Competition (2012-2013)
Committee Member, Faculty Research Committee, UT Chattanooga (2012-2014)
Committee Member, International Studies Committee, UT Chattanooga (2012-2015)
Committee Member, Faculty Rating of Administration, UT Chattanooga (2011-2012)
Track Chair, ASEM Annual Meeting (2012, 2014)
Track Chair, WinterSim Annual Meeting (2009)

HONORS AND AWARDS

Outstanding Teacher of the Year, April 2017
University of Tennessee at Chattanooga, Dept. of Engineering Management & Tech.

Outstanding Faculty Teacher of the Year, April 2013
University of Tennessee at Chattanooga, Dept. of Engineering Management & Tech.

Award Recipient, Access and Diversity Professional Development Grant. April 2015 ($1,279)
University of Tennessee at Chattanooga.

Award Recipient, Faculty Development Grant. October 2014 ($650)
University of Tennessee at Chattanooga.

Outstanding Coach Award, April 2012
University of Tennessee at Chattanooga, Dept. of Engineering Management & Technology

Award Recipient, Faculty Development Grant. October 2011 ($600)
University of Tennessee at Chattanooga.

Faculty Recipient-Adviser, Opportunity Graduate Assistantship (OGA). 2013. Corey Rorex.


Outstanding Faculty Teacher of the Year, April 2011
University of Tennessee at Chattanooga, Department of Engineering Management

American Society for Quality Scholarship Award, April 2009
American Society for Quality (ASQ), Louisville - section 912

Industrial Engineering Graduate Student Award, April 2008
University of Louisville, Department of Industrial Engineering

University of Louisville, Speed School of Engineering

Scholarship, Edward R. Clark Scholarship in Computer Simulation, August 2003 – July 2005
University of Louisville, Department of Industrial Engineering

INTERNATIONAL STUDENTS DIRECTED
Miguel Rodríguez-Garcia, Universidad de Vigo, (2014-2015)
Project Title: Impact of Appointment Cancellations and No-Shows on Patients Waiting Time at a Children’s Hospital.

**Sofia Villar Alvarado**, Universidad de Vigo, (2013-2014)

Project Title: Evaluating the Potential Development of Container Shipping Services Thought the Northern Sea Route and its Impact on Spanish Ports.

**Martin Villar**, Universidad Católica del Uruguay ‘Dámaso Antonio Larranaga’, (2012-2013)

Project Title: Programming the Pairwise Method for Facility Improvement at a Midsize Manufacturing Plant.

**MASTER CAPSTONE STUDENTS DIRECTED**

<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eric Meadows</td>
<td>UTC (2019)</td>
</tr>
<tr>
<td>Abdulaziz Ghazzawi</td>
<td>UTC (2018)</td>
</tr>
<tr>
<td>Avery Sanderfer</td>
<td>UTC (2018)</td>
</tr>
<tr>
<td>Sherrod Munday</td>
<td>UTC (2018)</td>
</tr>
<tr>
<td>Maryam Gorashi</td>
<td>UTC (2017)</td>
</tr>
<tr>
<td>Aaron Rubel</td>
<td>UTC (2017)</td>
</tr>
<tr>
<td>Stephen Brook</td>
<td>UTC (2017)</td>
</tr>
<tr>
<td>Valentine Mbamalu</td>
<td>UTC (2016)</td>
</tr>
<tr>
<td>Samrat Kandukuri</td>
<td>UTC (2016)</td>
</tr>
<tr>
<td>Dale Mobley</td>
<td>UTC (2015)</td>
</tr>
<tr>
<td>Jason Brotherton</td>
<td>UTC (2015)</td>
</tr>
<tr>
<td>Jonathan Howard</td>
<td>UTC (2015)</td>
</tr>
<tr>
<td>Corey Rorex</td>
<td>UTC (2014)</td>
</tr>
<tr>
<td>Markisha Williams</td>
<td>UTC (2014)</td>
</tr>
<tr>
<td>Caleb Ilesanmi</td>
<td>UTC (2013)</td>
</tr>
<tr>
<td>Andrew Wiltshire</td>
<td>UTC (2013)</td>
</tr>
<tr>
<td>Garrett McBryde</td>
<td>UTC (2013)</td>
</tr>
<tr>
<td>Justin Stephens</td>
<td>UTC (2013)</td>
</tr>
<tr>
<td>Lionel Locke</td>
<td>UTC (2013)</td>
</tr>
<tr>
<td>Tina Ottey</td>
<td>UTC (2013)</td>
</tr>
<tr>
<td>Calandra Jones</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>Charlene Jameson</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>Clinton Hendren</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>Dominique Batson</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>J. D. Elder</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>Jody Dunnigan</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>John Haren</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>LaToya Frierson</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>Mehad Ismail</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>Michael Henkel</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>Tim Jackson</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>Tony A. Knight</td>
<td>UTC (2012)</td>
</tr>
<tr>
<td>Alex Gomez</td>
<td>UTC (2011)</td>
</tr>
</tbody>
</table>
INDUSTRY EXPERIENCE

Consultant – Transportation and Inventory Management, 2015-present
Erlanger Hospital. Ongoing outreach projects.
Children’s Hospital at Erlanger. Ongoing outreach projects.
Columbus McKinnon. Outreach projects.

Communication Systems and Sales Engineer, September 2001 – July 2003
Panasonic Latin America, Panama - Department of Communication Systems and Sales Engineering
- Developed business strategies targeting $7 million a year
- Designed two standard tests procedures for E1 and ISDN communication systems certifications
- Conducted engineering and telecommunication training in Ecuador, Central America and the Caribbean

Communication Systems Product Manager, September 2000 – September 2001
SIEMENS Panama, Panama - Department of Telecommunication Systems
- Managed 10 distributors/customers’ accounts and projects (private and government)
- Sold $1.1 million in fiber optic cables, cabling products, and passive devices to private and government bids
- Managed prequalification process for $2.2 million (customer: Grupo Union Fenosa, Spain)

Project Engineer, September 1998 – September 2000
TRT Technologies Inc., Panama - Nippon Electric Corporation (NEC) products
- Managed a successful “product launching program” for NEC (Nippon Electric Corporation) telecommunication products
- Managed a network of 12 commercial sales and engineering accounts
- Configured and sold first private branch exchange (PBX) using ISDN digital service in Panama City

