Academic Program Review

Engineering Management
Graduate Program Self-Study Report

Academic Years 2020-2024

Table of Contents

A.

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 five major campuses located in Chattanooga, Knoxville, Martin, Memphis, and Pulaski. 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% 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 (CECS) at UTC. 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 Volkswagen). Chattanooga is also home to 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. As requirements emerged 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: (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%). This online alternative enables a student to have the flexibility to pursue a graduate degree while continuing to work full-time or engage in activities 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, is delivered using Canvas. 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 the academic accomplishment of the faculty, but also significant managerial experience. For example, some faculty members teaching in the program have years of senior level executive experience including experience on boards of directors of major companies. While other faculty members have experience with start-up companies, operations of national level and 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.

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 2023, UTC, started the ***Joint Undergraduate to Master's Program (JUMP).*** This program allows a student to take graduate classes early, substituting up to 9 undergraduate hours, and potentially complete a graduate program in less time and for less cost than the traditional graduate program which is completed after the undergraduate degree is awarded. Undergraduate students at UTC who are classified as seniors and are within 30 hours of completion of their first bachelor's degree with an overall GPA of at least 3.4 are eligible to participate in JUMP. Applications to JUMP may be submitted online when the student has reached junior status and is in the last semester before their final year. With the approval of the Admissions Committee, the students will be admitted to JUMP in their senior year (when they are within 30 hours of completion). Students admitted to JUMP will begin coursework related to the graduate degree within 30 hours of completing the undergraduate degree. Upon completion of the undergraduate degree, meeting graduate continuation standards, and completing an application to the Graduate School, the student's level will be changed from undergraduate to graduate.

In Augst 2023, the College of Engineering and Computer Science hired Mackenzie Clark as the Graduate Recruitment Coordinator. Her role is to support the online MS programs in engineering, computer science, and engineering management.

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, and coordinating courses with faculty.

To date, new online courses are being developed, we have 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.

Joint Undergraduate to Masters Program (JUMP)

This program allows a student to take graduate classes early, substituting up to 9 undergraduate hours, and potentially complete a graduate program in less time and for less cost than the traditional graduate program which is completed after the undergraduate degree is awarded.

Mackenzie Clark

A graduate of the University of Tennessee at Chattanooga, Clark, who is from Murfreesboro, Tennessee, majored in communication and was a member of the Ladies of Gold dance squad. After graduating in May 2023, Clark was hired as a graduate recruitment coordinator for the College of Engineering and Computer Science. As a former marketing intern for the Gary W. Rollins College of Business, she was familiar with working on campus. Clark also was a student orientation leader and campus tour guide as an undergraduate, which inspired her to choose recruitment.

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 the 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 teams for all six MBA programs. She also planned conferences and seminars, including seminars in Beijing and London.

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 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. A 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 high quality and to assist the students in the preparation of their projects an organization has been set up in Canvas. Information is included 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 a project proposal
- Develop a project schedule
- Select committee members
- Conduct the literature review
- Collect data
- Analyze data
- Write 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 (FA22-SP23)

Student	Project Advisor	Project Title
Chelsie Ewing	Mr. Paul Baggett	Implementation of Building Lifecycle Management into UTC Facilities
Charles Bolen	Dr. Serkan Varol	An Engineering Management Study on the Effects of a Booming Commercial Space Launch Market

Joo Oh	Dr. Seong Dae Kim	KTM USA Tool Transfer Timing Planning Improvement
Joseph Caporali	Dr. Wolday Abrha	Quality Analysis of the Continued Need for Fossil Fuels and Combustion Engines
Immanuel Sandryka	Dr. Wolday Abrha	Paint Application Quality Development
Andrew Mowrer	Dr. Jennifer Goodrich	Transactional vs. Transformational: Engaging Engineers
David Sissom	Dr. Wolday Abrha	Systems Model for Low Energy-Intensive Aluminum Reclamation
Mena Youssef	Dr. Serkan Varol	Vehicle Fatality Analysis by Gender using Predictive Analytics
Branden Vinsant	Dr. Serkan Varol	Telos Global – Internal Expansion and Growth Plan
James Cross	Dr. Seong Dae Kim	Cross Town Engineering United States Pacific Northwest Expansion
Clarence Langley	Dr. Seong Dae Kim	Study on Trends and Emerging Sustainability Practices on Detached Single-Family Homes
Rana Taha	Dr. Seong Dae Kim	The Influence of Demographic Factors on the Perception of Construction Workers Towards Safety Culture
Jesus De La Cruz	Dr. Serkan Varol	Elma Stem Upset Scrap Reduction Using DMAIC
Enass Mohammed	Mr. Paul Baggett	AutoCAD Electrical (ACADe) for Substation Design: Increasing Efficiency in Power Substation Design Firms
Kenisha Gardner	Mr. Paul Baggett	Healthy Smart Homes
Tracie Clifford	Dr. Seong Dae Kim	Increasing Engineering Student Diversity in Study Abroad

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 keep 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 2023. 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. The 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. The average grade of students in these categories is 80%. The assessment data for Spring 2023 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 that reviews and makes necessary changes in the graduate curriculum every year based on student evaluations and assessment results.

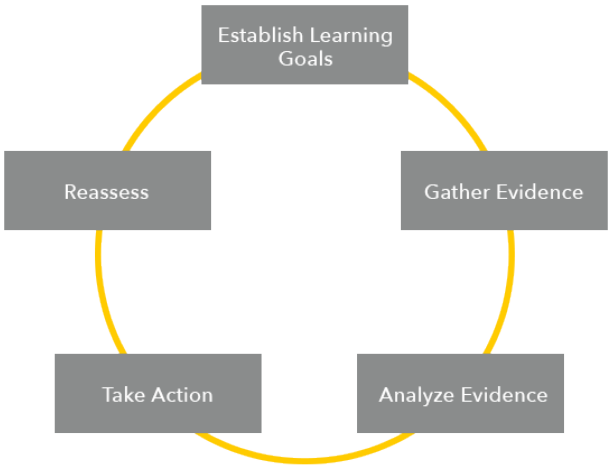


Figure 1. Engineering Management Assessment Cycle

The process shown in Figure 1. 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 are 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, participates in the 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 missions, visions, and values, as shown in Table 2.

Table 2. Alignment of Mission, Vision, and Values

	UTC	College of Engineering and Computer Science	Engineering Management
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.	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.	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

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 with students, employers, and collaborators in the Chattanooga area and surrounding states.

In the current structure, the requirement of 18 hours of core courses and 15 hours of 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 offerings in construction disciplines have had a positive impact on private firms, 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 sets responsive to different challenges and environments. Therefore, the new curriculum is designed to provide the knowledge and skills needed to function effectively as managers on technical and non-technical processes. The certificate programs accommodate 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 with 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 curriculum including courses for the Construction Management concentration is shown in Table 3.

Table 3. Comparison of Engineering Management Graduate Program's New and Old Curriculum

Old Curriculum (2019-20)	New Curriculum (2023-24)

Core Courses (18 hrs.): ENGM 5040 - Decision Making and Optimization Techniques (3 Hrs.) ENGM 5500 - Concepts in Engineering Management (3 Hrs.) ENGM 5540 - Technical Project Management (3 Hrs.) ENGM 5580 - Advanced Engineering Economy (3 Hrs.) ENGM 5830 - Strategic Management and Technology (3 Hrs.) ENGM 5960r - Capstone Project (3 Hrs.) **Elective Courses* (15 hrs.):** ENGM 5040 - Decision Making and Optimization Techniques (3 Hrs.) ENGM 5510 - Legal and Ethical Perspectives in Engineering (3 Hrs.) ENGM 5520 - Reliability Engineering (3 Hrs.) ENGM 5560 - Quality Management Systems (3 Hrs.) ENGM 5570 - Advanced Quality Control (3 Hrs.) ENGM 5800 - Product Development (3 Hrs.) ENGM 5820 - Value Management (3 Hrs.) ENGM 5910 - Special Topics in Engineering Management (3 Hrs.) ENGM 5950 - Research Methods Lab (3 Hrs.) ENGR 5920 - Graduate Internship in Engineering (3 Hrs.) **Construction Electives (9 hours)** ENGM 5600 - Sustainability and LEED (3 Hrs.) ENGM 5610 - Construction Law: Contracts and Claims (3 Hrs.) ENGM 5620 - Strategic Bidding and Estimating (3 Hrs.) ENGM 5630 - Advanced Operations and Constructability (3 Hrs.) ENGM 5640 - Design and Construction of Tall Buildings (3 Hrs.) **Power Systems Management Electives (15 hours)** ENEE 5160 - Introduction to the Smart Grid	**Core Courses (18 hrs.):** ENGM 5030 - Statistics for Engineering Managers ENGM 5040 - Decision Making and Optimization Techniques (3 Hrs.) ENGM 5500 - Concepts in Engineering Management (3 Hrs.) ENGM 5540 - Technical Project Management (3 Hrs.) ENGM 5570 - Lean Six Sigma (3 Hrs.) ENGM 5580 - Advanced Engineering Economy (3 Hrs.) ENGM 5960r - Capstone Project (3 Hrs.) **Elective Courses* (15 hrs.):** ENGM 5830 - Strategic Management and Technology (3 Hrs.) ENGM 5510 - Legal and Ethical Perspectives in Engineering (3 Hrs.) ENGM 5520 - Reliability Engineering (3 Hrs.) ENGM 5550 - Technical Entrepreneurship and Leadership (3 Hrs.) ENGM 5560 - Quality Management Systems (3 Hrs.) ENGM 5570 - Advanced Quality Control (3 Hrs.) ENGM 5800 - Product Development (3 Hrs.) ENGM 5820 - Value Management (3 Hrs.) ENGM 5910r - Special Topics in Engineering Management (3 Hrs.) ENGM 5950 - Research Methods Lab (3 Hrs.) ENCE 5920r - Graduate Internship in Engineering (3 Hrs.) **Construction Electives (9 hours)** ENGM 5600 - Sustainability and LEED (3 Hrs.) ENGM 5610 - Construction Law: Contracts and Claims (3 Hrs.) ENGM 5620 - Strategic Bidding and Estimating (3 Hrs.) ENGM 5630 - Advanced Operations and Constructability (3 Hrs.) **TOTAL: 33 hrs.** ***Please Note:** Electives can be taken in areas outside of engineering management, such as other engineering disciplines or science or business.

ENEE 5520 - Power System Operations ENEE 5610 - Power Electronics and Drives ENEE 5620 - Power System Protection ENEE 5650 - Sustainable Electric Energy Systems ENEE 5720 - Power System Analysis and Design **TOTAL: 33 hrs.** ***Please Note:** Electives can be taken in areas outside of engineering management, such as other engineering disciplines or science or business.	

Graduate Certificate programs are now offered in four distinctive areas of engineering management, each consisting of four 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 follows:

a. Project and Technology Management

b. Quality Management

c. Logistics and Supply Management

d. Construction Management

a. Certificate Program in Project and Technology Management

ENGM 5540 Technical Project Management (3hrs.)

ENGM 5580 Advanced Engineering Economy (3hrs.)

ENGM 5850 Technical Innovation (3hrs.)

ENGM 5870 Supply Chain Management (3hrs.)

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. programs 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 4. Engineering Management Courses Offered in the Last Two Years

COURSE INFORMATION		ACADEMIC YR 2021-22			ACADEMIC YR 2022-23		
ENGM NO.	TITLE (CREDIT HOURS)	FALL	SPR	SUM	FALL	SPR	SUM

5040	Decision Making and Optimization techniques (3)		**X**			**X**	
5100	Data Analytics for Engineering Managers					**X**	**X**
5500	Concepts in Engineering Management (3)	**X**			**X**		
5510	Legal & Ethical Perspectives in Engineering (3)				**X**		
5520	Reliability Engineering (3)		**X**			**X**	
5530	Advanced Ergonomics (3)			**X**			**X**
5540	Technical Project Management (3)		**X**			**X**	
5550	Technology Entrepreneurship & Leadership (3)					**X**	
5560	Quality Management Systems (3)			**X**			
5570	Advanced Quality Control (3)				**X**		
5580	Advanced Engineering Economy (3)	**X**			**X**		
5600	Sustainability and LEED (3)					**X**	
5610	Construction Law: Contracts and Claims (3)	**X**			**X**		
5620	Strategic Bidding and Estimating (3)		**X**			**X**	
5800	Product Development (3)				**X**		
5820	Value Management (3)	**X**					
5830	Strategic Management and Technology (3)		**X**			**X**	
5910R	Data Analytics (3)		**X**				
5910R	Special Topics in ENGM (3)		**X**				
5920	Graduate Internship in Engineering (1)	**X**					**X**
5950	Capstone Project I (1)	**X**	**X**		**X**	**X**	
5960	Capstone Project II (2)	**X**	**X**	**X**	**X**	**X**	
5998R	Research (1)		**X**				
5999R	Thesis (1-6)	**X**	**X**		**X**	**X**	**X**

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 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 meeting times, 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, (2) are local students but are not able to attend class as scheduled (e.g. work schedules, others), (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 have been offered in the last two years.

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

COURSE INFORMATION		ACADEMIC YR 2021-22			ACADEMIC YR 2022-23		
ENGM NO.	**TITLE (CREDIT HOURS)**	**FALL**	**SPR**	**SUM**	**FALL**	**SPR**	**SUM**
5040	Decision Making and Optimization techniques (3)		22			16	
5100	Data Analytics for Engineering Managers					13	4
5500	Concepts in Engineering Management (3)	22			27		
5510	Legal & Ethical Perspectives in Engineering (3)				12		
5520	Reliability Engineering (3)		17			8	
5530	Advanced Ergonomics (3)			11			10
5540	Technical Project Management (3)		18			14	
5550	Technology Entrepreneurship & Leadership (3)					16	
5560	Quality Management Systems (3)			17			
5570	Advanced Quality Control (3)				10		
5580	Advanced Engineering Economy (3)	37			17		
5600	Sustainability and LEED (3)					10	
5610	Construction Law: Contracts and Claims (3)	19			5		
5620	Strategic Bidding and Estimating (3)		12			11	
5800	Product Development (3)				22		
5820	Value Management (3)	12					

5830	Strategic Management and Technology (3)		20			15	
5910R	Data Analytics (3)		4				
5910R	Special Topics in ENGM (3)		1				
5920	Graduate Internship in Engineering (1)	2					5
5950	Capstone Project I (1)	14	16		12	9	
5960	Capstone Project II (2)	6	7	1	8	12	
5998R	Research (1)		1				
5999R	Thesis (1-6)	1	1		2	2	1

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 engineering management and 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 the 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 6. MS Engineering Curriculum Alignment with Program Outcomes

			Outcome 1	**Outcome 2**
ENGM	5040	Decision Making and Optimization Techniques	**x**	
ENGM	5500	Concepts in Engineering Management	**x**	
ENGM	5510	Legal and Ethical Perspectives in Engineering		**x**
ENGM	5520	Reliability Engineering	**x**	
ENGM	5540	Technical Project Management	**x**	**x**
ENGM	5550	Technical Entrepreneurship and Leadership		**x**
ENGM	5560	Quality Management Systems	**x**	**x**
ENGM	5570	Advanced Quality Control	**x**	
ENGM	5580	Advanced Engineering Economy		**x**
ENGM	5600	Sustainability and LEED	**x**	
ENGM	5610	Construction Law: Contracts and Claims		**x**
ENGM	5620	Strategic Bidding and Estimating	**x**	
ENGM	5630	Advanced Operations and Constructability	**x**	
ENGM	5800	Product Development	**x**	**x**

ENGM	5820	Value Management	**x**	
ENGM	5830	Strategic Management and Technology	**x**	
ENGM	5950	Research Methods Lab		**x**
ENGM	5920R	Graduate Internship in Engineering		**x**
ENGM	5960R	Capstone Project	**x**	**x**
Outcome 1: Application of Engineering Management Principles				
Outcome 2: Effective and Professional Communication				

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 https://catalog.utc.edu/preview_entity.php?catoid=44&ent_oid=2195&returnto=1737. The MS Engineering Management program aims to ensure that course offerings and their contents specifically address the student and industry needs and that an appropriate level of rigor and skill mastery are incorporated in its curriculum, as can be seen from course syllabi, shown in Appendix H.