Quality Control Engineer, September 1996 – September 1998
LG Electronics Latin America, Panama - Quality Control Center
- Managed standard quality control, inspection, and prevention programs for LG Electronics Home Appliance Division
- Designed emergency reworks and warranty claims procedures for $36.750 million in products
- Developed product specification and maintenance programs for the Latin America market

Appliance Product Manager, August 1996 – September 1998
LG Electronics Latin America, Panama - Home appliances and Air Conditioning Systems
- Conducted certification training for distributors, engineers and service technicians
− Developed users and service manuals for A/C systems, washing machines and microwave products
− Analyzed distribution and supply-chain patterns for products sold in Costa Rica, Cuba, Ecuador, Venezuela and Panama
Appendix G. Undergraduate Syllabi Examples

Project Management and Practice

Fall 2019

Department of Engineering Management & Technology

ETEM 3550, CRN 40827, Face-to-Face, 3 credit hours

Instructor: Dr. Seong Dae Kim
Email and Phone Number: SeongDae-Kim@utc.edu; 423-425-5786
Office Hours and Location: M, 10:00 am - 3:00 pm or by Appointment. Office: EMCS 326B
Course Meeting Days, Times, and Location: MW, 3:25-4:40 pm, EMCS 231

Course Catalog Description: Introduction to the identification, selection, and planning of projects. Specific topics include: definition of project and program, project leader selection, project goals, team selection, organizational structure, work breakdown structures (WBS), scheduling, PERT/Gantt charts, critical path method (CPM), budgeting, decision analysis, risk management, and the monitoring and control of projects. MS Project software is applied. Fall semester. Lecture 3 hours.

Course Pre/Co Requisites: Prerequisite: MGT 2110, MATH 2100, or ENGR 2220 with a minimum grade of C or department head approval. Prerequisite or corequisite: ENCE 3520 or department head approval. Differential course fee will be assessed.

Course Student Learning Outcomes: Upon successful completion of this course, learners will be able to
1. Demonstrate understanding of the definition of a project;
2. Demonstrate understanding of project maturity;
3. Explain the role of a project manager;
4. Identify a project life cycle;
5. Demonstrate knowledge of projects in different organization;
6. Create work breakdown structure of a project;
7. Explain how to estimate project budgets;
8. Explain how to schedule tasks in a project;
9. Explain how to allocate resources;
10. Demonstrate understanding of project control and auditing;
11. Explain how to terminate a project.

ABET – ETAC Student Outcomes:

J. RUBRIC: KNOWLEDGE OF CONTEMPORARY ISSUES
   A. Define Contemporary Issues
   B. Identify Strategies
   C. Evaluate Potential Solutions

Course Fees: Differential course fee will be assessed.


Technology Requirements for Course: Web Browser: Internet Explorer or FireFox

Hardware/Software Requirements: Participants need access to a personal computer (Mac or Windows) and the Internet for major amounts of time for this course. Plug-ins Necessary: You should have an updated version of Adobe Acrobat Reader (for pdf documents). Additional software plug ins may be needed. Check the Technical Requirements for the UTC Learn system. Microsoft Word and PowerPoint version 2010 or later.

Technology Skills Required for Course: You are expected to have working knowledge and capability with your computer hardware, networking and a variety of software applications before entering this class. Class participants must know how to and check their e-mail on a daily basis. You will need to know the appropriate user name and password to access the UTC Learn online password-protected system. If you do NOT know your user name and password, please contact the Call Center at (423) 425-4000. You must be able to save word processing files in a .doc/.docx (Microsoft Word) or .pdf (Adobe Acrobat).

Communication: Class announcements are made through UTC Learn and UTC email. UTC email is the official means of communication between instructor and student at UTC. Please check your UTC email and UTC Learn on a regular basis. The instructor will respond to a student's UTC email within 2 days unless there is an emergent situation.

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. Quiz: There are six online quizzes. Each quiz will be linked on the pre-determined day in the schedule at 9:00 a.m. and must be completed by 11:59 p.m. on the same day. Quiz questions will include multiple-choice, true-false, filling in the blank, and/or essay questions. The length of each quiz will be 30 min. There will be no make-up quizzes. If you have any technical problems during the quiz, you need to contact the instructor ASAP.

B. Mid-term Exam: Each student will be given an exam that will be conducted individually. Details of the exam will be given later in class.

C. Final Exam: Students will be given an exam that will be conducted individually. Details of the exam will be given later in class.

D. Discussion Board Participation: Students are required to participate on the Discussion Board through Blackboard on a regular basis. Minimum requirement for Discussion Board participation is at least one posting and one comment to other person’s posting for every chapter.

Course Grading
**Course Grading Policy:** 90-100 points = A; 80-89 points = B; 70-79 points = C, 60-69 points = D; < 60 points = F. Final grades will be rounded precisely. If you have an 89.4 points final average, this is a B. if you have a 69.5 points, this is a C.

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>25</td>
</tr>
<tr>
<td>Mid-term Exam</td>
<td>25</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30</td>
</tr>
<tr>
<td>Discussion Board Participation</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

**Instructor Grading and Feedback Response Time:** The results of quizzes and exams will be posted electronically within a week of the due date. Discussion Board Participation grade will be posted at the end of the last week of class.

**Course and Institutional Policies**

**Late/Missing Work Policy:** All assigned work should be submitted by the due date. No late or partial work will be accepted without discussion with the class instructor.

**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:** Online students do not have to attend class but are required to participate online.

**Course Participation/Contribution:** Active participation in class and responding to questions on discussion boards on Blackboard counts towards 20% credit as part of your final grade. Attendance is not enough to receive full credit for participation.