Engineering 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 their 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 their 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

- ENCE 5920r - Graduate Internship in Engineering

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:
A. 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.
ORB. 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 that offered internship opportunities to our students in academic year 2018-2019 is given below:

Tennessee Valley Authority (TVA)

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 UTC, 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.

UTC Learn, or Canvas, UTC's current Learning Management System (LMS), 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 Canvas is the discussion board. This feature enables students to have online discussions with the instructor and other students in class on assigned topics.

Kaltura has been used to upgrade two of the classrooms (EMCS 231 and EMCS 202) in the College of Engineering and Computer Science in order to deliver online courses by using this method, which provides both video and audio delivery for online courses. Kaltura 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 aids in maintaining the class's semester schedule. Kaltura 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 fees are used to support faculty and graduate students to upgrade and deliver all Engineering Management online courses.

The 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 Canvas 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 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.

The Walker Center also provides training for faculty to utilize UTC Learn in their courses and organizations. UTC is also in process of evaluating a few alternative systems to Kaltura in order to upgrade its lecture capture system.

In April 2022, our Master's in Engineering Management at The University of Tennessee at Chattanooga is ranked #3 in the nation for Best Thesis Program.

The University of Tennessee at Chattanooga is ranked #11 in the nation and made Best in the South for top Master's in Engineering Management Online Degree Programs for 2022.

The University of Tennessee at Chattanooga made the rankings at #13 for 2020 Most Affordable Online Colleges for Master's Degrees in Engineering Management!

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

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 Kaltura 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 Kaltura. 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 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 submit the following materials to the Graduate School:

- A completed online application form
- A Statement of Purpose/Intent
- Payment of the $35 nonrefundable application fee for domestic applicants or $40 for international applicants
- An official transcript from each college or university previously attended
- Students whose native language is not English are required to provide scores for the Test of English as a Foreign Language (TOEFL), the International English Language Testing System (IELTS), or the Duolingo English Test. An official TOEFL score of 550 or above is required. A score of 213 or above on the computer-based test, or a score of 79 or above on the Internet-based test, is considered equivalent to a score of 550 or above on the paper-based test. IELTS scores must be 6.0 or higher. Duolingo English Test scores must be 100 or higher (160-point scale). Scores must be no more than two years old. Applicants who have received a degree from a U.S. institution in the past two years are exempt from the language proficiency requirement. 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.

· 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 a 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 also attend 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.

The College of Engineering and Computer Science hired Mackenzie Clark as the Graduate Recruitment Coordinator. Her role is to support the online MS programs in engineering, computer science, and engineering management.

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 program play a crucial role in the recruitment efforts by informing their colleagues, friends, and family members about the Engineering Management graduate program at UTC and its availability and flexibility as a 100% online program. This includes local as well as on-line and international graduates.

C. Enrollment

The Master of Science in Engineering Management (MSEM) program experienced a decline in enrollment from Fall 2020 to Fall 2023, primarily attributed to the challenges posed by the COVID-19 pandemic. The enrollment figures reveal a noticeable decrease, starting at 55 in Fall 2020 and declining to 46 in Fall 2021. Although there was a slight uptick to 52 in Fall 2022, the numbers remained consistent in Fall 2023. The impact of the pandemic on educational institutions, including disruptions to regular academic activities, uncertainties, and shifting priorities, likely contributed to this fluctuation in MSEM enrollment over the specified period. As the academic landscape continues to adapt to the ongoing challenges, it will be essential to monitor and address factors influencing enrollment trends in the coming semesters. Figure 3 shows the enrollment data between Fall 2020 and Fall 2023.

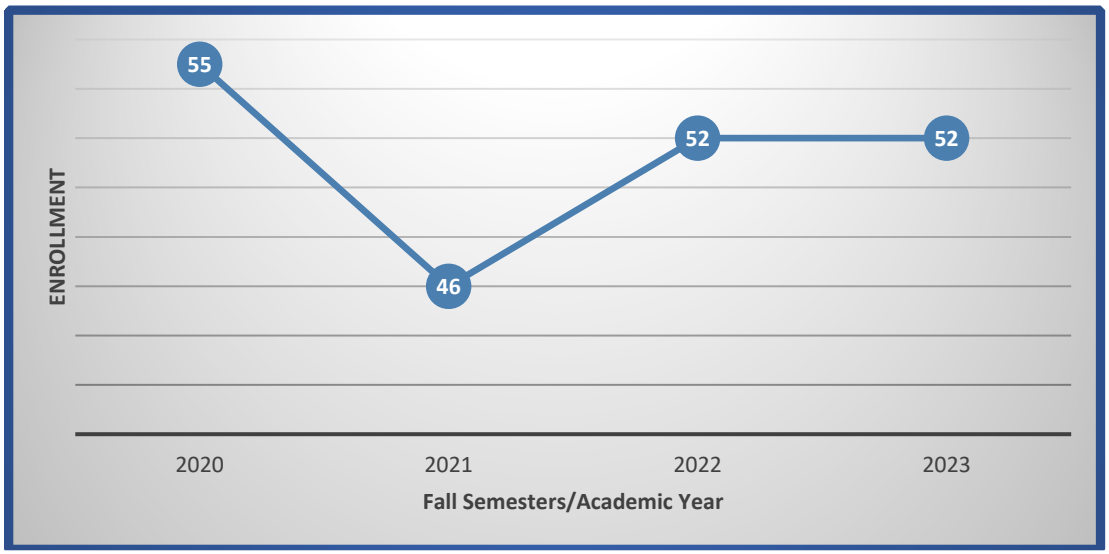


Figure 3. Engineering Management Graduate Program Enrollment **Data***

*Source: Office of Planning, Evaluation, and Institutional Research.

D. Degrees Awarded

The number of degrees awarded in the Engineering Management graduate program over the years has also stayed constant over the last four academic years except 2021-22, which was during the COVID pandemic. In 2022-23, there was an upward trend. Figure 4 shows the number of degrees awarded between 2019-20 and 2022-23.

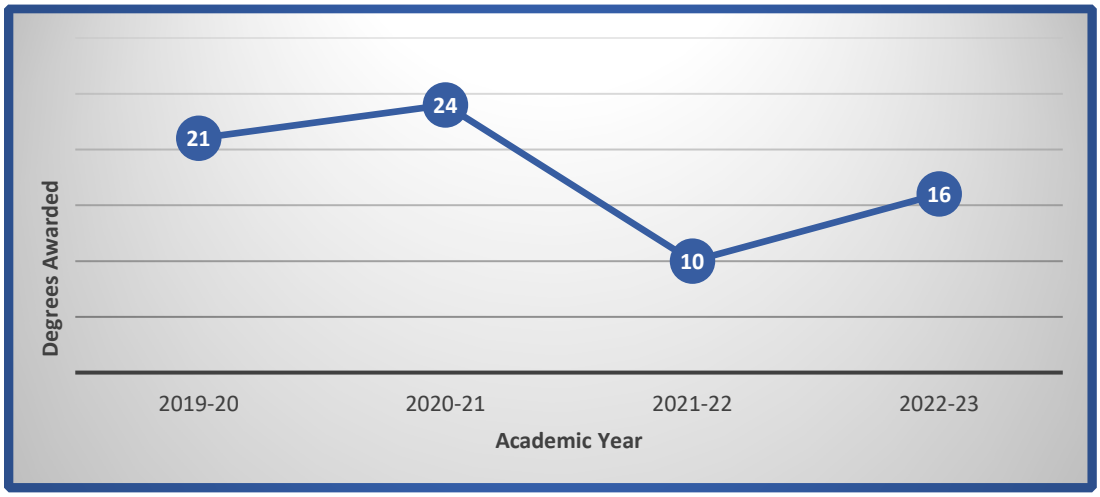


Figure 4. Master of Science in Engineering Management Degrees Awarded*

*Source: Office of Planning, Evaluation, and Institutional Research.

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 results for Fall 2022 are 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

(http://www.utc.edu/collegeengineering-computer-science/student-employment/day-of-networking.php).

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 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 some examples of distinguished speakers for the last two years (9/2020 – 3/2023).

Michael Miga
Harvie Branscomb Professor, Professor of Biomedical Engineering* Vanderbilt University
* also appointed in Radiology, Neurosurgery, and Otolaryngology
March 21 - 3:15pm - 4:15pm - Maytag Room
Topic: "Computation-Enhanced Surgery and Intervention: Provocative Questions"

Sid Verma
Chief Technology Officer & President - Digital and Innovation - ASTEC
February 16th - 3:15pm - 4:15pm - Maytag Room
Topic: "Construction industry technology needs, challenges, and opportunities"

Gregory Sechrist
Associate Technology Manager at University of Tennessee Research Foundation
November 8th - 3:15pm - 4:15pm - Maytag Room
Topic: "Positioning Your Technology for Impact: How IP Can Establish A Market Advantage"

Tim Rausch
Chief Nuclear Officer - TVA
September 15th - 3:15pm - 4:15pm - Maytag Room
Topic: "So you want to put your education to work?"

Dr. Nick Peters
Section Head - Quantum Information Science Section
April 6th - 2:00pm - 3:00pm - Maytag Room
Topic: "Quantum Communications and Networking at Oak Ridge National Laboratory"

Tim Fritch
TVA - Manager of Reliability Analysis
February 22nd - 3:15 - 4:15pm - Maytag Room
Topic: "TVA's implementation efforts and experiences with installing time-series devices and the applications utilized in transmission operations to ensure a reliable grid."

Dr. Andy Novobilski
Provost and Vice President for Academic Affairs at Delta State University
January 25th - 3:15 - 4:15pm - via ZOOM

Dr. Fareena Saqib
Assistant Professor, Electrical and Computer Engineering at University of North Carolina at Charlotte
November 17th - 3:30 - 4:30pm - Maytag Room - EMCS 426*
Topic: "Hardware Architectures for Side Channel Analysis Countermeasures "

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

Dr. Christopher Holloway
RF Fields Group Leader, National Institute of Standards and Technology (NIST)
October 15th - 12 - 1pm - Benwood Auditorium- EMCS 230

Topic: “Rydberg Atom-Based Sensors: The Quest for Fundamentally New SI-Traceable Measurement Techniques”

Richard Clark
Kosmos Energy
Senior Vice President and Head of Gulf of Mexico business unit
September 2nd - 3:15 - 4:15pm - Maytag Room - EMCS 426*

Dr. Eric Jacuzzi
Sr. Director of Aerodynamics for NASCAR R&D
March 9th - 9:30 am; via ZOOM
See student email for ZOOM login information or email Christy-Waldrep@utc.edu for login information
Topic: "Aerodynamics in NASCAR"

Dr. Karl Zelik
Assistant Professor at Vanderbilt University
February 4th - 3:15 pm; via ZOOM
Topic: "Researching, Developing & Translating Wearable Assistive Tech for Sweaty, Squishy, Quirky Humans"

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 the workforce and approaches to technical solutions.

3.6. Academic Support

The availability of instructional resources has improved with the opening of the library building in January 2015. The program’s instructional equipment and facilities within the College of Engineering and Computer Science 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 are 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 on the Graduate Council. All graduate coordinators for the college meet at least once per semester to discuss the curriculum, assistantships, recruitment, 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.

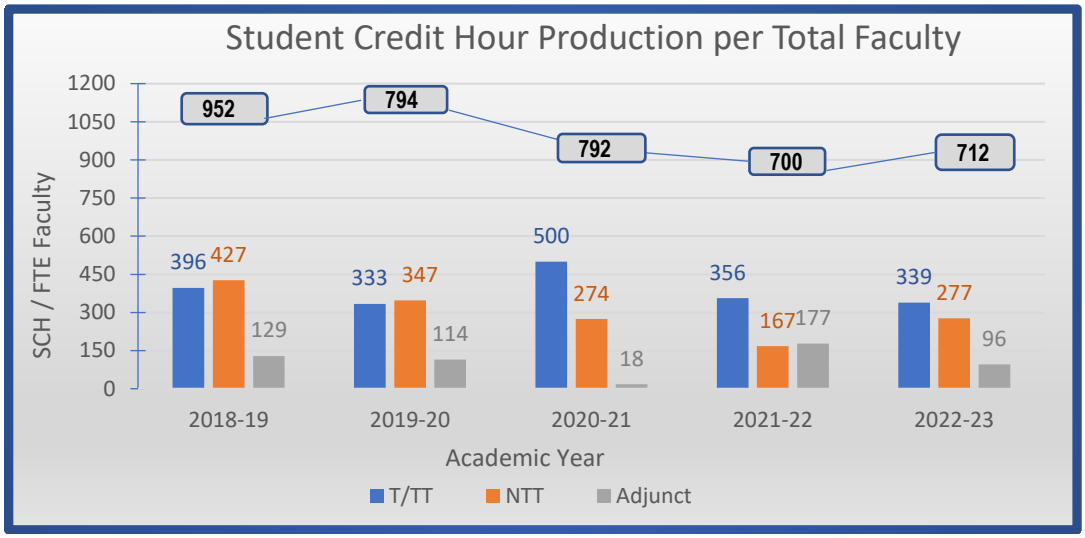


Figure 5. SCH per Total Faculty FTE per Academic Year

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
2018-19	Adjunct	3211	539	395
	NTT	3928	262	246
	T/TT	21559	1732	295
	Total	**28698**	**2533**	**936**
2019-20	Adjunct	1918	137	N/A
	NTT	4472	725	592
	T/TT	18777	2071	602
	Total	**25167**	**2933**	**1194**
2020-21	Adjunct	2424	159	N/A
	NTT	4166	617	580
	T/TT	18968	1584	437
	Total	**25558**	**2360**	**1017**
2021-22	Adjunct	1624	228	126
	NTT	4100	386	386

	T/TT	21334	1590	394
	Total	**27058**	**2204**	**906**
2022-23	Adjunct	3211	539	395
	NTT	3928	262	246
	T/TT	21559	1732	295
	Total	**28698**	**2533**	**936**
Key: TT = FT Tenured/Tenured-Track Faculty; NTT = FT Non Tenure Track Faculty				

4.3. 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 backgrounds and training to enroll and persist through graduation. The diversity of faculty and graduate major enrollment are presented in Appendix B.

4.4. Faculty Professional Development

The MS Engineering Management faculty strives 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 https://www.utc.edu/engineering-and-computer-science/academic-programs/engineering-management-and-technology/faculty-and-staff.