**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:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/19</td>
<td>Introduction</td>
<td>No Assignment</td>
</tr>
<tr>
<td>8/21, 8/26</td>
<td>Chapter 1 – Projects in Contemporary Organizations</td>
<td>Read Chapter 1</td>
</tr>
<tr>
<td>8/28</td>
<td>Chapter 2 – Strategic Management and Project Selection</td>
<td>Read Chapter 2</td>
</tr>
<tr>
<td>9/2</td>
<td>NO CLASS (Labor Day)</td>
<td></td>
</tr>
<tr>
<td>9/4</td>
<td>Chapter 2 – Strategic Management and Project Selection</td>
<td>Read Chapter 2</td>
</tr>
<tr>
<td>9/9</td>
<td>Chapter 3 – The Project Manager</td>
<td>Quiz 1 - Chapter 1 &amp; 2 Read Chapter 3</td>
</tr>
<tr>
<td>Date</td>
<td>Chapter Title</td>
<td>Assignment</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>9/11</td>
<td>Chapter 4 – Managing Conflict and the Art of Negotiation</td>
<td>Read Chapter 4</td>
</tr>
<tr>
<td>9/16, 9/18</td>
<td>Chapter 5 – The Project in the Organization Structure</td>
<td>Read Chapter 5</td>
</tr>
<tr>
<td>9/23, 9/25</td>
<td>Chapter 6 – Project Activity and Risk Planning</td>
<td>Read Chapter 6</td>
</tr>
<tr>
<td>9/30</td>
<td>Chapter 6 – Project Activity and Risk Planning</td>
<td>Quiz 2 - Chapters 3, 4, 5, Read Chapter 6</td>
</tr>
<tr>
<td>10/2, 10/7</td>
<td>Chapter 6 – Project Activity and Risk Planning</td>
<td>Read Chapter 6</td>
</tr>
<tr>
<td>10/9</td>
<td>Mid-term</td>
<td>Mid-term Exam</td>
</tr>
<tr>
<td>10/14</td>
<td>NO CLASS (Fall Break)</td>
<td></td>
</tr>
<tr>
<td>10/16, 10/21</td>
<td>Chapter 7 – Budgeting: Estimating Costs and Risks</td>
<td>Read Chapter 7</td>
</tr>
<tr>
<td>10/23</td>
<td>Chapter 7 – Budgeting: Estimating Costs and Risks</td>
<td>Read Chapter 8</td>
</tr>
<tr>
<td>10/28</td>
<td>Chapter 8 - Scheduling</td>
<td>Quiz 3 - Chapters 6 &amp; 7, Read Chapter 8</td>
</tr>
<tr>
<td>10/30</td>
<td>Chapter 8 - Scheduling</td>
<td>Read Chapter 9</td>
</tr>
<tr>
<td>11/4</td>
<td>Chapter 9 – Resource Allocation</td>
<td>Quiz 4 - Chapter 8, Read Chapter 9</td>
</tr>
<tr>
<td>11/6</td>
<td>Chapter 9 – Resource Allocation</td>
<td>Read Chapter 9</td>
</tr>
<tr>
<td>11/11</td>
<td>Chapter 10 – Monitoring and Information Systems</td>
<td>Read Chapter 10</td>
</tr>
<tr>
<td>11/13</td>
<td>Chapter 11 – Project Control</td>
<td>Quiz 5 - Chapter 9, Read Chapter 11</td>
</tr>
<tr>
<td>11/18</td>
<td>Chapter 11 – Project Control</td>
<td>Read Chapter 11</td>
</tr>
<tr>
<td>11/20</td>
<td>NO CLASS (Thanksgiving Holiday Travel Day)</td>
<td></td>
</tr>
<tr>
<td>11/25, 11/27</td>
<td>Chapter 12 – Project Auditing</td>
<td>Read Chapters 12, 13</td>
</tr>
<tr>
<td>12/2</td>
<td>Review</td>
<td>Quiz 6 - Chapters 10, 11, 12 &amp; 13</td>
</tr>
<tr>
<td>12/9 (3:30-5:30 pm)</td>
<td>Final Exam</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

Schedule subject to change
Quality Improvement

Fall 2019

ETEM 4560, CRN 46351, In-class, 3 credit hours

Instructor: Dr. Aldo McLean, PE, CMQ-OE, CPEM
Email and Phone Number: aldo-mclean@utc.edu (423) 425-4121

Office Hours and Location: Office: EMCS 326D. Hours: Monday: 3:15 pm to 4:15 pm, Tuesdays and Thursdays from 10:00 am to 1:00pm, Wednesdays 8:30 am to 10:30 pm. By appointment; please contact the administrative assistant (Shanae Anderson: Shanaeanderson@utc.edu) to schedule an appointment, a call or online meeting during these hours.

Course Meeting Days, Times, and Location: Mondays and Wednesdays for 2:00 to 3:15 pm at EMCS 231.

Course Catalog Description: Introduction to quality control concepts, control charts, product specifications, process control, acceptance sampling systems, and total quality control management (TQM), which is widely used in industry to improve product and service quality, and reduce costs. Lecture 2 hours and laboratory 1 hour.

Course Pre/Co Requisites: MGT 2110 with a minimum grade of C or department head approval.

Course Student Learning Outcomes: Upon successful completion of this course, students should be able to:
1. Define quality and other concepts for process improvement
2. Design control charts to track the performance of productive systems
3. Apply the concepts of process control and process capability
4. Describe the concept of six-sigma and other quality systems currently in use
5. Explain acceptance sampling and other methods for controlling quality
6. Explain the work and contribution of quality gurus in the field
7. Describe the different of quality assurance, quality control and quality management
8. Apply Root Cause analysis techniques


Supplemental/Optional Course Materials: will be provided by the instructor for ETEM 4560. Sources include on-line resources, reference books, textbook or magazines, additional materials, or software.

Technology Requirements for Course: Students need access to a dependable computer with reliable internet connection to conduct this course. This course requires of the use of Excel, Minitab or SPSS (statistical software), MSWords, Adobe Acrobat software to address most assignments and labs. Video lectures are recorded in Mediasite or Canvas Studio by faculty and students might require speakers or headphones to follow along. Student should have access to UTC Learn, Canvas to complete and submit their work. Test your computer set up and browser for compatibility with UTC Learn at http://www.utc.edu/learn/getting-
help/systemrequirements.php. Video conferencing applications as Zoom and Skype might be required for long distance meeting with faculty.

**Technology Skills Required for Course:** Students should be able to access the learning management system (UTC Learn), Canvas, use their MocsNet email effectively and to access the course information. Student will be instructed on the basic of using Minitab and/or SPSS and they are required to extend their knowledge of the software independently. Scanning, formatting, coping and pasting, upload/downloading files and installing software are required skills. Students should be able to use Adobe Acrobat to create, format and submit PDF files. Students should also be able to use general purpose software/applications including MSExcell, MSPowerPoint, MSWords to create files effectively as well as submit files, and communicating with the instructor. Producing and sharing short videos might be required for labs and assignments as well.