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

Publications (Journals) – 2019 to current

- **Dr. Serkan Varol**:
  - Ridder, Z., Varol, S. (2023). "Understanding the Retention Rate for Engineering Students" submitted to the Journal of Student Success and Retention
  - Catma, S., Varol, S. (2023). "Exploring the Spatial Dimensions of College Retention within the Context of Inequality", International Journal of Education Economics and Development. Volume 14, Issue 1, pages 42-55
  - Varol, S., Odougherty, P. (2022). "A Predictive Analytics of Electronic Control Unit System Defects within Automotive Manufacturing". Journal of Failure Analysis and Prevention. Volume 22, 918-925
  - Varol, S., Catma, S., Reindl, D., Serieux, E. (2022). "Primary factors influencing the decision to vaccinate against COVID-19 in the United States: A Pre-Vaccine Analysis", International Journal of Environmental Research and Public Health. Volume 19, Issue 3. 1026

- Varol, S., Catma, S. (2021). "Assessing the impact of a distance based Spatial Factor on Retention", Education Sciences. Volume 11, Issue 9. 508
- Catma, S., Varol, S. (2021). "Willingness to Pay for a Hypothetical COVID-19 Vaccine in the United States: A Contingent Valuation Approach. Vaccines Journal. Volume 9, Issue 4. 384
- Varol, S., Marquez, A. (2020). "An Empirical Study on Assessing Brand Loyalty in Automobile Industry using Hidden Markov Model" is published by Academy of Marketing Studies Journal, Volume 24, Issue 1, pp. 1-13

- **Dr. Seong Dae Kim**
  - Lina Abdelkarim, Blake Burba, Kenisha Gardner, Daron Lyons, Landon Parker, Jacob Ridenour, Caleb Traxler, Robyn Wood, Seong Dae Kim, Sungwoo Yang, and Eun Young Kim* (2024), "Systems Thinking Approach for Energy -Efficient Multiplex Housing Design: Focusing on Passive Design Strategies", Journal of Green Building, 19(3
  - Black, N.; West, A.; Ewing, C.; Honeycutt, M.; Berta, Z.; Lindsey, B.; Kim, E.; Kim, S. and Yang, S. (2023), "Design a Net Zero House at 100-Year Flood Zone in a Historic District: A Case of Solar Decathlon Design Challenge Entry", Journal of Green Building, Accepted for publication on 7/12/2022, Published on 3/14/2023, Vol. 18, Issue 1.
  - Seong Dae Kim, J.C. Kim, and Jarrett Bachman (2020), "Optimization of International Sport Event Tournament Schedules: A Managerial View on The Scheduling Fairness of The 2015 World Baseball Softball Confederation Premier 12 Tournament", Journal of Physical Education and Sport Management, Vol. 7, No. 2, December 2020, pp. 9-16.
  - Tom Riley and Seong Dae Kim (2019), "Developing a Manufacturing Process for Home-Based Business", American Journal of Advanced Research (AJAR), Vol. 3, No. 2.

- **Dr. Wolday Abrha**
  - Needham, A., Kim, S., Abrha, W.D., and Sokolov, A.M. The Development of a Systems Control Guide for Aligning Technology Projects to Stakeholders and Strategy. Engineering Management Journal

Conference Presentations – 2019 to current

- Seong Dae Kim (2023), "Overview of AI vs. Human Experiments and Implications for Engineering Management Fields", Proceedings of American Society for Engineering Management 2023 International Annual Conference (ASEM 2023 IAC) held on October 25-28, 2023.
- Ana Tecu, Seong Dae Kim, Wolday Abrha, and Aldo McLean (2021), "Remote Working Strategy Induced by COVID-19: A Case Study", Proceedings of the American Society for Engineering Management 2021 International Annual Conference, submitted on May 12, 2021. Accepted on August 16, 2021.
- Mohammad Aman Ullah Al-Amin and Seong Dae Kim* (2021), "Innovative Refrigeration Design using ASIT: Self-Evaporating Water Condenser with Double Cooling System", Proceedings of IISE Virtual Annual Conference & Expo 2021, May 23, 2021.

- Mohammad Aman Ullah Al-Amin and Seong Dae Kim* (2021), "Strategic Facility Location/Truck Stop Selection Considering Interval Time Allocation for Long-Haul Truck Drivers near I-90", Proceedings of IISE Virtual Annual Conference & Expo 2021, May 25, 2021.
- Jonathan Sinclair and Seong Dae Kim (2019), "Economic Feasibility of the Residential Applications of Photovoltaics in Alaska", Proceedings of ASEM International Annual Conference 2019, Philadelphia, Pennsylvania.
- Tom Riley and Seong Dae Kim (2019), "Developing a Manufacturing Process for Home-Based Business", The 2019 IBII International Conferences Proceedings, Houston, Texas.
- Kalee Hotchkiss, Serkan Varol*, and Seong Dae Kim (2022), "Factors Affecting Oil Spill Quantity Released in Arctic Conditions: Alaska, U.S.A.", Proceedings of 2022 Society for Industrial and Systems Engineering (SISE) Virtual Conference.
- Seong Dae Kim*, Hyunsoo Lee, and Mohammad Aman Ullah Al-Amin (2021), "Human Motion to Collaborative Two-Arm Robot Through Digital Twin Models", Proceedings of ASME International Mechanical Engineering Congress & Exposition (IMECE) 2021 Virtual Conference, accepted, November 2021.
- Abrha, W., Ahmed, R., McDonald, E., & Lee, K. (2023). Regression Analysis – Graduation Rate in Hamilton County Schools. Proceedings of the International Annual Conference of the American Society for Engineering Management. American Society for Engineering Management (ASEM).
- Sandryka, E., and Abrha, W. (2023). Quality Development for a Paint Booth – A Case Study at an Automotive Plant. Proceedings of the International Annual Conference of the American Society for Engineering Management. American Society for Engineering Management (ASEM).
- Abrha, W., Ahmed, R., Gould, P., & McCollum, C. (2022). Lean Six Sigma for Mitigating High School Dropouts. Proceedings of the International Annual Conference of the American Society for Engineering Management. American Society for Engineering Management (ASEM).
- Decambra, X. and Abrha, W. (2021). Nuclear Industry Analysis-outlook and Perceptions. In Proceedings of the International Annual Conference of the American Society for Engineering Management. (p. 1-8). American Society for Engineering Management (ASEM).
- Tecu, A. M., Kim, S., Abrha, W., and McLean, A. (2021). Remote Working Strategy Induced by Covid-19: a Case Study. In Proceedings of the International Annual Conference of the American Society for Engineering Management. (p. 1-10). American Society for Engineering Management (ASEM).
- Ross, S., Sokolov, A., Abrha, W., and Yang, K. (2020). Analysis of U.S. government construction projects in Afghanistan using value engineering principles. Procedings of the American Society for Engineering Management 2020 International Annual Conference.
- Webb, C., Sokolov, A.M., Abrha, W.D., and Rodgers, A. (2020). Cost-efficiency of nitrogen removal in stormwater devices. Proceedings of the American Society for Engineering Management 2020 International Annual Conference.
- Tong, J., Varol, S. (2023) "Adherence to Colorectal Cancer Screening Using Nationwide Unbalanced Data" to be presented at the 2024 IISE Annual Conference, May 18-21, 2024, Montreal, Canada

- Grubb, J., Varol, S. (2023) “Statistical Analysis of BIAS in Manufacturing Efficiency Loss Data” In proceedings at the American Society for Engineering Management 2023 International Annual Conference and 44th Annual Meeting, October 25, 2023, Colorado
- Gursoy, G., Varol, S, Varol, A. (2023). “Impact of Machine Learning in Digital Marketing Application” In proceedings at the 2nd International Informatics and Software Engineering Conference, December 17, 2023, Ankara, Turkey
- Sabbir H.K, Varol, S. (2023). “Analysis of Variance of Accident Data to Detect Factors Correlating to Fatalities in Tennessee” In proceedings at the 11th International Symposium on Digital Forensic and Security, May 9-May 11, 2023, Chattanooga, TN
- Hotchkiss, K., Varol, S., Seong, K. (2022). “Factors Affecting Spill Quantity Released in Arctic Conditions: Alaska, USA. In proceedings In proceedings at the Eleventh Annual World Conference of The Society for Industrial and System Engineering Conference, October 6, 2022, Virtual
- Kaplanoglu, E., Varol, S., Nasab, A. (2022). “Myoelectric Controlled Rehabilitation System for Chronic Low Back Pain”. In proceedings at the TOK2022 Automatic Control National Congress, September 15-18, 2022, Elazig, Turkey
- Youssef, M, Varol, S., Catma, S. (2022). “Vehicle Fatality Analysis by Gender using Predictive Analytics”. In proceedings at the 10th International Symposium on Digital Forensic and Security, June 6-June 7, 2022, Istanbul, Turkey
- Messiha, M., Fox, L., Varol, S., Aldhuwayhi, B., Kaplanoglu, E. (2021). “Traffic Accidents Cause and Effect Analysis: A Case Study in Chattanooga, Tennessee”. In proceedings at the 2nd International Informatics and Software Engineering Conference, December 17, 2021, Ankara, Turkey
- Shook, M, Rogers, S., Varol, S. (2021). “Exploratory Study of 3D Printed Homes: How it Disrupts the Residential Construction Industry”. In proceedings at the Tenth Annual World Conference of The Society for Industrial and System Engineering Conference, September 23, 2021, Virtual
- AlAmin, M., Varol, S, Mowrer, A., Tong, J., Catma, S. (2021). “Analyzing Factors Associated with Fatality Rate of Road Collisions: A Case Study in Tennessee”, In proceedings at the American Society for Engineering Management 2021 International Annual Conference and 42nd Annual Meeting, October 27, 2021, Virtual
- O’ Dougherty P., Ferrel, K., Varol, S. (2021). “A Study of Semiconductor Defects within Automotive Manufacturing using Predictive Analytics” In proceedings at the 9th International Symposium on Digital Forensic and Security, June 30-July 1, 2021, Elazig, Turkey
- Varol, S. (2020). “Intensification of Personally Identifiable Information”, presented at the 2020 IISE Annual Conference, October 12, 2020, Virtual
- Abdulrahman, A., Varol, S. (2020). “A Review of Image Segmentation Using Matlab Environment”, in proceedings at the 8th International Symposium on Digital Forensic and Security, June 1-June 2, 2020, Beirut, Lebanon
- Varol, S., Arzoo, R. (2019). “Student Enrollment and Retention in Universities of PLAINS and Great Lake Regions” in proceeding at the Academy of Business Research Fall Conference, October 30-November 1, San Antonio, Texas

- Abdlrazaq,A., Varol, S. (2019). “A Trust Management Model for IoT” in proceedings at the 7th International Symposium on Digital Forensic and Security , June 9 – June 13, 2019, Barcelos, Portugal
- Azeez, N.S., Varol, S. (2019). “Securing Database Management Systems using RAM Serial Numbers” in proceedings at the 7th International Symposium on Digital Forensic and Security , June 9 – June 13, 2019, Barcelos, Portugal

4.5. Improvement Processes

The faculty actively engage 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 programatic 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 the quality of teaching, research, and service. The annual EDO evaluation consists of objectives, reports, and evaluations. 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 conferences in which they participated, the number of journal publications, 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 toward 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. 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 $40,000 to remodel EMCS 214 (Advance Robotics Lab) so that it can be used for projects related to logistics , order processing and robotics. Collaborative Robots and A Flexible Manufacturing System (FMS) are 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 informational resources to support teaching and learning primarily through the 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 UTC Library is well equipped to support the research and scholarship needs of the UTC community with an operating budget of over 4.8 million dollars, a dynamic and engaged faculty and staff, a new library building that opened in January 2015, and a broad collection of diverse materials including 600,000 print and ebooks, over 100,000 digital journals available, 150+ indexes and databases, and more.

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 2020-2024

Databases, Serials, and Ongoing Expenditures

The Library makes available 124,000 serial titles, including open access titles, through subscriptions to full-text resources, databases, journal packages, and individual journals. The Library has identified 5,765print 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

$298,112.00 of the total $1,369,363 spent toward ongoing serial and database subscriptions.

The majority of journal content is current and online via journal packages from publishers including Springer/Nature, Elsevier, Wiley, Taylor and Francis, Sage, Ovid, and Oxford University Press. These packages provide access to online journal content across the many disciplines associated with Computer Science and Computer Engineering. Titles available online with full text coverage include, but are not limited to: *Journal of the ACM, IEEE Transactions on Information Theory, Journal of Cryptology, IEEE Sensors Journal, ACM Transactions on Graphics, Information Sciences, Logical Methods in Computer Science, ACM Transactions on Software Engineering, Information and Software Technology, IEEE Transactions on Fuzzy Systems, Journal of Artificial Intelligence Research, ACM Computing Surveys, The Computer Journal, Journal of Computer and System Sciences, Information and Software Technology, Algorithmica, Theoretical Computer Science, Journal of Functional Programming, Journal of Machine Learning Research, IEEE Transactions on Computers, Software and Systems Modeling, International Journal of Computer Vision, IBM Journal of Research and Development.* See the supplemental list of full-text journals for the entire listing of applicable titles.

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 subject specific resources.

Monographs, Audio-Visuals, and One-Time Expenditures

The Library's print and electronic book collection consists of 1,111,602 unique titles. 88,251 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 349,749 items of which, 647 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. In2022-2023, the Library expended $19,984out of a total amount of $334,205 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 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 2022-2023, 2,392 ILL borrowing and document delivery requests

were filled for the UTC community; of those, 48 were filled for faculty and students in the College of Engineering and Computer Science.

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 2021-2022, monographs and audio-visual materials circulated 1,111,602 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 17,450 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.

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 3,543 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 234 workshops covering everything from 3D Modeling and Photography to Brainstorming for Creative Assignments and Audio Editing. These workshops were attended by 2,798 participants.

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 2022-2023, the WCC conducted a total of 2,511 individual consultations and 96 workshops and presentations. Four of these presentations were for Engineering and Computer Science classes.

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 2022-2023, Special Collections' staff conducted 22 instruction sessions that reached 235 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 microformat 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.

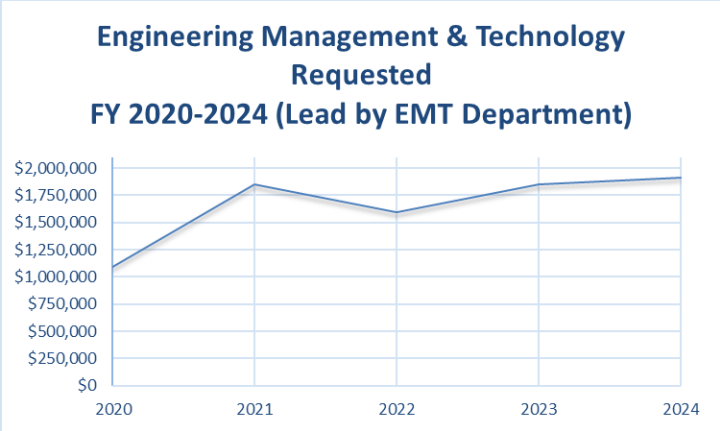
5.3. Materials and Support Staff

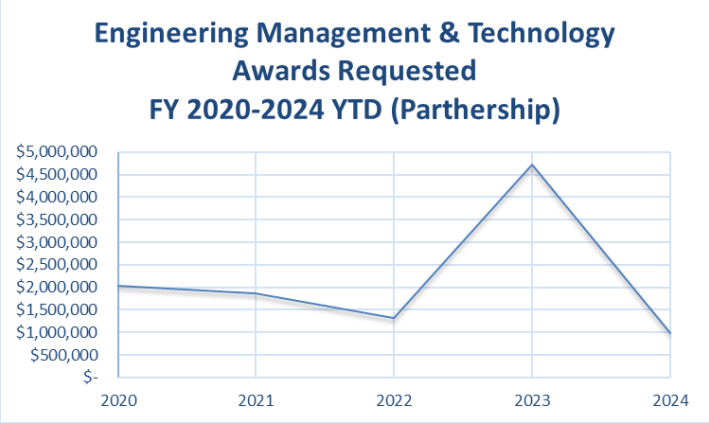
The MS Engineering Management program provides adequate materials and support staff to encourage research and publication. The Walker Center for Teaching and Learning promotes excellence in teaching, learning and the use of technology through dialogue, inquiry, and research. To fulfill these goals, the 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 shows the internal and external grants received by the faculty in the department. Appendix A shows the operating budget for the department.





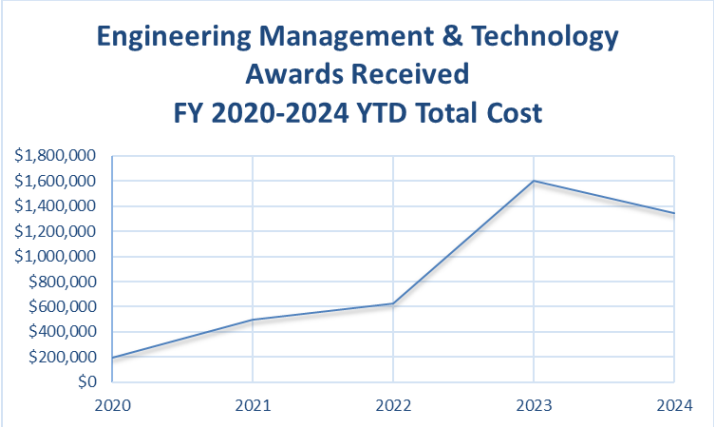


Figure 6. Grants (Funded Proposals, FY 2020 through FY 2024) 5-year history of dollars requested/proposed and awards received.