**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.

**Communication:** Class announcements will be made through UTC Learn and Canvas to your Mocs email address. UTC Mocs email is the official means of communication between instructor and student at UTC. Please check your UTC Mocs email and UTC Learn/Canvas on a regular basis. Email the instructor only from your UTC Mocs email to make sure your email reach the instructor for a reply. Add “ETEM4650FA19” to make subject of your email to make sure the instructor can see your email on time.

Video conferencing is available through Zoom if an online appointment is needed outside of office hours. You can also use Zoom to meet with your classmates virtually. You can learn more about Zoom at http://www.utc.edu/walker-center-teaching-learning/classroomtechnology/zoom.php.

For communicating via UTC Mocs email with the instructor the student should use the following protocol or format regardless of the device:

“Hi/Hello/Dear Dr. McLean:

---  “Your message here”  ---

Regards/Thanks/Sincerely,
Senders Name, Last name, Course No., Senders MocsID”

**Course Assessments and Requirements:** We are scheduled to 16 weeks of class for Fall 2019. Although your attendance is not factored in your grade your attendance to at least 75% of lectures is required for a grade.

- **Assignments:** are required for most modules to allow students to practice the subject fundamentals and methods. Most calculation in assignments are required to be completed “by hand” (students own handwriting). PDF in the only acceptable file format for assignments submitted by hand. Submitting MSExcel or MSWords files for calculations are not allowed unless required in a specific assignment.

- **Quizzes:** are administered at the end of most chapters and can’t be taken at a later time. The “Not for Grading” option allow student to tell the instructor not to use that quiz for a
grade. This option can only be used 2 times in the semester. Review the policies regarding quizzes listed on UTC Learn under the “Course Policies” tab for details.

• **Exams:** are available at the end of a module. Students can take the exam once all requirements of the module are satisfied or on the last day of the module as a designated test date. In case of missing an exam period, students can make an appointment to take a makeup test up-to one week after the exam date at the ETM office (EMCS 326). The exception is the exam for Module 4 that must be taken on the designated date, and will be offered on-line only.

• **Labs:** Most labs in the course are a combination of videos and experimental assignment in or outside the classroom. At least one lab will be conducted in class and attendance required (Lego Game). Student attendance and participation is required on this particular lab.

• **Participation Forum/Discussion Board:** are available at the end of most chapter to allow students to participation in the class topic while demonstrating their knowledge on the class subjects. Participation Forums are available in UTC Learn for the required chapters in the course. Review the policies regarding Participation Forums listed on UTC Learn under the “Course Policies” tab for details.

• **Video Lectures:** All lectures are recorded to allow students to review lectures at a later time. An hybrid course give students the benefit of not been required for their physical presence for daily lectures in-class but only 4 class meetings in the semester. However, a virtual presence is required by review lectures on-line and on-demand over the Mediasite, UTC Learn, Blackboard, and completing assignments, quizzes, exams, labs and project on time.

**Conflict resolution policy regarding team work:** If your current group is not performing you expect act fast and change to a different group. Don’t wait until the last few weeks before due date to try getting a new partner or group. Individual complains on the performance of your team or individuals in your team close to the due date will not change the outcome of project or grade.

Any policy that is not discussed in this Syllabus the University of Tennessee - Chattanooga’s Policy will apply.

**Course Grading**

**Course Grading Policy:** Participation 15% (Participation Forums/Discussion Boards), Quizzes 10%, Assignment 10%, Labs 10%, Exam 1 10%, Exam 2 15%, Exam 3 15%, and Exam 4 15%.

The grading scale is the standard scale used in other courses in the school of Engineering Management:

**A:** 90-100% (Excellent, very professional)

**B:** 80-89.9% (Expected professional performance)

**C:** 70-79.9% (Require rework to be acceptable)

**D:** 60-69.9% (Unacceptable)

**F:** < 60 (Undesirable).
**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**

**Tobacco use statement:** UTC is a smoke-free campus. However, the use of tobacco, tobacco products, chewing tobacco, electronic cigarettes, vapors, aerosols, and e-liquids is not allowed in the classroom (before or between classes) or faculty office including second hand smoking.

**Late/Missing Work Policy:** Late assignment, labs and/or projects would be penalized 15 before grading and 40%-100% after grading unless an official excuse is provided and approved by the instructor. Students are advised to keep a copy of all their work until the end of the semester. Missing work should be submitted to the instructor for a grade.

**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. (from the [Student Handbook](#))

**Course Attendance Policy:** In-class student attendance to class is required for lecture. Student should notify the instructor in advance if not able to attend to one of these meeting times. In that case, students should complete the attendance at another recording time during the same month. Student on-line attendance will be tracked by their on-time completion of assignments, quizzes, exams and their active participation in the Participation Forum/Discussion Boards. Canvas also tracks your review of on-line video lectures and content every time you log in.

**Course Participation/Contribution:** Student’s participation is evaluated by the number and strength of your contributions in class and to the course topics. “Participation Forum”, “Discussion Board”, and “Collaboration” features on the UTC Learn site for the course are mostly available for on-line student unless specified by the instructor. It is the student’s responsibility to review each and all on-line video lectures available, participate actively and proactively in forums, and attend to activities that requires attendance.

**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 you are expected to complete them. We value your feedback and appreciate you taking time to complete the anonymous evaluations.