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 to maintain high enrollment rates. Faculty build strong relationships with students through smaller classes and one-on-one meetings and serve as primary mentors of students. The faculty also encourage local industries to hire MS program students, enabling the maintenance of 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 plan can be seen at https://www.utc.edu/sites/default/files/2022-05/CECS-Strategic-Plan-22-27.pdf.

6.4. Graduate Student Data Collection and Placement Evaluation

Graduate students are connected to the college's LinkedIn page (https://www.linkedin.com/school/utc-college-of-engineering-and-computer-science/) 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 https://www.utc.edu/engineering-and-computer-science/cecs-news.

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), UTC's institutional accrediting body. UTC is accredited by SACSCOC to award baccalaureate, masters and

doctorate degrees. Questions about the accreditation of the University of Tennessee at Chattanooga may be directed in writing to the Southern Association of Colleges and Schools Commission on Colleges at 1866 Southern Lane, Decatur, GA 30033-4097, by calling (404) 679-4500, or by using information available on SACSCOC's website (www.sacscoc.org).

Appendices

Appendix A. Expenditures

Expenditures					
	2018-2019	**2019-2020**	**2020-2021**	**2021-2022**	**2022-2023**
Actual Expenditures [1,2]	$716,653.64	$742,673.31	$921,169.30	$827,044.52	$1,096,456.51
Expenditures per FT Faculty FTE [3]	$139,887	$163,722	$178,136	$178,967	$145,542
Expenditures per Student Major	$10,900	$12,507	$13,360	$15,561	$17,822
Expenditures per SCH	$777	$1,019	$1,021	$1,087	$1,070

[1] Data contains total department (graduate and undergraduate) results

[2] FTE is defined as number of credit hours being taught divided by 12.

[3] Contains Salaries (including adjuncts), Benefits, and Operating Expenditures.

Appendix B. Diversity

Diversity of Faculty and Graduate Major Enrollment **Fall 2022-23**

Gender and Ethnicity

(Graduate Major Enrollment)

Undergraduate Major Enrollment		
Multiple Races	1	
Unknown	13	
American Indian	1	
Asian	6	
Hispanic	4	
African American	17	
White	77	
	Female	**Male**
Total*	**25**	**94**

Graduate Major Enrollment		
Multiple Races	0	
Unknown	5	
Asian	2	
Hispanic	1	
African American	11	
White	33	
	Female	**Male**
Total*	**14**	**38**

Faculty		
Multiple Races	6	
Unknown		
American Indian		
Asian	2	
Hispanic	1	
African American	1	
White	2	
	Female	**Male**
Total (FT)	0	7
Total (FT & Adjunct)	3	9

Appendix C. Student Ratings

Engineering (ENGM) Fall 2023

	Strongly Agree (%)	Agree (%)	Somewhat Agree (%)	Neither Agree nor Disagree	Somewhat Disagree (%)	Disagree (%)	Strongly Disagree (%)
I am aware of the learning outcomes of this course, as stated in the syllabus	75	21	3	1	0	0	1
The course content addresses the learning outcomes of this course.	76	18	5	1	0	0	1
The course structure assists me in achieving the learning outcomes of this course.	67	22	5	2	1	1	2
I am achieving the learning outcomes of this course.	66	22	8	3	0	0	0
I keep up with all course readings and assigned work.	65	28	7	0	0	0	0
The course encourages my use of critical thinking skills.	64	26	8	1	0	1	1
The way this course is delivered encourages me to be actively engaged.	62	24	8	1	2	1	2
The instructor is willing to assist me with achieving the course learning outcomes.	73	19	3	3	0	0	1
The instructor provides constructive feedback on my coursework.	65	21	6	6	0	1	1
The instructor responds to my questions and emails within the time-frame indicated in the syllabus.	7	15	5	3	1	2	2

College of Engineering & Computer Science

	Strongly Agree (%)	Agree (%)	Somewhat Agree (%)	Neither Agree nor Disagree (%)	Somewhat Disagree (%)	Disagree (%)	Strongly Disagree (%)
I am aware of the learning outcomes of this course, as stated in the syllabus	64	23	7	2	2	1	1
The course content addresses the learning outcomes of this course.	62	24	8	2	2	1	1
The course structure assists me in achieving the learning outcomes of this course.	56	22	9	4	4	3	4
I am achieving the learning outcomes of this course.	53	23	12	4	3	2	3
I keep up with all course readings and assigned work.	57	26	11	2	2	1	1
The course encourages my use of critical thinking skills.	58	23	10	2	2	1	3
The way this course is delivered encourages me to be actively engaged.	52	20	11	5	4	4	4
The instructor is willing to assist me with achieving the course learning outcomes.	62	20	7	4	2	2	2
The instructor provides constructive feedback on my coursework.	53	20	10	6	4	3	4
The instructor responds to my questions and emails within the time-frame indicated in the syllabus.	60	20	6	7	2	2	4

Total University

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

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.

Full-text Journals
Access Intelligence
Advanced Cement Based Materials ACBM
Advanced Composites Bulletin
Advanced Engineering Materials
Advanced Functional Materials
Advanced Imaging
Advanced Materials
Advanced Materials and Composites News
Advanced Materials and Processes
Advanced Materials for Optics and Electronics
Academic Press
American Chemical Society
American Society of Civil Engineers
Association for Computing Machinery
Blackwell Publishers
Building Products
Bulletin of Earthquake Engineering
Bulletin of Engineering Geology and the Environment
Bulletin of Materials Science
Cahners Publishers
Cambridge University Press
Cement and Concrete Composites
Cement and Concrete Research
Chemical Vapor Deposition
Civil Engineering and Environmental Systems
Cygnus Business Media

De Gruyter Publishing
Design Engineering
Designing for User Experiences
Diesel Progress North American
Dynamics and Control
Earthquake Engineering and Engineering Vibration
Earthquake Engineering and Structural Dynamics
Elsevier Publishers
Geomechanics and Geoengineering: An International Journal
Geomechanics for Energy and the Environment
Geosystem Engineering
Granular Matter
Home Energy
Hindawi Publishers
Hydraulic and Mechanical MRO
IBM Journal of Research and Development
IEEE Publications
Industrial Distribution
Institute of Electrical & Electronics Engineers
Machine Design
Machining Science and Technology
Mainframe Computing
Manufacturing Engineering
Materials and Design
Materials and Structures
Materials at High Temperatures
Materials Letters
Materials Research Innovations
Materials Science
Materials Science and Engineering A Review Journal
Materials Science and Engineering B Solid State Materials for Advanced Technology

Materials Science and Technology MST: A Publication of the Institute of Metals
Materials Science in Semiconductor Processing
Materials Technology
Materials Today Proceedings
MDPI
Pergamon Press
Polymer Science
Polymer Testing
Polymers and Polymer Composites
Powder Technology
Power Engineering
Power Quality Assurance
Residential Systems

Robotics and Autonomous Systems
Rock Mechanics and Rock Engineering
Soil Dynamics and Earthquake Engineering
Soil Mechanics and Foundation Engineering
Soils and Foundations
Springer Publishers
Steel Construction Design and Research
Strength of Materials
Structural and Multidisciplinary Optimization
Structural Concrete Journal of the FIB
Structural Safety
Structural Survey
Structure and Infrastructure Engineering Maintenance Management Life Cycle
Design and Performance
Structures
Super Street bike
Surface Engineering
Survey Review

Surveying and Land Information Systems
Sustainable Energy Grids and Networks
Sustainable Energy Technologies and Assessments
Sustainable Materials and Technologies
Systems Engineering Theory and Practice
Taylor & Francis Publishers
Wiley Publishers
Wind Energy
Wind power Monthly Newsmagazine
Wood Material Science and Engineering
Wood Science and Technology

Appendix F. Example Curriculum Vitae

A. Resume of Seong Dae Kim

Seong Dae Kim, Ph.D., PMP, aCAP, LSSBB

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 Disaster 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

- Rana Taha and Seong Dae Kim (2024), "The Influence of Demographic Factors on the Perception of Construction Workers towards Safety Culture", *Proceedings of 60th Annual ASC (Associated Schools of Construction) International Conference 2024*, paper submitted on 11/12/2023. Under review.
- Lina Abdelkarim, Blake Burba, Kenisha Gardner, Daron Lyons, Landon Parker, Jacob Ridenour, Caleb Traxler, Robyn Wood, Seong Dae Kim, Sungwoo Yang, and Eun Young Kim* (2024), "Systems Thinking Approach for Energy -Efficient Multiplex Housing Design: Focusing on Passive Design Strategies", *Journal of Green Building*, 19(3), submitted on 9/5/2023, accepted for publication on 9/29/2023 for publication in summer 2024.
- Seong Dae Kim (2023), "Overview of AI vs. Human Experiments and Implications for Engineering Management Fields", *Proceedings of American Society for Engineering Management 2023 International Annual Conference* (ASEM 2023 IAC) held on October 25-28, 2023. Accepted for publication on 8/8/2023.
- Black, N.; West, A.; Ewing, C.; Honeycutt, M.; Berta, Z.; Lindsey, B.; Kim, E.; Kim, S. and Yang, S. (2023), "Design a Net Zero House at 100-Year Flood Zone in a Historic District: A Case of Solar Decathlon Design Challenge Entry", *Journal of Green Building*, Accepted for publication on 7/12/2022, Published on 3/14/2023, Vol. 18, Issue 1. https://doi.org/10.3992/jgb.18.1.243
- Kalee Hotchkiss, Serkan Varol*, and Seong Dae Kim (2022), "Factors Affecting Oil Spill Quantity

Released in Arctic Conditions: Alaska, U.S.A.", *Proceedings of 2022 Society for Industrial and Systems Engineering (SISE) Virtual Conference*.

- Hamza Aljarash and Seong Dae Kim* (2022), "Outlook of Electric Vehicle Market: Predicting EV Prices using Machine Learning Techniques", *Proceedings of 2022 ASEM Hybrid International Annual Conference*, manuscript accepted for publication on 7/11/2022.
- Hyunsoo Lee, Seong Dae Kim*, and Mohammad Aman Ullah Al Amin (2022), "Control framework for collaborative robot using imitation learning from human digital twin to robot digital twin", accepted for publication to *Mechatronics* on May 19, 2022. Published on May 24, 2022. Vol. 85.
- Ona Egbue, Suzanna Long, Seong Dae Kim (2022), "Resource Availability and Implications for the Development of Plug- In Electric Vehicles", *Sustainability*, Vol. 14, Issue 3, 1665, https://doi.org/10.3390/su14031665, published on January 31, 2022.
- Seong Dae Kim*, Hyunsoo Lee, and Mohammad Aman Ullah Al-Amin (2021), "Human Motion to Collaborative Two- Arm Robot Through Digital Twin Models", *Proceedings of ASME International Mechanical Engineering Congress & Exposition (IMECE) 2021 Virtual Conference*, accepted, November 2021.
- Ana Tecu, Seong Dae Kim, Wolday Abrha, and Aldo McLean (2021), "Remote Working Strategy Induced by COVID-19: A Case Study", *Proceedings of the American Society for Engineering Management 2021 International Annual Conference*, submitted on May 12, 2021. Accepted on August 16, 2021.
- Mohammad Aman Ullah Al-Amin and Seong Dae Kim* (2021), "Innovative Refrigeration Design using ASIT: Self- Evaporating Water Condenser with Double Cooling System", *Proceedings of IISE Virtual Annual Conference & Expo 2021*, May 23, 2021.
- Mohammad Aman Ullah Al-Amin and Seong Dae Kim* (2021), "Strategic Facility Location/Truck Stop Selection Considering Interval Time Allocation for Long-Haul Truck Drivers near I-90", *Proceedings of IISE Virtual Annual Conference & Expo 2021*, May 25, 2021.
- Seong Dae Kim, J.C. Kim, and Jarrett Bachman (2020), "Optimization of International Sport Event Tournament Schedules: A Managerial View on The Scheduling Fairness of The 2015 World Baseball Softball Confederation Premier 12 Tournament", *Journal of Physical Education and Sport Management*, Vol. 7, No. 2, December 2020, pp. 9-16.
- Seong Dae Kim* and Mohammad Aman Ullah Al-Amin (2020), "Factory Automation Modules and the Corresponding 3D- Model for the Digital Twin", *Proceedings of ASEM 2020 Virtual International Annual Conference*, October 30, 2020.
- Brad Grubb, Seong Dae Kim*, Aldo McLean, and Alexandr Sokolov (2020), "Increasing Profit and Time Value for Home Based Bakery Using DMAIC Framework", *Proceedings of ASEM 2020 Virtual International Annual Conference*, October 28, 2020.
- Tom Riley and Seong Dae Kim (2019), "Developing a Manufacturing Process for Home-Based Business", *American Journal of Advanced Research (AJAR)*, Vol. 3, No. 2. Available at http://ibii-us.org/Journals/AJAR/V3N2/V3N2.html.
- Jonathan Sinclair and Seong Dae Kim (2019), "Economic Feasibility of the Residential Applications of Photovoltaics in Alaska", *Proceedings of ASEM International Annual Conference 2019*, Philadelphia, Pennsylvania.
- Tom Riley and Seong Dae Kim (2019), "Developing a Manufacturing Process for Home-Based Business", *The 2019 IBII International Conferences Proceedings*, Houston, Texas.
- Sowmini Sengupta, Jisun Kim, and Seong Dae Kim (2018), Forecasting new features and market adoption of wearable devices using TRIZ and growth curves: Case of Fitness Tracking Products, *International Journal of Innovation and Technology Management*, Vol. 15, No. 1.

- Seong Dae Kim (2017), Understanding hidden risks from disasters: Cases of hurricane Katrina and Fukushima nuclear meltdown, ASCE's *Journal of Management in Engineering*, Volume 33, Issue 5, DOI: http://dx.doi.org/10.1061/(ASCE)ME.1943-5479.0000539, published online 4/13/2017.
- Seong Dae Kim (2017), Characterization of unknown unknowns using separation principles in case study on Deepwater Horizon oil spill, *Journal of Risk Research*, Vol. 20, No. 1, pp. 151-168, DOI: 10.1080/13669877.2014.983949.
- Seong Dae Kim and Chong M. Kim (2016), Survey of road design and maintenance in cold region metropolitan areas, *Proceedings of the 11th International Symposium on Cold Regions Development*, Inchon, Republic of Korea, May 18-20, 2016.
- Seong Dae Kim (2016), Decision analysis on wind energy technologies in Alaska, *Proceedings of the 11th International Green Energy Conference*, Anchorage, Alaska, May 8-11, 2016.
- 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.
- Seong Dae Kim (2014), Book Review: "Cox, Jr., Louis Anthony. 2012. Improving Risk Analysis. Springer. 412 pp.",

Interfaces, Vol. 44, Issue 6, November-December, Accepted for publication.

- J. Eric Bickel and Seong Dae Kim (2014), Reexamining the efficiency of the Major League Baseball over-under betting market, *Applied Financial Economics,* Vol. 24, No. 18, pp. 1229-1234, DOI: 10.1080/09603107.2014.925052.
- Seong Dae Kim, Robert K. Hammond, and J. Eric Bickel (2014), Improved mean and variance estimating formulas for PERT analyses, *IEEE Transactions on Engineering Management*, Vol. 61, No. 2, May 2014.
- Seong Dae Kim (2012), Characterizing unknown unknowns, Proceedings of PMI Global Congress 2012-North America.
- J. Eric Bickel, Eric Floehr, and Seong Dae Kim (2011), "Comparing NWS Pop forecasts to Third-Party Providers,"

Monthly Weather Review, Vol. 139, No.10, October 2011.