**Course Calendar/Schedule:**

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Aug 19/21</th>
<th>Faculty introduction/Syllabus/Class policies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Module 1Starts</td>
</tr>
<tr>
<td>Week 2</td>
<td>Aug 26/28</td>
<td>Module 1</td>
</tr>
<tr>
<td>Week 3</td>
<td>Sep 2/4</td>
<td>Holiday / Module 1</td>
</tr>
<tr>
<td>Week 4</td>
<td>Sept 9/11</td>
<td>Module 1Ends</td>
</tr>
<tr>
<td>Week 5</td>
<td>Sep 16/18</td>
<td>Module 2 Starts</td>
</tr>
<tr>
<td>Week 6</td>
<td>Sep 23/25</td>
<td>Module 2</td>
</tr>
<tr>
<td>Week 7</td>
<td>Sep 30/Oct 2</td>
<td>Module 2</td>
</tr>
<tr>
<td>Week 8</td>
<td>Oct 7/9</td>
<td>Module 2 Ends</td>
</tr>
<tr>
<td>Week 9</td>
<td>Oct 14/16</td>
<td>Fall Break / Module 3 Starts</td>
</tr>
<tr>
<td>Week 10</td>
<td>Oct 21/23</td>
<td>Module 3</td>
</tr>
<tr>
<td>Week 11</td>
<td>Oct 28/30</td>
<td>Module 3 Ends</td>
</tr>
<tr>
<td>Week 12</td>
<td>Nov 4/6</td>
<td>Module 3 Ends / Module 4 Starts</td>
</tr>
<tr>
<td>Week 13</td>
<td>Nov 11/13</td>
<td>Module 4</td>
</tr>
<tr>
<td>Week 14</td>
<td>Nov 18/20</td>
<td>Module 4</td>
</tr>
<tr>
<td>Week 15</td>
<td>Nov 25/27</td>
<td>Module 4 / Thanksgiving</td>
</tr>
<tr>
<td>Week 16</td>
<td>Dec 2</td>
<td>Module 4 Ends</td>
</tr>
<tr>
<td>Week 17</td>
<td>Dec 9</td>
<td>Final Exam schedule (Monday from 1:00 - 3:00 pm)</td>
</tr>
</tbody>
</table>

**Accessibility and Accommodation Statement:** Accessibility and any type of accommodations are managed by the Disability Resource Center (DRC). The DRC is accessible at [https://www.utc.edu/disability-resource-center/](https://www.utc.edu/disability-resource-center/), by phone at 425-4006, or come by the office, 102 Frist Hall. For exams accommodations visit [https://www.utc.edu/disability-resourcecenter/guidelinesprocedures/examaccommodations.php#li02](https://www.utc.edu/disability-resourcecenter/guidelinesprocedures/examaccommodations.php#li02).

**Counseling Center Statement:** If you find that personal problems, career indecision, student and time management difficulties, etc., are adversely impacting your successful progress at UTC, please contact the Counseling and Career Planning Center at 425-4438 or visit [https://www.utc.edu/counseling-center/index.php](https://www.utc.edu/counseling-center/index.php) for information.

**Veterans Services Statement:** The office of Veteran Student Services is committed to serving all the needs of our veterans and assisting them during their transition from military life to that of a student. If you are a student veteran or veteran dependent and need any assistance please refer to [https://www.utc.edu/dean-students/veteran-student-services/](https://www.utc.edu/dean-students/veteran-student-services/). This site can direct you the necessary resources for academics, educational benefits, adjustment issues, veteran allies, veteran organizations, and all other campus resources serving our veterans. You may also contact the coordinator of Veteran Student Programs and Services directly at 423.425.2277. THANK YOU FOR YOUR SERVICE.
Engineering Economy

Spring 2018

Department of Civil Engineering

ENCE 3520, CRN: 28589, In-Class, 3 credit hours

Instructor: Alexandr M. Sokolov
Email and Phone Number: alexandr-sokolov@utc.edu 423-425-4121
Office Hours and Location: Monday & Tuesday from 9:30 am – 12:30 pm, Thursday from 9:00 am -1:00 pm in EMCS 345
Course Meeting Days, Times, and Location: MWF, 1:00 pm -1:50 pm, EMCS 301
Course Catalog Description: Economic decision making for engineering systems. Choice of alternatives by equivalent annual cost, rate-of-return, present worth, and benefit-cost methods. Tax influences, statistical decision making, replacement policy. Fall, spring and summer semesters. Lecture 3 hours.
Course Pre/Co Requisites: Prerequisite: ENCE 2220 with a minimum grade of C or MGT 2110 and MATH 1910 or MATH 1950 with minimum grades of C or department head approval.
Course Student Learning Outcomes: TBD
Course Fees: Differential Course Fee will be assessed.
Technology Requirements for Course: Web Browser: Internet Explorer or FireFox
Hardware/Software Requirements: Participants need access to a personal computer (Mac or Windows) and the Internet for major amounts of time for this course. Plug-ins Necessary: You should have an updated version of Adobe Acrobat Reader (for pdf documents). Additional software plug ins may be needed. Check the Technical Requirements for the UTC Learn system.
Microsoft Word and PowerPoint version 2010
Technology Skills Required for Course: You are expected to have working knowledge and capability with your computer hardware, networking and a variety of software applications before entering this class. Class participants must know how to and check their e-mail on a daily basis. You will need to know the appropriate user name and password to access the UTC Learn online password-protected system. If you do NOT know your user name and password, please contact the Call Center at (423) 425-4000. You must be able to save word processing files in a .doc/.docx (Microsoft Word) or .pdf (Adobe Acrobat).
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. Quiz: There are six quizzes. The lowest quiz grade will not be counted. Each quiz will be taken in class on Friday or Wednesday of the predetermined week according to the schedule. Quizzes will have multiple-choice and/or true-false and/or filling in the blank, and short answer. You will have the entire class to take the quiz. There will be no make-up quizzes. B. Mid-term Exam: Each student will be given an exam
that will be conducted individually in class. Details of the exam will be given later in class. **C. Final Exam:** Students will be given an exam that will be conducted individually in class. Details of the exam will be given later in class. **D. Participation:** Students are required to participate in class and attend all lectures.

**Course Grading**

**Course Grading Policy:** The grade for this course will be determined by work submitted in the form of: Quizzes 25%, Mid-term Exam 25%, Final Exam 30%, & Participation 20%. The UTC 10 Point Grading scale will be used. 90-100% A, 80-89% B, 70-79% C, 60-69% D, 0-59% F

**Instructor Grading and Feedback Response Time:** The results of quizzes and exams will be posted electronically within a week of the due date. Participation grade will be posted at the end of the last week of class.

**Course and Institutional Policies**

**Late/Missing Work Policy:** All assigned work should be submitted by the due date. No late or partial work will be accepted without discussion from the class instructor. No makeup exams or quizzes will be given without discussion from the class instructor.

**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:** Class attendance is mandatory, and attendance will be taken during random lectures.

**Course Participation/Contribution:** Active participation in class and responding to questions, carrying on in discussions will count towards the 20% participation grade. Attendance is not enough to receive full credit for participation.