- Seong Dae Kim, Teresa Brewer, Gary Kretchik, Donghwoon Kwon, Harrison Yeo, and Kelly Brown (2011), Prioritization of Future Freight Infrastructure Projects within the Anchorage Metropolitan Area Transportation solutions (AMATS), Proceedings of 13th TRB National Transportation Planning Applications Conference, Reno, Nevada, May 8-12, 2011, Available at http://trb-appcon.org/program.html#s8.
- Seong Dae Kim and J. Eric Bickel (2010), "Roads or Radar: The Tradeoff Between Investments in Infrastructure and Forecasting When Facing Hurricane Risk," *IEEE Systems Journal*, Vol. 4, Issue 3, pp. 363-375.
- J. Eric Bickel, Eric Floehr, and Seong Dae Kim (2010), "Comparing NWS POP Forecasts to Third-Party Providers," *Proceedings of 20th Conference on Probability and Statistics in the Atmospheric Sciences*, The 90th American Meteorological Society Annual Meeting, Atlanta, GA, January 18, 2010. (http://ams.confex.com/ams/90annual/techprogram/session_23848.htm)
- J. Eric Bickel and Seong Dae Kim (2008), "Verification of The Weather Channel Probability of Precipitation Forecasts", *Monthly Weather Review*, Vol. 136, Issue 12, December 2008. Featured in New Scientist (http://www.newscientist.com/blogs/shortsharpscience/2009/02/how-good-are-the-weather-chann.html).
- Seong Dae Kim and J. Eric Bickel (2008), "Roads or Radar: Investing in Infrastructure or Improved Forecasting in the Face of Tropical Cyclone Risk," Proceedings of the 28th Conference on Hurricanes and Tropical Meteorology, AMS Annual Meeting, Orlando, FL, April 30, 2008.
- J. Eric Bickel and Seong Dae Kim (2008), "Verification of The Weather Channel Probability of

Precipitation Forecasts," Proceedings of the 19th Conference on Probability and Statistics, 88th AMS Annual Meeting, New Orleans, LA, January 23, 2008.

- Seong Dae Kim and J. Eric Bickel (2007), "Roads or Radar: Investing in Infrastructure or Improved Forecasting in the Face of Hurricane Risk," Proceedings of the 44th Annual Technical Meeting of the Society of Engineering Science, College Station, TX, October 23, 2007.
- Seong Dae Kim, Farnaz Akhavi, and Ben Zoghi (2005), "Industry Trend of Evolution Analysis Tool", *Proceedings of Industrial Distribution Educators Association (IDEA) Second Annual Meeting*, 32nd Annual Meeting of Federation of Business Disciplines, Dallas, Texas, March 2 ~ March 5, 2005.
- Seong Dae Kim, Farnaz Akhavi, and Ben Zoghi (2005), "How to Design New Services using TRIZ", *Proceedings of Industrial Distribution Educators Association (IDEA) Second Annual Meeting*, 32nd Annual Meeting of Federation of Business Disciplines, Dallas, Texas, March 2 ~ March 5, 2005.
- Seong Dae Kim and Kyung Won Lee (2004), "Application of TRIZ (Russian Theory of Inventive Problem Solving) to Service Field (Non Technical Field)", *The 13th Knowledge Management Society of Korea Academic Symposium*, December 10, 2004.
- Kim, Y. S., and Kim, S. D. (2002), "Various Creativity-Related Test Results from a Creative Engineering Design Course", Notes of Learning and Creativity Workshop, 7th Int'l. Conf. on AI in Design, Cambridge, Aug. 2002.
- Seong-Dae Kim and Young-Taek Park (2002), Application of TRIZ to Inventory Management, *The Asian Journal on Quality*, June 2002, Volume 3, No. 1, pp. 91-97.

MANUSCRIPTS IN PREPARATION

- AI and Creativity

CONFERENCE PRESENTATION

- Rana Taha and Seong Dae Kim (2024), "The Influence of Demographic Factors on the Perception of Construction Workers towards Safety Culture", 60th Annual ASC (Associated Schools of Construction) International Conference 2024 to be held at Augurn University, Auburn, Alabama, April 3-5, 2024, paper submitted on 11/12/2023. Under review.
- Seong Dae Kim (2023), "Overview of AI vs. Human Experiments and Implications for Engineering Management Fields", American Society for Engineering Management 2023 International Annual Conference (ASEM 2023 IAC) to be held in Denver, Colorado on October 25-28, 2023. Abstract submitted on 3/13/2023, Abstract accepted for presentation on 7/10/2023.
- Muin Bogari* and Seong Dae Kim (2023), "Exploring the Relationship Between the Growing Number of Satellites and Space Debris in Low Earth Orbit, and People's Perception of Space Debris Environmental Impacts", 2023 International Conference of Advanced Research in Applied Science, Engineering and Technology (ICARASET'23), Institute of Business Intelligence Innovation (IBII) held on March 31 – April 1, 2023, Houston, Texas. Abstract accepted for presentation on 3/11/2023. Presented on 3/31/2023.
- Ryan Limpus* and Seong Dae Kim (2023), "The Role of Psychological Safety on Interdepartmental Conflict Management Systems", 2023 International Conference on Management, Leadership and Business Intelligence (ICMLBI'23), Institute of Business Intelligence Innovation (IBII) held on March 31 – April 1, 2023, Dallas, Texas. Abstract accepted for presentation on 3/10/2023. Presented on 3/31/2023.
- Ryan Limpus* and Seong Dae Kim (2023), "The Mediating Role of Psychological Safety on Interdepartmental Conflict Management Systems", IISE Annual Conference & Expo 2023, New Orleans, Louisiana, abstract submitted on 11/18/2022, presented on 5/22/2023.
- Hamza Aljarash and Seong Dae Kim* (2022), "Outlook of Electric Vehicle Market: Predicting EV Prices using Machine Learning Techniques", 2022 ASEM Hybrid International Annual Conference,

abstract submitted on 3/7/2022, accepted on 3/29/2022, presented virtually on 10/8/2022.

- Kalee Hotchkiss, Serkan Varol*, and Seong Dae Kim (2022), "Factors Affecting Oil Spill Quantity Released in Arctic Conditions: Alaska, U.S.A.", 2022 Society for Industrial and Systems Engineering (SISE) Virtual Conference, presented on 10/6/2022.
- Seong Dae Kim, Li-Shiue Gau, and Jong-Chae Kim* (2022), "Statistical Relationships between Manager Experiences and Team Performance in Major League Baseball", 2022 Applied Sport Management Association (ASMA) Conference,

presented as a poster on 2/17/2022.

- Seong Dae Kim*, Hyunsoo Lee, and Mohammad Aman Ullah Al-Amin (2021), "Human Motion to Collaborative Two- Arm Robot Through Digital Twin Models", presented at American Society of Mechanical Engineers (ASME) International Mechanical Engineering Congress & Exposition (IMECE) 2021 virtually on November 2, 2021.
- Ana Magdalena Tecu, Seong Dae Kim*, and Wolday Abrha (2021), "Remote Working Strategy Induced by COVID-19: A Case Study", presented at ASEM 2021 Virtual International Annual Conference and 42nd Annual Meeting on October 28, 2021.
- Mohammad Aman Ullah Al-Amin and Seong Dae Kim* (2021), "Innovative Refrigeration Design using ASIT: Self- Evaporating Water Condenser with Double Cooling System", presented at IISE Annual Conference & Expo 2021 virtually on May 23, 2021.
- Mohammad Aman Ullah Al-Amin and Seong Dae Kim* (2021), "Strategic Facility Location/Truck Stop Selection Considering Interval Time Allocation for Long-Haul Truck Drivers near I-90", presented at IISE Annual Conference & Expo 2021 virtually on May 25, 2021.
- Seong Dae Kim* and Mohammad Aman Ullah Al-Amin (2020), "Factory Automation Modules and the Corresponding 3D- Model for the Digital Twin", presented at ASEM 2020 Virtual International Annual Conference, October 30, 2020.
- Brad Grubb, Seong Dae Kim*, Aldo McLean, and Alexandr Sokolov (2020), "Increasing Profit and Time Value for Home Based Bakery Using DMAIC Framework", presented at ASEM 2020 Virtual International Annual Conference, October 28, 2020.
- Jonathan Sinclair and Seong Dae Kim*, "Economic Feasibility of the Residential Applications of Photovoltaics in Alaska", presented at ASEM International Annual Conference 2019, Philadelphia, Pennsylvania, October 25, 2019.
- Tom Riley and Seong Dae Kim* (2019), "Developing a Manufacturing Process for Home-Based Business", presented at IBII 2019 International Conference on Management, Leadership and Business Intelligence, Houston, Texas, March 1, 2019.
- Seong Dae Kim* and J.C. Kim (2018), "Effects of Major League Baseball Manager Attributes on Team Performance", presented at INFORMS Annual Meeting 2018, Phoenix, Arizona, November 4, 2018.
- J.C. Kim and Seong Dae Kim (2017), "Experienced Veteran or Promising Rookie: The Effects of MLB Managers' Salary and Experience on Team Success", presented at New England Symposium on Statistics in Sports (NESSIS), Cambridge, Massachusetts, September 23, 2017.
- Seong Dae Kim and J. C. Kim (2016), "Analysis of World Baseball Softball Confederation Premier 12 Schedule", INFORMS Annual Meeting 2016, Nashville, Tennessee, November 16, 2016.
- Seong Dae Kim and Chong M. Kim (2016), "Survey of Road Design and maintenance in Cold Region Metropolitan Areas", 11th International Symposium on Cold Regions Development (ISCORD 2016), Inchon, Republic of Korea, May 18-20, 2016.
- Seong Dae Kim (2016), "Decision analysis on wind energy technologies in Alaska", 11th International Green Energy Conference (IGEC 2016), Anchorage, Alaska, May 8-11, 2016.

- Sowmini Sengupta, Jisun Kim, Seong Dae Kim (2015) "Applying TRIZ and Bass model to forecast fitness tracking devices technology" PICMET 2015, Portland, Oregon, August 2-6, 2015.
- Seong Dae Kim (2014) "Characterizing Hidden Risks using Knowledge Gap and Separation Principles," INFORMS Annual Meeting San Francisco 2014, November 12, 2014.
- Seong Dae Kim (2012) "TRIZ as a Problem Solving Method for Stalled Projects," Alaska Quality Conference, Anchorage, AK, October 31, 2012.
- Seong Dae Kim (2012) "Characterizing Unknown Unknowns," PMI Global Congress 2012-North America, Vancouver, British Columbia, Canada, October 22, 2012.
- Seong Dae Kim (2012) "Characterizing Unknown Unknowns When Facing Natural Disasters," INFORMS Annual Meeting Phoenix 2012, October 16, 2012.
- Seong Dae Kim (2011) "Sustainable Risk Management for Arctic Offshore Oil & Gas Development", INFORMS Annual Meeting 2011, Charlotte, North Carolina, November 16, 2011.
- Seong Dae Kim and Teresa M. Brewer (2011), "Prioritizing Future Freight Infrastructure Projects within the AMATS Area," 13th TRB National Transportation Planning Applications Conference, Reno, Nevada, May 9, 2011.
- Seong Dae Kim (2010), "Hurricane Risk Analysis," A University of Alaska North by 2020 Forum / International Arctic Research Center Seminar Series, Anchorage, AK, November 11, 2010, Slides available at http://www.iarc.uaf.edu/NX2020/seminar-defining-risk-in-arctic.
- Seong Dae Kim (2010), "Curriculum Development for the Innovation Management Program for Sustainability," INFORMS Annual Meeting 2010, Austin, TX, November 10, 2010.
- Seong Dae Kim and J. Eric Bickel (2010), "Investments in Infrastructure and Forecasting When Facing Hurricane Risk," INFORMS Annual Meeting 2010, Austin, TX, November 9, 2010.
- 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.

- Seong Dae Kim and J. Eric Bickel (2008), "The Tradeoff between Investments in Infrastructure and Forecasting in the face of Hurricane Risk," INFORMS Annual Meeting 2008, Washington D.C., October 15, 2008.
- J. Eric Bickel and Seong Dae Kim (2008), "Baseball Betting Markets and Player Valuation," INFORMS Southwest Regional Conference 2008, College Station, TX, April 18, 2008.
- Seong Dae Kim and J. Eric Bickel (2008), "Roads or Radar: Investing in Evacuation Infrastructure or Improved Forecasting in the face of Hurricane Risk," INFORMS Southwest Regional Conference 2008, College Station, TX, April 18, 2008.

SEMINARS AND LECTURES

- Invited lecture for UTC IARC 4100 (Senior Thesis I) "Life-Cycle Cost and Life-Cycle Assessment", October 18, 2021.
- Invited lecture for UTC ETEM 1000 (Engineering Management Seminar) "Evolution Patterns of a Technology/Business", September 27, 2019.
- 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.
- Invited lecture for UTC ETEM 1000 (Engineering Management Seminar) "Possibilities in Engineering Management", September 14, 2018.
- Internet broadcasting "I am PM", Seoul, Korea, June 28, 2016. Advertised at http://talkit.tv/Event/1373.
- Graduate seminar: Forecasting Fitness Tracking Devices Technology Using TRIZ and Bass model,

Pohang University of Science and Technology (POSTECH), Pohang, Korea, June 22, 2016.

- Monthly seminar: Creativity in Project Risk Management, PMI (Project Management Institute) Korea Chapter monthly seminar, Seoul, Korea, June 15, 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.
- Lecture 17: TRIZ-based Creative Problem Solving Method, Engineering Project Management Program, Seoul National University, May 27, 2016.
- Lecture 16: Creativity in Project Risk Management, Engineering Project Management Program, Seoul National University, May 27, 2016.
- Seong Dae Kim (2015), "TRIZ Patterns of Technological Systems Evolution", special seminar for Bonneville Power Administration (BPA), Portland, OR, August 4, 2015.
- Seong Dae Kim (2010), "PM, TRIZ, and Beyond," Korea PM Forum, Seoul, Korea, December 21, 2010.
- Seong Dae Kim (2010), "Why Project Management?" Special seminar presented to POSCO, Seoul, Korea, December 21, 2010.

AWARDS AND HONORS

- UTC College of Engineering and Computer Science (CECS) Outstanding Faculty Advising Award, April 2023.
- U.S. Department of Energy, Solar Decathlon, Rockstar Rookie Award, April 2022.
- UTC College of Engineering and Computer Science (CECS) Outstanding Faculty Advising Award, April 2022.
- UTC Spring 2021 Faculty Grant, $475 for attending "PMI Online Course: Digital Transformation Series".
- UTC Summer 2020 Faculty Grant, $773 for attending "Virtual Seminar: Integrating Design Thinking with Project Management" on May 20, 2020.
- UTC College of Engineering and Computer Science (CECS) Outstanding Faculty Advising Award, April 2020.
- UTC College of Engineering and Computer Science (CECS) Outstanding Faculty Teaching Award, April 2020.
  - 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.
  - Fall 2013/Spring 2014 United Academics Travel Grant, UAA, October 8, 2013, $360 for IIE Best Practices in Lean & Six Sigma Applied to Healthcare (Online Virtual Conference) on Oct. 23, 2013 & IIE Best Practices in Managing Continuous Improvement (Online Virtual Conference) on Nov. 20, 2013.
- 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

- 11/2013-06/2014 PI, "Professional Training for Oil and Gas Process Lifecycle Planning, Risk Reduction, Optimization and Safety", Alaska Oil and Gas Occupations Training Grant by State of Alaska Department of Labor and Workforce Development, award amount: $40,000.
- 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.
- 06/2004-12/2004 Research Assistant, "Elk Customer Service Survey" supervised by Dr. Ben Zoghi in the Department of Engineering Technology & Industrial Distribution, Texas A&M University, Documentation and analysis of the survey to Elk's distributors nation-wide.
- 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

- Gateway Decathlon 2025 proposal "Zero-Energy Modular House" as PI. Submitted on 10/27/2023 requesting $100,000. Not selected.
- Tennessee Board of Architecture and Engineering Examiners (TBAEE) proposal "Support for UTC DOE Solar Decathlon team" as PI, with Sungwoo Yang and Eun Young Kim. Submitted on 8/24/2023 requesting $20,683. Selected for funding on 11/1/2023.
- Environmental Research & Education Foundation (EREF) preproposal "AI-Enabled Smart Battery Management for Extended Lithium Battery Lifespan and Waste Minimization" as a co-PI, with Michael Danquah (PI), Dalei Wu, Vahid Rasouli Disfani. Submitted in May 2023 requesting $159,776.
- NSF S-STEM Grant Proposal "Collaborative Research: SUCCESS: Southern Appalachia University and Community College Engineering and Computer Science Scholarships and Supports" as a co-PI on 2/27/2023. PI: Dr. Ignatius Fomunung. Submitted on 3/9/2023 requesting $3,743,230. Not selected.
- TDOT Research Proposal "Induced Travel Study Applied in Urban Areas in Tennessee" (RRFP #2) as PI, co-PI: Dr. Ignatius Fomunung, submitted on 2/8/2023 requesting $196,943. Not selected.

.

TDOT Research Proposal "Selecting Countermeasures for High-Risk Locations for Wildlife Related Crashes in Tennessee" (RRFP #3) as PI, co-PIs: Dr. Ignatius Fomunung, Dr. Tom Wilson, submitted on 2/8/2023 requesting $244,401. Not selected.

- TDOT Research Proposal "Evaluation and Development of Cost Prediction Models for Resurfacing Projects to

Improve M&R Analysis and Project Development" (RRFP #8) as co-PI, PI: Dr. Mbakisya Onyango, submitted on 2/10/2023 requesting $200,000. Not selected.

- TVA Research Proposal "Power Shortage Risk Assessment with Increased Power Consumption from Electric Vehicle Boom and Other Future Risks" by Seong Dae Kim (PI), Vahid Disfani, and Abdul Ofoli submitted on 9/2/2022 requesting $114,692. Not selected.

Proposal submitted in response to the Request for Qualification from Tennessee Department of Transportation Long Range Planning Division by Ignatius Fomunung, Mbakisya Onyango, Seong Dae Kim, and Dalei Wu. Awarded a contract for the Technical Assistance Program on 8/15/2022.

- State of California/Orange County Sustainability Decathlon "Building Affordable Zero-Energy Moc House" by Sungwoo Yang (PI), Seong Dae Kim (Co-PI), and Thomas Lyons (Co-PI). Requesting $100,000. Project duration 8/1/2022 – 10/31/2023. Selected for funding on 5/23/2022.

- Department of Energy (DOE) Proposal "Low-cost and Passive Solar Steam Generator" submitted on 3/21/2022 requesting $319,035 as co-PI.
  - PMI Sponsored Research Program Proposal "Dealing with Risks and Conflicts that Come with the Emergence of ESG" submitted on 3/15/2022 requesting $50,000 as PI. Not selected.
  - TDOT Research Proposal "Risk Assessment and Cost Estimation Tool for Transportation Projects" (RRFP #2) as PI, co-PI: Dr. Ignatius Fomunung, submitted on 2/1/2022 requesting $132,583. Not selected.
- TDOT Research Proposal "Solutions to Improve Driver Behaviors within Work Zones" (RRFP #24) as PI, co-PIs: Drs. Ignatius Fomunung, Serkan Varol, and Joseph Owino, submitted on 2/2/2022 requesting $243,896. Not selected.
  - PMI Sponsored Research Program Proposal "Conflict Resolution by the Gender of Project Manager" submitted on 4/23/2021 requesting $50,000 as PI. Not selected.
- University Collaboration Interest Statement for FY21 ORAU-Directed Research and Development (ODRD) Program. Focus Area on Data Science and Analytics. Submitted on 12/20/2020. Not selected.
  - TVA Research Proposal "Levelized Cost of Energy Analysis of Fuel Cell-Based Hydrogen Economy for TVA" requesting $148,756, Seong Dae Kim (PI). Submitted on 9/29/2020. Not selected for FY21 funding.
- U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) proposal "Harnessing Heat 200 °C from Unconcentrated Sunlight with Inexpensive and scalable Ambiently-Dried Transparent Aerogels" requesting $151,357, Sungwoo Yang (PI), Seong Dae Kim, and Prakash Dhamshala, submitted as Co-PI on 6/18/2020. Not funded.
  - Ruth S. Holmberg Grant for Faculty Excellence proposal "Developing A Practical Product Development Methodology for Sustaining Innovation" requesting $5,000. Submitted as PI on April 6, 2020. Not funded.
  - One UT Collaboration & Innovation Grant proposal "Developing a Practical Product Development Methodology for Innovation" requesting $49,599. Submitted as PI on February 3, 2020. Not funded.
- University of Tennessee Chattanooga UC Foundation Funding proposal "Developing a Digital Twin for Mechatronics Modules" requesting $49,806. Submitted as PI on January 24, 2020.
  - 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. Not funded.
  - TDOT research proposal "Rapid Emergency Evacuation Planning/Assessment for Tourist Attractions and Isolated Communities" requesting $194,897. Submitted to TDOT as PI in April 2019. Not funded.
- TDOT research proposal "Understanding Freight Impacts on Tennessee Communities" requesting 142,423. Submitted to TDOT as Co-PI in April 2019. Not funded.
- NSF S-STEM grant proposal "UT-Chattanooga Workforce Development for Smart Factories" requesting $600,000. Submitted to NSF S-STEM as Co-PI in March 2019. Not funded.
- TDOT 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

Fall 2023 Quality Management Systems
(ENGM 5560) Spring 2022-2024 Summer 2022, Fall 2022, 2023 Capstone Project II
(ENGM 5960)

Fall 2021-2023 Spring 2022-2024 Capstone Project I (ENGM 5950)
Fall 2020-2022 Spring 2021-2023, Summer 2023 Thesis (ENGM 5999r)
Fall 2020, 2022 Product Design for Innovation (ENGM 5800)
Spring 2019-2024 Decision Making and Optimization Techniques (ENGM 5040)
Spring 2019-2024 Summer 2021 Technical Project Management (ENGM 5540)
Fall 2018-2023 Spring 2024 Summer 2020-2023 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)

ACADEMIC SERVICE

- Paper reviewer for Associated Schools of Construction (ASC) 2024 Conference Proceedings, December 2023.
- Session chair for session "Emerging Topic: AI and EM", ASEM International Annual Conference, October 2023.
- Faculty Lead for UTC Solar Decathlon Design Challenge team. August 2023 – April 2024.
- Member, Technical Program Committee for IEEE International Conference on Technology Management, Operations and Decisions (ICTMOD) to be held in Rabat, Morocco on November 22-24, 2023. June 2023 – November 2023.
- Journal paper reviewer, *Engineering Management Journal*, June 2023.
- Paper reviewer for *Proceedings of ASEM 2023 International Annual Conference* (IAC), June 2023.
- Volunteer, Mid-South 2023 (ASCE Student Symposium) hosted by CECS Department of Civil Engineering, April 2023.
- Member, CECS Dean Search Committee, February 2023 – present.
- Associate Editor, International Journal of Green Energy (IJGE), December 2022 – present.
- Member, Engineering Management Lecturer Search Committee, November 2022 – December 2022.
- Member, CECS Technology Symposium Planning Committee, November 14, 2022 – present.
- Member, Ad Hoc Committee to update Graduate School Strategic Plan, October 2022 – present.
- Session chair, International Symposium on Digital Forensics and Security (ISDFS), held at UTC on May 11&12, 2023.
- Chair, Technical Program Contacts of Organizing Committee, International Symposium on Digital Forensics and Security (ISDFS), held at UTC on May 11&12, 2023, October 2022 – May 2023.
- Journal paper reviewer, *IEEE Transactions on Engineering Management*, September 2022.
- Guest Editor, Special Issue of International Journal of Green Energy (IJGE) for International Green Energy Conference (IGEC) 2022, September 2022 – present.
- Member, International Organizing Committee for the 15th International Green Energy Conference (2023, Glasgow, UK), August 2022 – July 2023.

- Faculty advisor for UTC Solar Decathlon Design Challenge team. The UTC team made top 10 and moved to final, August 2022 – April 2023.
- Chair, Conference Committee of International Association for Green Energy (IAGE), August 2022 – present.
- Journal paper reviewer, *Engineering Management Journal*, July 2022.
- Member, Editorial Board of International Journal of Green Energy (IJGE), May 1, 2022 – present. (https://www.tandfonline.com/action/journalInformation?show=editorialBoard&journalCode=ljge20)
- Member, inaugural Board of Directors, International Association for Green Energy (IAGE), April 3, 2022 - present.

- Chair, Construction Management Assistant Professor Search Committee, UTC, November 2021 – March 2022.
- Member, Mechatronics Assistant/Associate Professor Search Committee, UTC, November 2021 – February 2022.
- Member, CECS Safety Committee, UTC, Conduct lab safety inspections, October 2020 – present.
- Journal paper reviewer, *Engineering Management Journal*, November 2021.
- Member, Technical Program Committee at 2021 IEEE International Conference on Technology Engineering Management and Innovation: Best Practice on Technology Engineering and Management Toward Better Productivity (TEMAN), October 2021 – present. Reviewed 13 conference papers on October 27 - November 4, 2021.
- Member, UTC Graduate Council Curriculum Committee, Fall 2021 – Fall 2022.
- Member, UTC Graduate Council, Fall 2018 – present.
- Journal paper reviewer, *Engineering Management Journal*, August 2021.
- Faculty advisor for Solar Decathlon Design Challenge (sponsored by US Department of Energy) working with Chemical Engineering and Interior Design & Architecture of UTC. Advising Chelsie Ewing (MS ENGM: Construction Management student). UTC team made top 10 and moved to final on 2/26/2022. UTC team received Rockstar Rookie Award. May 2021 – April 2022. UTC news headline on 3/16/2022. Story available at https://blog.utc.edu/news/2022/03/utc-team-ranked-top- 10-in-department-of-energy-competition/. The Chattanoogan.com news on 3/16/2022 available at https://www.chattanoogan.com/2022/3/16/445354/UTC-Team-Designs-Energy-Efficient-Home.aspx. Local 3 News on 3/28/2022 available at https://www.youtube.com/watch?v=UpMK9IgqIwg.
- Member, International Association for Green Energy (IAGE) Task Force, August 2021 – April 3, 2022.
- Chair, Engineering Management Visiting Assistant Professor Search Committee, UTC, June – July 2021.
- Journal paper reviewer, *Applied Sciences*, June 2021.
- Conference paper reviewer, ASEM International Annual Conference 2021, June 2021.
- Journal paper reviewer, *Applied Sciences*, April 2021.
- Journal paper reviewer, *Engineering Management Journal*, January 2021.
- Journal paper reviewer, *Journal of Sensor and Actuator Networks*, January 2021.
- Member, Graduate Curriculum Ad Hoc Committee at UTC, November 2020 – July 2021.
- Journal paper reviewer, *Engineering Management Journal*, November 2020.
- Reviewer for revising and updating *ASEM Engineering Management Handbook*, Chapter Title: Simulation, January 2021 – February 2021.
- Reviewer for revising and updating *ASEM Engineering Management Handbook*, Chapter Title: Supply Chain Management for Engineering Managers, October 2020 – January 2021.
- Journal paper reviewer, *Applied Economics*, November 2020.
- Journal paper reviewer, *Symmetry*, October 2020.
- Session Chair, Innovation Best Practices session, ASEM 2020 Virtual International Annual Conference held on October 28-30, 2020.
- Member of International Organizing Committee, session chair, and Best Student Presentation Award judging panel for the 2021 International Green Energy Conference, held online (from Tianjin, China) on July 17-20, 2021. Appointed on 9/24/2020.
- Journal paper reviewer, *Sustainability*, August 2020.
- Reviewer Board member, *Applied Sciences*, July 23, 2020 – present.
- Affiliation with the SimCenter as a faculty member in Energy thrust. July 1, 2020 – June 30, 2022.
- Journal paper reviewer, *Engineering Management Journal*, July 2020.
- Journal paper reviewer, *Applied Sciences*, May 2020.
- Technical Program Committee for IEEE International Conference on Technology Management, Operations and Decisions (ICTMOD) to be held in Marrakech, Morocco on November 25-27, 2020.
- Chair, Construction Management Faculty Search Committee, UTC, September 27, 2019 – February 24, 2020. Position successfully filled on time. EMT is the only CECS department who

got it done on time.

- Chair, Engineering Management Faculty Search Committee, UTC, September 9, 2019 – February 24, 2020. Position successfully filled on time. EMT is the only CECS department who got it done on time.
- 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.
- Technical program committee for IEEE TEMS International Conference TEMSCON 2020.
- Graduate Program Coordinator for EMT, UTC, August 23, 2019 – August 2023.
- Journal paper reviewer, *Engineering Management Journal*, March 2020.
- Journal paper reviewer, *Applied Sciences*, February 2020.
- Journal paper reviewer, *IEEE Access*, February 2020.
- Journal paper reviewer, *Engineering Management Journal*, October 2019.
- Journal paper reviewer, *Applied Sciences*, September 2019.
- Journal paper reviewer, *Energies*, July 2019.
- Journal paper reviewer, *IEEE Transactions on Engineering Management*, June 2019.
- Conference paper reviewer, ASEM 2019 International Annual Conference, June 2019.
- Journal paper reviewer, *IEEE Transactions on Engineering Management*, May 2019.
- Journal paper reviewer, *IEEE Transactions on Engineering Management*, January 2019.
- Journal paper reviewer, *Risks*, December 2018.
- Journal paper reviewer, *IEEE Transactions on Engineering Management*, November 2018.
- Technical program committee for IEEE TEMS International Conference TEMSCON 2019.
- Journal paper reviewer, *IET Software*, September 2018.
- Conference paper reviewer, IEEE International Conference on Technology Management, Operations and Decisions (ICTMOD) to be held November 21-23, 2018. September 2018.
- Journal paper reviewer, *IET Software*, April 2018.
- Journal paper reviewer, *International Journal of Environmental Research and Public Health*, April 2018.
- Journal paper reviewer, *Sustainability*, April 2018.
- Journal paper reviewer, *Symmetry*, December 2017.
- Journal paper reviewer, *Journal of the Operational Research Society*, November 2017.
- Technical program committee for IEEE TEMS International Conference TEMSCON 2018.
- Journal paper reviewer, *Sustainability*, November 2017.
- Journal paper reviewer, *IEEE Transactions on Engineering Management*, August 2017.
- Journal paper reviewer, *Sustainability*, August 2017.
- Journal paper reviewer, *Computers & Industrial Engineering*, July 2017.
- Journal paper reviewer, *IEEE Software*, June 2017.
- Journal paper reviewer, *The Journal of Engineering*, April 2017.
- Journal paper reviewer, *International Journal of Environmental Research and Public Health*, March 2017.
- Journal paper reviewer, *Applied Economics*, October 2016.
- Journal paper reviewer, *Sustainability*, August-September 2016.
- 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.
- Journal paper reviewer, *Journal of Management in Engineering*, June 2016.
- Journal paper reviewer, *Journal of Management in Engineering*, May 2016.
- Journal paper reviewer, *Computer & Industrial Engineering*, May 2016.
- Journal paper reviewer, *International Journal of Technoentrepreneurship*, November 2015.

- Journal paper reviewer, *Applied Economics*, April 2015.
- Journal paper reviewer, *Computers & Industrial Engineering*, December 2014.
- Journal paper reviewer, *Science World Journal*, August 2014.
- Member, College of Engineering Assessment Committee, UAA, Spring 2014.
- Member, Faculty Senate Committee on Research & Creativity Activity, UAA, Fall 2013 – Spring 2018.
- 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 – Spring 2018.
- Member, College of Engineering Curriculum Committee, UAA, Fall 2011 – Spring 2018.
- Member, Faculty Grants & Leaves Committee, UAA, Fall 2011 – Spring 2012.
- Journal paper reviewer, *Risk Analysis*: An International Journal, October 2010.
- 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.