**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:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture</th>
<th>Assignment</th>
<th>Quiz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Week of January 8th</td>
<td>Chapter 1 Introduction to Engineering Economy</td>
<td>Read Chapter 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Week of January 15th</td>
<td>Chapter 2 Cost Concepts and Design Economics</td>
<td>Read Chapter 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Week of January 22nd</td>
<td>Chapter 3 Cost-Estimation Techniques</td>
<td>Read Chapter 3</td>
<td>Chapter 1 &amp; 2</td>
</tr>
<tr>
<td>4</td>
<td>Week of January 29th</td>
<td>Chapter 4 The Time Value of Money</td>
<td>Read Chapter 4</td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>Chapter(s) and Notes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Feb 5th</td>
<td>Chapter 5 Evaluating a Single Project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Feb 12th</td>
<td>Chapter 6 Comparison and Selection among Alternatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Feb 19th</td>
<td>Midterms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Feb 26th</td>
<td>Chapter 7 Depreciation and Income Taxes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Mar 5th</td>
<td>Chapter 8 Price Changes and Exchange Rates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Mar 12th</td>
<td>SPRING BREAK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Mar 19th</td>
<td>Chapter 9 Replacement Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Mar 26th</td>
<td>Chapter 10 Evaluating projects with the Benefit CRM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Apr 2nd</td>
<td>Chapter 11 Breakeven and Sensitivity Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Apr 9th</td>
<td>Chapter 12 Probabilistic Risk Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Apr 16th</td>
<td>Chapter 13 The Capital Budgeting Process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Apr 23rd</td>
<td>Chapter 14 Decision making Considering Multiattributes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Apr 30th</td>
<td>Final Exams</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix H. Graduate Syllabi Examples

Technical Project Management

Spring 2019

Department of Engineering Management & Technology

ENGM 5540, CRN 22308, Online, 3 credit hours

Instructor: Seong Dae Kim, Ph.D., PMP, aCAP
Email and Phone Number: SeongDae-Kim@utc.edu; 423-425-5786

Office Hours and Location: M, 11:00 am - 2:00 pm, W, 11:00 am – 2:00 pm, or by Appointment. Office: EMCS 326B
Course Meeting Days, Times, and Location: W, 2:00-4:30 pm, EMCS 231

Course Catalog Description: All aspects of project management are covered with emphasis on human and institutional interactions that occur during management of technical projects. Methods of resource identification and allocation, integration of scheduling and cost factors, development of project plans and control are addressed. Project control methods such as PERT and CPM are introduced. A project case study is carried through the semester to illustrate decisions and problems encountered in technical project management. Individual presentations required. Lecture 3 hours.

Course Pre/Co Requisites: Prerequisite: N/A. May be registered as ENGR 5540. Credit not allowed in both ENGM 5540 and ENGR 5540.

Course Student Learning Outcomes: Upon successful completion of this course, learners will be able to
1. Demonstrate understanding of the definition of a project;
2. Demonstrate understanding of key project management concepts;
3. Estimate project budgets;
4. Demonstrate understanding of work breakdown structure;
5. Demonstrate understanding of technical tools and techniques in project management;
6. Apply project management tools and techniques in a small-scale project setting;
7. Use project management software effectively;
8. Communicate effectively as a project manager.

ABET – ETAC Student Outcomes:

J. RUBRIC: KNOWLEDGE OF CONTEMPORARY ISSUES

A. Define Contemporary Issues
B. Identify Strategies

C. Evaluate Potential Solutions

Course Fees: Differential course fee will be assessed.


Supplemental/Optional Course Materials: N/A

Technology Requirements for Course: Web Browser: Internet Explorer or FireFox
Hardware/Software Requirements: Participants need access to a personal computer (Mac or PC) and the Internet for major amounts of time for this course. Plug-ins Necessary: You should have an updated version of Adobe Acrobat Reader (for pdf documents). Additional software plug ins may be needed. Check the Technical Requirements for the UTC Learn system. Microsoft Word and PowerPoint version 2010 or later.

Technology Skills Required for Course: You are expected to have working knowledge and capability with your computer hardware, networking and a variety of software applications before entering this class. Class participants must know how to and check their e-mail on a daily basis. You will need to know the appropriate user name and password to access the UTC Learn online password-protected system. If you do NOT know your user name and password, please contact the Call Center at (423) 425-4000. You must be able to save word processing files in a .doc/.docx (Microsoft Word) or .pdf (Adobe Acrobat). You should be able to use a computer during the class to in-class exercise.

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. Quizzes: There are five online quizzes. Each quiz will be linked on the pre-determined day in the schedule at 9:00 a.m. and must be completed by 11:59 p.m. on the same day. Quiz questions will include multiple-choice, true-false, filling in the blank, and/or essay questions. The length of each quiz will be 30 min. There will be no make-up quizzes. If you have any technical problems during the quiz, you need to contact the instructor ASAP.

B. Mid-term Exam: Each student will be given an exam that will be conducted individually. Details of the exam will be given later in class.

C. Term Project: Teams of two or three students will apply as many tools and techniques as possible from this course to prepare the project management plan for a project of student’s choice. Details of the term project will be given later in class.

D. Participation: Students are required to participate on the Discussion Board through Blackboard on a regular basis. Minimum requirement for Discussion Board participation is at least one posting and one comment to another person’s posting for every chapter. Students are also required to evaluate other teams’ term project presentations.
Course Grading

Course Grading Policy: 90.0-100.0% = A; 80.0-89.9% = B; 70.0-79.9% = C; 60.0-69.9% = D; <60.0% = F.

<table>
<thead>
<tr>
<th>Course</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>30%</td>
</tr>
<tr>
<td>Mid-term Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Term Project</td>
<td>30%</td>
</tr>
<tr>
<td>Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Instructor Grading and Feedback Response Time: The results of homework and exams will be posted electronically within a week of the due date.

Course and Institutional Policies

Late/Missing Work Policy: All assigned work should be submitted by the due date. No late or partial work will be accepted without discussion with the class instructor.

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: Online students do not have to attend class but are required to participate online.

Course Participation/Contribution: Active participation in class, commenting to other students’ posting on Blackboard, and evaluation of term project presentation count towards 10% credit as part of your final grade. Attendance is not enough to receive full credit for participation.

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:

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/9</td>
<td>Syllabus review; Introduction to project management</td>
<td>Chapters 1, 2, 3</td>
</tr>
<tr>
<td>1/16</td>
<td>Project scope management; project schedule management</td>
<td>Chapters 5 and 6</td>
</tr>
<tr>
<td>1/23</td>
<td>Scheduling using MS Project</td>
<td>MS Project tutorials</td>
</tr>
<tr>
<td>1/30</td>
<td>Project cost management</td>
<td>Quiz 1</td>
</tr>
<tr>
<td>2/6</td>
<td>Monte Carlo simulation using Crystal Ball® for budgeting</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Additional Info</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>2/13</td>
<td>Project resource management</td>
<td>Quiz 2 Chapter 9</td>
</tr>
<tr>
<td>2/20</td>
<td>Project risk management</td>
<td>Chapter 11</td>
</tr>
<tr>
<td>2/27</td>
<td>Qualitative/quantitative risk analysis</td>
<td>Quiz 3 Chapter 11</td>
</tr>
<tr>
<td>3/6</td>
<td>Midterm Exam</td>
<td></td>
</tr>
<tr>
<td>3/13</td>
<td>NO CLASS (Spring Break)</td>
<td></td>
</tr>
<tr>
<td>3/20</td>
<td>Project procurement management; project stakeholder management</td>
<td>Chapters 12 and 13</td>
</tr>
<tr>
<td>3/27</td>
<td>Introduction to agile</td>
<td>Quiz 4 Agile chapters 1 and 2</td>
</tr>
<tr>
<td>4/3</td>
<td>Implementing agile</td>
<td>Agile chapters 4 and 5</td>
</tr>
<tr>
<td>4/10</td>
<td>Special topics in project management</td>
<td>Quiz 5</td>
</tr>
<tr>
<td>4/17</td>
<td>Term project presentations</td>
<td></td>
</tr>
</tbody>
</table>

Course schedule subject to change

**Term Project presentation evaluation rubric:**

Presenting team: ______________________

Please rate the ENGM 5540 term project presentation on the following dimensions:

<table>
<thead>
<tr>
<th>Dimension (multiplier)</th>
<th>1 very poor (very low)</th>
<th>2 poor (low)</th>
<th>3 neutral (medium)</th>
<th>4 good (high)</th>
<th>5 very good (very high)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explanation of the problem of focus (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explanation of how the problem is linked to the technique(s) used (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearly stated research question(s) (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of technique(s) used (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of technique(s) used (.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional look of presentation slides (.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visualization of the results (.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of time allocation (.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total score = ______________________

(add multiplier*score from the above rows. Total possible points = 30)
Advanced Quality Control

Fall 2018

Department of Engineering Management and Technology

Course number: ENGM 5570, CRN: 49999, Modality: In Class, Credit hours: 3

Instructor: Wolday D. Abrha

Email and Phone Number: Wolday-Abrha@utc.edu; 423-425-5678

Office Hours and Location: W 12:15 – 2:15 PM or by appointment. Office: EMCS 328

Course Meeting Days, Times, and Location: Tuesday/Thursday 03:05 – 4:20 PM, EMCS 231

Course Catalog Description: The design and analysis of quality systems. Fundamental coverage of statistical process control, quality control concepts, control charts, product specifications, process control, acceptance sampling systems, and other means of assurance widely used in many industries to improve product and service quality and to reduce costs. Background in undergraduate statistics or equivalent. Knowledge of probability and statistical methods, numerical analysis, design of experiments, and hypothesis testing.

Course Pre/Co Requisites: Department head approval. May be registered in ENGR 5570. Credit not allowed in both ENGM 5570 and ENGR 5570.

Course Student Learning Outcomes: Upon completion of this course, the successful student will be able to:

1) Describe the specific characteristics, techniques, and insights that are necessary to apply and interpret different types of control charts appropriately.
2) Clarify how to diagnose and analyze problems that cause variation in manufacturing and service industries.
3) Develop, utilize, and interpret a variety of control charts for effective process machine and product control.
4) Explain the concept of process capability as it relates to statistical process control.
5) Apply selected problem-solving tools and techniques to resolve quality assurance issues of various case studies.
6) Illustrate how to present information clearly and unambiguously, validate decisions based on the information, and clearly communicate conclusions.
7) Recognize the basic philosophies surrounding quality management.


Supplemental/Optional Course Materials:
4) Additional materials such as case studies, journal articles, and notes will be posted in blackboard as needed.

**Technology Requirements for Course:** Your electronic device should be compatible to allow access to UTC Learn (also known as Blackboard), to read announcements and course materials, and to submit assignments and examinations. Grades will also be posted on Blackboard. If you are unfamiliar with Blackboard, you may use the Center for Student Success, enroll in an online training, or contact the Walker Center for Teaching and Learning to register for a classroom course. Minimum requirements: Microsoft – Excel, Word, and PowerPoint (versions 2010 or later), and Adobe Acrobat Pro.

**Technology Skills Required for Course:** Blackboard will serve as a key platform in the conduction of this class. Student are expected to be skilled enough to access Blackboard and be familiar to Microsoft office products (Excel, Word, and PowerPoint), Adobe Acrobat, and Adobe Connect. The *Solver* add-on Excel, *JMP*, and/or *Minitab* software may be used.

**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:** Course assessments will be based on total points earned from quizzes, exams, project, and participation.

1) All assessments, individual and team project reports, and PowerPoint presentation should be typed and uploaded to UTC Learn. Instructor may provide report writing and presentation guidelines as needed and can ask a hardcopy of any of these submissions.
2) The electronic file naming convention for any of your submissions is: 
   `LastName_FirstInitial_CourseNumber_Assignment#_due date_dot file extension`. 
   Example 1: John_A_ENGM5570_Assignment #1_August 15.doc. Also use this file naming in the header of your report.
3) Only pdf or word documents are the acceptable file formats.
4) All sources other than textbook and lecture materials should be properly cited (APA is a preferred format). *Any form of plagiarism will not be tolerated and will result in a zero grade for the specific work, and it can be reported for violating honor code.*
5) While some justifiable circumstances may be considered at the discretion of instructor (on case by case bases), late submissions will be penalized (see late/missing work policy for details).
6) The general evaluation criteria for written works is based on:
a. Instructions (refers to the ability to follow instructions correctly and submit by due date),
b. Mastery of concepts (refers to learning/student outcomes),
c. Flow (refers to the logical flow of written report which includes correct grammar and spelling),
d. Source (this refers to citation of information taken from books, journal articles, websites, etc.), and
e. Rubrics assigned for each assessment and question.

7) As a graduate student, all your works are expected to be submitted only after a thorough analysis of a problem. Hence, discussions using real-life case studies, work experiences, scenario analysis, etc. are expected.

Course Grading

Course Grading Policy:

1) *Quizzes (25%):* There will be at least two quizzes. You may be asked to attach worksheets. Details will be announced by instructor.

2) *Midterm Exam (15%):* The midterm exam will be available on October 4. You may be asked to attach worksheets. Details will be announced by instructor.

3) *Final Exam (20%):* The final exam is currently scheduled to be available on December 11, 3:30 – 5:30 PM. The final exam may be required to be proctored. Details will be announced by instructor. You may be asked to attach worksheets.

4) *Project/Research Paper (30%):* There will be a team of two students per project. Each team will cover an application of principles learned. A typical project is one that is applicable to your workplace or an organization you are affiliated with. Evaluation will be based on a written report and oral presentation. Project progress may be submitted in phases. Details will be announced on Blackboard.

5) *Participation (10%):* Active participation in responding to questions and topics in class counts towards your final grade. Additional discussions may be available on Blackboard.

Instructor Grading and Feedback Response Time:

- The results of quizzes, exams, and other submitted works will be posted electronically within a week of the due date. Participation grade will be posted at the end of the last week of class.
- Instructor will respond to all other inquiries within 24 hours. Any communication received on weekends will have to be responded by the next Monday.
- You are expected to adhere to a formal e-mail writing style, when sending emails. *Remember, e-mail is not a text message!* Example: include course code and CRN in the subject, start your message with greetings, and close it professionally.
Letter grading:

<table>
<thead>
<tr>
<th>Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 – 100</td>
<td>A</td>
</tr>
<tr>
<td>80 – 89</td>
<td>B</td>
</tr>
<tr>
<td>70 – 79</td>
<td>C</td>
</tr>
<tr>
<td>60 – 69</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
</tr>
</tbody>
</table>

Course and Institutional Policies

**Late/Missing Work Policy:** All assigned works should be submitted by the due date to UTC Learn. Late works are strongly discouraged and will be penalized. There will be a 10% penalty for each day a work is submitted late. If you know you are going to submit late, you should let me know in advance. No work will be accepted after solutions are provided.

**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:** While attendance will not be taken during every lecture, everyone is assumed to be an adult and will attend class if possible. If you are not present or do not utilize the discussion boards on Blackboard, you will not get credit for participation. It is the student’s responsibility to keep up with coursework, materials, review any missed work, and assignments.

**Course Participation/Contribution:** Active participation by responding to questions on discussion boards on Blackboard and in class counts towards 10% credit as part of your final 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:** This is a tentative course calendar/schedule. Additional information, updates, and announcements will be provided via UTC Learn, as needed.

<table>
<thead>
<tr>
<th>Week #</th>
<th>Chapter &amp; Topic</th>
<th>Assessments Due</th>
<th>Additional Notice</th>
</tr>
</thead>
</table>
| 1 | Introduction & Overview  
Ch 1: Quality Improvement in Modern Business Env’t  
Ch 2: The DMAIC Process | Learning assessment (August 21 – 23) |  |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Ch 3: Modeling Process Quality</td>
<td>Introductory profile, group preference (August 28)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ch 4: Inferences About Process Quality</td>
<td>Labor Day (September 3)</td>
<td></td>
</tr>
</tbody>
</table>
| 4 | Ch 4 (cont’d)  
Ch 5: Methods/Philosophy of SPC | Quiz 1, phase 1 of project (September 13) | Chapters for quiz: TBD |
| 5 | Ch 6: Control Charts for Variables  
Ch 7: Control Charts for Attributes |  |  |
| 6 | Ch 8: Process/Measurement Capability Analysis | Midterm exam (October 4) |  |
| 7 | Ch 9: CUMSUM & EWMA  
Ch 10: Univariate SPC techniques | Phase 2 of project (October 11) | Midterm grade announcement, if needed |
| 8 | Ch 10 (cont’d)  
Ch 11: Multivariate SPC |  |  |
| 9 | Ch 12: Engineering Process Control & SPC | Quiz 2 (October 18) | Chapters for quiz: TBD Fall Break (October 16) |
| 10 | Ch 13: DOE |  |  |
| 11 | Ch 13 (cont’d)  
Ch 14: Optimization with DOE | Phase 3 of project (November 8) |  |
| 12 | Ch 15: Acceptance Sampling for Attributes |  |  |
| 13 | Ch 16: Acceptance Sampling – others | Quiz 3 (November 20) |  |
| 14 | Review | Phase 4 of project (November 29) | Last day of Class (November 29) |
| 15 | No Class (Study day & final exam week) |  |  |
| 16 | Final Exam | Final Exam (December 11) | Exam time: 3:30 – 5:30 pm |
Appendix I. Oral and Written Communication Rubrics
## Oral Communication Rubric for Graduate Students

<table>
<thead>
<tr>
<th>Score</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Comments:
- **Speaking Skills**
- **Attention to Audience**
- **Visual Aids**
- **Presentation Length**

### Instructions:
Please mark your score in the last column for each category as described below, and put your total score in the last row.

---

**Major:**

**Date:**

**Name of Student:**

**VC College of Engineering and Computer Science**
<table>
<thead>
<tr>
<th>Score</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Writing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Process and Commitment to the Writing Process</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows no enthusiasm for and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows some enthusiasm for and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows exceptional enthusiasm for</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Engaging &amp; Revising</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engaging in the ideas of their peers and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engaging in the ideas of their own</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engaging in the ideas of both</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Starting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows clear evidence of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows clear evidence of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows clear evidence of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Revision</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student makes minor revisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student makes major revisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student makes significant revisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Editing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows clear evidence of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows clear evidence of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows clear evidence of</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Signature of Reviewer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Instructions:** Please mark your score in the last column for each category as described below, and put your total score in the last row.