STUDENT ADVISING (as primary advisor)

- 2024
  - Tejaswini Adari, MS Engineering Management, Capstone Project
  - Micheal Habib, MS Engineering Management, Capstone Project
  - Ketan Patel, MS Engineering Management, Capstone Project
  - Tyler Ransom, MS Engineering Management, Capstone Project
- 2023
  - Michael Shook, MS Engineering Management: Construction Management, Capstone Project
  - Lina Abdelkarim, MS Engineering Management: Construction Management, Capstone Project
  - Rayanne Alameddine, MS Engineering Management, Capstone Project
  - Destaneh Nichols, MS Engineering Management, Capstone Project
  - Tomas Attalla, MS Engineering Management, Capstone Project
  - Muin Bogari, MS Engineering Management, Thesis. Presented poster at Technology Symposium (Spring 2023)
  - Ryan Limpus, MS Engineering Management, Thesis
  - James Darrel Cross II, MS Engineering Management, Capstone Project
  - Rana Taha, MS Engineering Management, Capstone Project
  - Mena Youssef, MS Engineering Management, Capstone Project
  - Tracie Clifford, MS Engineering Management, Capstone Project
  - Clarence Langley, MS Engineering Management: Construction Management, Capstone Project
  - Cameron Perry, Engineering Management undergraduate student, undergraduate research. Presented poster at Technology Symposium (Spring 2023)
  - Ryan Linsey, Engineering Management undergraduate student, undergraduate summer research. (Summer 2023)
- 2022
  - Clarence Langley, MS Engineering Management: Construction Management, Capstone Project
  - Erik Tomlinson, MS Engineering Management, Capstone Project
  - Joo Oh, MS Engineering Management, Capstone Project
  - Muin Bogari, MS Engineering Management, Thesis
  - Yasmeen Abazid, MS Construction Management, Capstone Project
  - Ryan Limpus, MS Engineering Management student, Thesis

    - Hamza Aljarash, MS Engineering Management student, Capstone Project
    - Joshua Giles, MS Engineering Management student, Capstone Project
- 2021
    - Levi Thornton, EM undergraduate student, Undergraduate Summer Research program.
    - Rashun Freeman, MS Engineering Management student, Capstone Project
    - Ryan Limpus, MS Engineering Management student. Thesis.
    - Sahej Singh, MS Engineering Management student. Capstone Project
    - Mohanned Mustfa, MS Construction Management student
    - Mohammad Aman Ullah Al Amin, MS Engineering Management student. Graduate Research 1st Place at the Technology Symposium
    - Laura Fox, MS Engineering Management student. Graduate Research 2nd Place and Best Overall Design: Engineering Management at the Technology Symposium
- 2020
    - Mohammad Aman Ullah Al Amin, MS Engineering Management student. Received SEARCH Award in April 2020.
    - Ana Tecu, MS Engineering Management student
    - Laura Fox, MS Engineering Management student
    - Adam Needham, MS Engineering Management student
- 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”
- Josh Craft, MS Engineering Management: “An Investigation of, and Guide to, Holistic Energy Project Planning in Rural Alaskan Communities”
- 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 Finnegan, 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"

RESEARCH INTERESTS

- Characterizing and identifying hidden risks
- Decision & Risk Analysis for energy technologies
- Emergency management modeling regarding natural disasters
- Efficiency of sports betting market
- Sports analytics for baseball teams and managers
- Data analytics for decision making
- Technology forecast using TRIZ method
- Creative problem solving methods for system improvement
- AI-based new product development

TEACHING INTERESTS

- Project risk management
- Lean Six Sigma process improvement
- Decision analysis
- Computer simulation of systems (discrete/continuous event, agent-based, and system dynamics)
- Business intelligence and analytics
- Creative problem solving methods including TRIZ
- New product development using TRIZ and AI
- TRIZ-based technology forecast
- Research methods

ACTIVITIES

- Co-Guest Editor of Special Issue of International Green Energy Conference (IGEC) 2016 for International Journal of Green Energy (IJGE), appointed in May 2016.
- 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

- Took "PMI Online Course: Digital Intelligence Series" offered by Project Management Institute (PMI). January 22-April 19, 2021. Funded by UTC Faculty Grants.
- Virtual seminar: Write Winning NSF Grant Proposals, January 28-29, 2021. Funded by UTC CECS.
- Virtual seminar: PMI SeminarsWorld: Integrating Design Thinking on Your Projects, May 20, 2020. Funded by UTC Faculty Grants.
- Attended Supply Chain Lunch and Learn "Managing Risk in the Supply Chain" by Dr. Thomas J. Goldsby on August 9, 2019.
- IISE online course: Introduction to IE in Healthcare, March-July, 2019.
- IISE online course: Principles in Patient Flow and Throughput, March-July, 2019.
- IISE online course: Healthcare Labor Management, March-August, 2019.
- Attended CECS Research Workshop by Office of Research Compliance (ORI) on January 11, 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.

CREDENTIALS

- Lean Six Sigma Black Belt, July 9, 2021 – present.
- Associate Certified Analytics Professional (aCAP), July 1, 2017 – July 1, 2026.
- 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)
- Power BI
- MS Project
- SPSS
- MATLAB
- Tableau
- R

B. Resume of Serkan Varol

Dr. Serkan Varol
Address: 10846 Prairie Lake Drive, Apison, TN, 37302
Cell Phone: 409-223-6679
Email: **serkanvarol23@gmail.com**

EDUCATION:

Lamar University, Beaumont, TX **August 2016**
Doctor of Engineering in Industrial Engineering

University of Tennessee at Chattanooga, Chattanooga, TN **May 2024**
Post-Baccalaureate Certificate-Business Analytics Certification

Wilkes University, Wilkes-Barre, PA **May 2012**
Master of Science in Engineering Management

West Virginia University, Morgantown, WV **May 2010**
Bachelor of Science in Industrial & Management Systems Engineering
(Exchange Program Student at **Bogazici University**, Istanbul, Turkey in Spring 2007 semester**)**

WORK EXPERIENCE:

University of Tennessee at Chattanooga, Chattanooga, TN **August 2020-Present**
Assistant Professor – Engineering Management and Technology
Engineering Management Graduate Program Coordinator

- Taught 7 different courses.
  -Advanced Engineering Economy (In Class and Online Sections)
  -Data Analytics & Research Methods (In Class and Online Sections)
  -Technical Entrepreneurship and Leadership (In Class and Online Sections)
  -Value Management (In Class and Online Sections)
  -Engineering Management and Principles (In Class and Online Sections)
  -Quality Control/Improvement (In Class and Online Sections)
  -Engineering Management Principles (In Class and Online Sections)
- Outstanding Teaching Award (2022)
- Serving as a faculty senate in the undergraduate & graduate curriculum
- Served as a chair of the Engineering Management faculty search committee
- Served as a member of the Construction Management faculty search committee
- Served as a chair for the strategic plan reputation & recognition committee
- Served as a member of the college governance committee
- Serving as the faculty advisor for the ASEM student chapter
- Created a new course "Data Analytics and Research Methods"
- Prepared a sample protocol for a 2+2 exchange program with Marmara University
- Awarded two faculty grants.

Graduate Project/Thesis Advised

(1) Branden Vincent (Spring 2023). Telos Global: A Financial Analysis. Master of Science in Engineering Management and Technology (Thesis Committee Chair)
(2) Jesus De La Cruz (Spring 2023). Elma Stem Upset Scrap Reduction Using DMAIC Master of Science in Engineering Management and Technology (Thesis Committee Chair)
(3) Bradley Polanco (Spring 2022). Understanding Market Condition: A post-COVID-19 Market – Master of Science in Engineering Management and Technology (Thesis Committee Chair)
(4) Mohammad Aman Ullah Al Amin (Spring 2021). Digital Twin Model of Two-Arm Collaborative Robot for Human Arms Motion Simulation Using Reverse Engineering – Master of Science in Engineering Management and Technology (Thesis Committee Member)
(5) Malick Sall (Summer 2022). Should We Prefer Full Automation to Conventional Vehicles? (Thesis Committee Chair)

Maltepe University, Istanbul, Turkey **July 2021-August 2021**
Assistant Professor (Visiting Faculty) – Industrial Engineering Department

- Taught Technology Management Course

Southeast Missouri State University, Cape Girardeau, MO **August 2017-July 2020**

Assistant Professor - Industrial & Systems Engineering

- Taught 10 different courses:
  -IM311 - Introduction to Statistical Control (In Class and Online Sections)
  -IM302 - Fundamentals of Technology Management (In Class)
  -IM313 - Facilities Management
  -IM315 - Work Measurement (In Class)
  -EG316 - Data Cleaning and Linkage
  -UI410 - Manufacturing Research in a Global Society
  -IM411 - Total Quality Assurance (In Class)
  -IM419 - Industrial Supervision (In Class and Online Sections)
  -IM600 - Managing Technology Innovation (In Class and Online Sections)
  -IM602 - Advanced Quality Concepts (In Class)
- Serving as a member in Graduate Curriculum, and Recruitment committees for the College of Engineering and Technology
- Serving as a member in Faculty Compensation-Faculty Senate for Southeast Missouri State University
- Serving as an advisor (also the founder of) for IISE student chapter at SEMO
- Serving as a member in STEM Data and Predictive Analytics
- Created a new course "Data Analytics-EG316" for Industrial and Systems Engineering program
- Assisted in creating a new course "Lean Enterprise and Supply Chain Management" for the Industrial and Systems Engineering program
- Advised 41 undergraduate and graduate students on academic and career-related issues

Graduate Project/Thesis Advised

(1) *Ramprasad Maddipatla* (Fall 2017). Leveraging Machine Learning Applications in Internet of Things to Enhance Mobile Phones Supply Chains: A Theoretical Model - Master of Science in Technology Management (Thesis Committee Member)
(2) *Rukshar Arzoo* (Spring 2019). Consumer Behavior in High Tech Dining Services - Master of Science in Technology Management (Thesis Committee Chair)
(3) *Sahith Sanike (Spring 2019).* Compressed Air Assessment At Food Processing Facility - Master of Science in Technology Management (Thesis Committee Member)
(4) *Durga Kodali (Fall 2019)*. Impact of Leadership Styles on Organizational Performance (Thesis Committee Chair)

Ford Motor Company, Dearborn, MI **December 2015 - July 2017**
Business/Data Operation Analyst - Global Data Insight and Analytics

- Recognized by being nominated to the highest technical award for designing and leading the development of a Spark-based Data Profiling tool, written in Scala
- Implemented Machine Learning algorithms for recognizing patterns and processing data
- Leveraged supply chain data integration for business intelligence
- Mastered customer related attributes and creating profiles
- Assisted in creating Scala/Python software-based data profiling tool
- Developed identity resolution techniques
- Developed regular expression patterns (regex) to identify key business terms

- Created metadata dictionaries for projects
- Managed metadata to support reporting capabilities
- Interpreted business data and developing analytic standards
- Hands-on experience on Alteryx, Informatica and IBM ETL tools

Lamar University, Beaumont, TX **December 2012 - December 2015**
Research and Teaching Assistant – Industrial Engineering Department

- Conducted data evaluation under the American Bureau of Shipping (ABS) project
- Maintained and repairing computer hardware and software for College of Engineering
- Provided technical advice for engineering faculty/staff
- Assisted to Industrial Management (INEN 4315), System Engineering (INEN 4301), Lean Manufacturing (INEN 5354), Applications of Quant Methods (INEN 2301) courses

Wilkes University, Wilkes Barre, PA **August 2010 – May 2012**
Research and Teaching Assistant – Engineering Management Department

- Assisted in Engineering Project Analysis (EGM 320) course (face-to-face and online)
- Assisted in Operations Analysis and Resources Allocation (EGM 520) course
- Reviewed/Grade Engineering Management assignments (Arena and SPSS)
- Organized engineering labs

Ajans Press, Istanbul, Turkey **January 2007 – June 2007**
Intern as a Media Analyst – Automotive Sector

- Prepared reports that evaluated automotive marketing campaigns

CURRENT/PAST PROFESSIONAL SERVICES:

Session Chair at the 2nd International Informatics and Software Engineering Conference
Session Chair at the 10th International Symposium on Digital Forensic and Security
Reviewer at the "Engineering Management" Journal
Reviewer at the "Medicina" Journal
Reviewer at the "Education Science" Journal
Reviewer at the "International Symposium on Digital Forensics and Security"
Reviewer at the "Healthcare" Journal
Reviewer at the "IIE Annual Conference & Expo"
Reviewer at the "Tropical Medicine & International Health" Journal
Reviewer at the "International Journal of Environmental Research and Public Health" Journal
Reviewer at the "International Informatics and Software Engineering" Conference

CURRENT/PAST PROFESSIONAL MEMBERSHIPS

Faculty Advisor of ASEM student chapter at UTC (2021-Present)
Founder and chair of IISE Chapter at SEMO (2018-2020)
Founder & advisor of Turkish Student Association at Lamar University (2014-2015)
Former President of Turkish Student Association at West Virginia University (2006-2009)
IISE member

AWARDS & CERTIFICATIONS:

Quality Management (QM) certification
Alteryx Designer Core Certification

Six Sigma Green Belt
IBM InfoSphere Data Stage
IBM InfoSphere Quality Stage
Certificate of Master Advisor

SOFTWARE SKILLS:

- **Programming Languages and Statistic Software**: VBA, SPSS, Phyton, SQL
- **Package Programs**: Microsoft PowerApp, Alteryx, SAS, Rapid Miner, Informatica, IBM InfoSphere Data and Quality Stage, Arena, CS5, SAP
- **Office Products**: Microsoft Word, Excel, Outlook, PowerPoint, Access

RESEARCH SUPPORT / GRANTS

- (PI: Serkan Varol): "Multi-Dimensional Record Enhancement Technique"
  DENSO North America Foundation
  Status: **Awarded**
  Amount: $8,275
- (PI: Serkan Varol): "Willingness to pay for a hypothetical Covid-19 Vaccine in the USA"
  UTC Faculty Grants
  Status**: Awarded**
  Amount: $2,500
- (PI: Serkan Varol): "Primary factors influencing the decision to vaccinate against COVID-19 in the United States: A Pre-Vaccine Analysis"
  UTC Open Fund
  Status: **Awarded**
  Amount: $1,222

PUBLICATIONS:

Journal Papers:

- Ridder, Z., **Varol, S**. (2023). "Understanding the Retention Rate for Engineering Students" submitted to the Journal of Student Success and Retention

- Catma, S., **Varol, S**. (2023). "Exploring the Spatial Dimensions of College Retention within the Context of Inequality", International Journal of Education Economics and Development. Volume 14, Issue 1, pages 42-55

- **Varol, S**., Odougherty, P. (2022). "A Predictive Analytics of Electronic Control Unit System Defects within Automotive Manufacturing". Journal of Failure Analysis and Prevention. Volume 22, 918-925

- **Varol, S**., Catma, S., Reindl, D., Serieux, E. (2022). "Primary factors influencing the decision to vaccinate against COVID-19 in the United States: A Pre-Vaccine Analysis", International Journal of Environmental Research and Public Health. Volume 19, Issue 3. 1026

- **Varol, S**., Catma, S. (2021). "Assessing the impact of a distance based Spatial Factor on Retention", Education Sciences. Volume 11, Issue 9. 508

- Catma, S., **Varol, S**. (2021). "Willingness to Pay for a Hypothetical COVID-19 Vaccine in the United States: A Contingent Valuation Approach. Vaccines Journal. Volume 9, Issue 4. 384

- **Varol, S**., Marquez, A. (2020). "An Empirical Study on Assessing Brand Loyalty in Automobile Industry using Hidden Markov Model" is published by Academy of Marketing Studies Journal, Volume 24, Issue 1, pp. 1-13

Refereed Conference Publications:

- Tong, J., **Varol, S.** (2023) "Adherence to Colorectal Cancer Screening Using Nationwide Unbalanced Data" to be presented at the 2024 IISE Annual Conference, May 18-21, 2024, Montreal, Canada
- Grubb, J., **Varol, S**. (2023) "Statistical Analysis of BIAS in Manufacturing Efficiency Loss Data" In proceedings at the American Society for Engineering Management 2023 International Annual Conference and 44th Annual Meeting, October 25, 2023, Colorado
- Gursoy, G., **Varol, S**, Varol, A. (2023). "Impact of Machine Learning in Digital Marketing Application" In proceedings at the 2nd International Informatics and Software Engineering Conference, December 17, 2023, Ankara, Turkey
- Sabbir H.K, **Varol, S**. (2023). "Analysis of Variance of Accident Data to Detect Factors Correlating to Fatalities in Tennessee**"** In proceedings at the 11th International Symposium on Digital Forensic and Security, May 9-May 11, 2023, Chattanooga, TN

- Hotchkiss, K., **Varol, S**., Seong, K. (2022). "Factors Affecting Spill Quantity Released in Arctic Conditions: Alaska, USA. In proceedings In proceedings at the Eleventh Annual World Conference of The Society for Industrial and System Engineering Conference, October 6, 2022, Virtual
- Kaplanoglu, E., **Varol, S**., Nasab, A. (2022). "Myoelectric Controlled Rehabilitation System for Chronic Low Back Pain". In proceedings at the TOK2022 Automatic Control National Congress, September 15-18, 2022, Elazig, Turkey

- Youssef, M, **Varol, S**., Catma, S. (2022). "Vehicle Fatality Analysis by Gender using Predictive Analytics". In proceedings at the 10th International Symposium on Digital Forensic and Security, June 6-June 7, 2022, Istanbul, Turkey

- Messiha, M., Fox, L., **Varol, S**., Aldhuwayhi, B., Kaplanoglu, E. (2021). "Traffic Accidents Cause and Effect Analysis: A Case Study in Chattanooga, Tennessee". In proceedings at the

2nd International Informatics and Software Engineering Conference, December 17, 2021, Ankara, Turkey

- Shook, M, Rogers, S., **Varol**, S. (2021). "Exploratory Study of 3D Printed Homes: How it Disrupts the Residential Construction Industry". In proceedings at the Tenth Annual World Conference of The Society for Industrial and System Engineering Conference, September 23, 2021, Virtual
- AlAmin, M., **Varol, S**, Mowrer, A., Tong, J., Catma, S. (2021). "Analyzing Factors Associated with Fatality Rate of Road Collisions: A Case Study in Tennessee", In proceedings at the American Society for Engineering Management 2021 International Annual Conference and 42nd Annual Meeting, October 27, 2021, Virtual
- O' Dougherty P., Ferrel, K., **Varol, S**. (2021). "A Study of Semiconductor Defects within Automotive Manufacturing using Predictive Analytics" In proceedings at the 9th International Symposium on Digital Forensic and Security, June 30-July 1, 2021, Elazig, Turkey
- **Varol, S**. (2020). "Intensification of Personally Identifiable Information", presented at the 2020 IISE Annual Conference, October 12, 2020, Virtual
- Abdulrahman, A., **Varol, S**. (2020). "A Review of Image Segmentation Using Matlab Environment", in proceedings at the 8th International Symposium on Digital Forensic and Security, June 1-June 2, 2020, Beirut, Lebanon
- **Varol, S**., Arzoo, R. (2019). "Student Enrollment and Retention in Universities of PLAINS and Great Lake Regions" in proceeding at the Academy of Business Research Fall Conference, October 30-November 1, San Antonio, Texas
- Abdlrazaq,A., **Varol, S**. (2019). "A Trust Management Model for IoT" in proceedings at the 7th International Symposium on Digital Forensic and Security , June 9 – June 13, 2019, Barcelos, Portugal
- Azeez, N.S., **Varol, S**. (2019). "Securing Database Management Systems using RAM Serial Numbers" in proceedings at the 7th International Symposium on Digital Forensic and Security , June 9 – June 13, 2019, Barcelos, Portugal
- **Varol, S**. (2018). "The Neuroeconomics of Brand Imaging and Brand Loyalty" in proceedings at the 2018 IISE Annual Conference, May 19-22, 2018, Orlando, Florida
- **Varol**, **S**., Marquez, A. (2015). "The Use of Conditional Probability and Expected Value Functions to Maximize Earnings on Betting Games", In proceedings at the Academy of Business Research Conference, 2015, October 28 – October 30, 2015, San Antonio, Texas
- **Varol**, S., Marquez, A. (2015). "The Novel Implementation of the Hidden Markov Model into Forecasting Brand Loyalty in Automobile Industry", In proceedings at the Fourth Annual World Conference of The Society for Industrial and System Engineering Conference, October 19-21, 2015, Fort Laudedale, Florida

- **Varol, S.,** Varol, A. (2015). "Facilitation of Intergroup Communications Skills with the Help of Mobile Applications", In proceedings at the World Conference on Business and Management - WCMB 2015, 29 June – 2 July 2015, Seoul, Korea
- **Varol, S**., Underdown, R. (2013). "An Analysis of Mobile Applications for the Purpose of Facilitating Knowledge Management"**,** In proceedings at the 10th International Conference on Intellectual Capital, Knowledge Management & Organizational Learning - ICICKM 2013, 23-25 October 2013, Washington D.C
- Varol, N., **Varol, S**. (2013). "Overcoming Resistance to Change and Managing Knowledge: A Case Study at Firat University", In proceedings at the 10th International Conference on Intellectual Capital, Knowledge Management & Organizational Learning - ICICKM 2013, 23-25 October 2013, Washington D.C.
- **Varol, S.,** Varol, N. (2012). "The Influences of Inter-Group Relations on an Organizational Structure", In proceedings at the 9th International Conference on Intellectual Capital, Knowledge Management & Organizational Learning - ICICKM 2012, 18-19 October 2012, Bogota, Colombia
- **Varol, S.,** Varol, A. (2012). "Transformational and Transactional Leaders: A Case Study in the Higher Education", In proceedings at the 9th International Conference on Intellectual Capital, Knowledge Management & Organizational Learning - ICICKM 2012, 18-19 October 2012, Bogota, Colombia

Professional Presentations/Workshops:

- Presented: "Analytics in Automotive Manufacturing" for Engineering Planning Center at Volkswagen Group of America, December 2023
- Organized "Alteryx for Everyone Workshop" at UTC, September 2023
- Presented: "Data Analytics for Everyone" for MTSU Non-STEM Program, October 2022
- Presented: "Understanding the importance of Six Sigma under Project Management" at İNEST Professional Series Workshop, Feb 2022.
- Presented "A Statistical and Machine Learning Approach to a Multidimensional Study of Student Retention" at CoSTEM Data and Predictive Analytics Group Meeting, Nov 2019.
- Presented "ABCs of Data Cleaning" for Pillar Analytics, a consulting company located in Dublin, OH, April 2018.
- Presented "Spark-based Data Profiling tool" at Henry Ford Technical Award Conference, June 2017. Detroit, Michigan

Appendix G. Undergraduate Syllabi Examples

Department of Engineering Management and Technology
Course number: ETEM 4590, CRN: 42152, Modality: F2F, Credit hours: 3

Instructor: Dr. Wolday Abrha, CPEM®, LSSBB.
Email and Phone Number**:** Wolday-Abrha@utc.edu; 423-425-5678

Office Hours and Location**:** TR 11:00 AM – 12:00 PM or by appointment. Office: EMCS 328

Course Meeting Days, Times, and Location: TR 9:25 – 10:40 AM. EMCS 321.

Course Catalog Description**:** Methods of designing new facilities and expanding or renovating existing facilities. Planning facility layout, facility location, and activities are presented. Topics such as analysis of workspace, workflow, material handling systems, facility planning data collection methods, process flow-charting, supply chain management, and economics are covered. Lecture 3 hours. Prerequisite: ENCE 3520 or ETEM 3520 with minimum grades of C or department head approval. Differential course fee will be assessed.
Course Student Learning Outcomes: Upon completion of this course, the successful student will be able to: 1) Define facility location and facility layout in an organization and engineering context. 2) Apply processes, methods, and algorithms for the planning of facilities. 3) Discuss current material handling equipment, their application, and their performance. 4) Examine layouts applied to factory and production operations. 5) Provide a unified picture of facility systems and the facility planning process.

ABET (Accreditation Board for Engineering and Technology) – Student Outcomes: TBD
Course Fees: Differential Course Fee will be assessed.

Required Course Materials**:**

1. Tompkins, J. A., White, J. A., Bozer, Y. A. and J.M. Tanchoco (2010). Facility Planning, 4th ed. New Jersey, NJ: John Wiley & Sons, Inc. ISBN-13: 9781119781189. Or
2. Tompkins, J. A., White, J. A., Bozer, Y. A. and J.M. Tanchoco. (2010). Facility Planning, 4th ed. New Jersey, NJ: John Wiley & Sons, Inc. ISBN-13: 978-0-470-44404-7.

Supplemental/Optional Course Materials**:** Heizer, Jay, and Barry Render (2008). Operations Management, 9th edition. New Jersey: Pearson Prentice Hall. ISBN-13: 978-0-13-234271-1.

Technology Requirements for Course**:** Your electronic device should be compatible enough to allow access to UTC Learn (Canvas), to read announcements and course materials, and to submit assignments and examinations. Grades will also be posted on Canvas. If you are unfamiliar with Canvas, enroll in online training (https://www.utc.edu/learn/). Or contact the Walker Center for Teaching and Learning. Minimum requirements: Microsoft – Excel, Word, and PowerPoint (versions 2010 or latest), Adobe Acrobat, Adobe Connect, Pro-planner, and AutoCAD.

Technology Skills Required for Course**:** Canvas will serve as a key platform in the conduction of this class. Students are expected to be skilled enough to access Canvas and be familiar with Microsoft office products (Excel, Word, and PowerPoint), Adobe Acrobat, and Adobe Connect.
Technology Support**:** If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.
Student Technology: If you have technology needs to access your courses and/or complete course requirements on Canvas, submit a request (https://new.utc.edu/information-technology/learning-from-home) with Information Technology.

Student Accommodations: If you have accessibility and accommodation requests, contact the Disability Resource Center (https://www.utc.edu/disability-resource-center/index.php) at 423-425-4006 or email DRC@utc.edu.

Course Assessments and Requirements**:** Course assessments will be based on total points earned from quizzes, assignments, and participation. ***All quizzes will be available online***. For some questions, you may be asked to submit a worksheet (document or spreadsheet). If you do not submit the worksheet, you will receive zero for the specific question where worksheet is required. No make-up will be administered for any assessment. If you are ill (with an excuse note from a doctor), an alternative means of evaluation may be provided.

1. All assessments (assignments, discussions, etc.) should be typed and uploaded to UTC Learn. I may provide report writing and presentation guidelines as needed and can ask for a hard copy of any of these submissions.
2. Only pdf or word documents are acceptable file formats. If you submitted a file format that is not compatible (e.g., Google Docs) or cannot be open on Canvas, your submission will not be graded.
3. All sources, including the textbook should be properly cited (use APA 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 the honor code.
4. While some justifiable circumstances may be considered at my discretion (on a case-by-case basis), late submissions will be penalized (see late/missing work policy).
5. The general evaluation criteria for written works are based on instructions (refers to the ability to follow instructions correctly and submit by due date), proficiency in concepts (refers to learning/student outcomes), flow (refers to the logical flow of written report which includes correct grammar and spelling), source (this refers to citation of information taken from books, journal articles, websites, etc.), and rubrics assigned for each assessment and question.

Proctorio: This course requires one or more remotely proctored tests using Proctorio through Canvas. I will specify the proctoring parameters, rules, and policies that will be used (e.g., the percentage limit for suspicious activity, number of red flags, etc.). Students must make sure to have access to a quiet (preferably private) space for testing, a webcam (USB or internal), a microphone (USB or internal), and their Mocs card (UTC ID) ready for the ID verification process. Students understand that recording hardware (webcam and microphone) is purchased and controlled by the

student and that recordings from any location must be approved. If you are unable to complete a proctored exam and/or need to request alternative test-taking options, contact me at least one week in advance from the exam date. Any form of academic misconduct during proctored exams is subject to the policies specified by UTC's Academic Integrity (see student conduct policy). Guidelines for test takers can be found at https://www.utc.edu/walker-center-teaching-learning/pdfs/proctorio-student-guide.pdf. Additional information, FAQ, and support about Proctorio can be found at https://proctorio.com/support.

Course Grading

Grading Policy: Quizzes (70%), Assignments (20%), and Participation (10%)**.**

Letter grading

89.55 – 100	A
79.55 - 89.54	B
69.55 – 79.54	C
59.55 – 69.54	D
59.54 and below	F

Instructor Grading and Feedback Response Time**:**

1. The test results for quizzes may be posted immediately or right after the due date. Grading of assignments may take at least one week after the due date.
2. I will respond to all other inquiries received through electronic communications (e-mail and voice messages) within ***24 hours***. Any communication received at weekends will have to be responded to by the next business day.
3. Students are expected to adhere to a formal e-mail writing style when sending e-mails. Example: include course code and CRN in the subject, start your message with greetings, and close it professionally. Use your UTC e-mail instead of other non-UTC related external e-mail addresses (e.g., Gmail, Yahoo, etc.). External emails are subject to deletion to ensure our common benefit in cyber security.

Course and Institutional Policies

Late/Missing Work Policy: All assigned works should be submitted by the due date to UTC Learn. Late work is strongly discouraged and will be penalized. There will be a *10%* penalty for each calendar day a work is submitted late unless a student gets my permission in advance. No work will be accepted after solutions are provided (e.g., posted on UTC Learn, discussed during lecture, etc.).

Student Conduct Policy**:** UTC's Academic Integrity Policy is stated in the Student Handbook (https://www.utc.edu/dean-students/student-handbook.php).

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 will exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.

Course Attendance Policy**:** Attendance is required, and rolls will be taken as needed.

Course Participation/Contribution: Active participation in class and posting to discussion forums on UTC Learn (if needed) accounts for ***10%*** 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.

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

Course Calendar/Schedule**:** This is a tentative course calendar/schedule. It should be used for planning purposes only. Additional information, updates, and announcements will be provided on canvas, as needed. The tentative schedule is subject to change. I reserve the right to adjust the scope and conduct of the course with the intent of best addressing the course learning objectives. This includes but is not limited to the outlined topics, the number and timing of assessments as deemed appropriate.

Week	**Topics arranged in modules**	**Notes, availability of assessments or due dates**
1	Introduction and Overview Module 1	
2	Module 1 (cont'd)	Assignment/discussion 1 (TBA)
3	Module 2	Quiz 1 (TBA)
4	Module 2 (cont'd)	Assignment/discussion 2 (TBA)
5	Module 3	
6	Module 3 (cont'd)	Quiz 2 (TBA)
7	Module 4	
8	Module 4 (cont'd)	Quiz 3 (TBA)
9	Module 5	
10	Module 5 (cont'd)	Assignment/discussion 3 (TBA)
11	Module 6	Quiz 4 (TBA)
12	Module 6 (cont'd)	
13	Module 7	Quiz 5 (TBA)
14	Module 7 (cont'd) Review	
15/16	Thanksgiving Break; Quiz 6 (may be comprehensive)	

Additional Notes:

1. If you have any grading issues that I am not aware of, you need to let me know by 5 pm on the last day of classes.
2. Unless specifically mentioned as part of an assignment or announcement, all due dates in this course are based on the time zone where the UTC campus is located. That is, Eastern Standard Time (EST).

Quality Management Systems Fall Fall 2023
Department of Engineering Management and Technology

Course number: ENGM 5560, CRN: 46470, Modality: Online (Internet), Credit hours: 3

Instructor: Seong Dae Kim, Ph.D., PMP, aCAP, LSS BB

Email and Phone Number: SeongDae-Kim@utc.edu; 423-425-5786

Office Hours and Location: Mondays 9:30 am – 3:00 pm, Wednesdays 9:30 am – 2:00 pm, or Zoom meeting by appointment.

Course Meeting Days, Times, and Location: Mondays, 2:00 – 3:15 pm, Wednesdays, 2:00 – 3:15 pm, ECS 231 (not applicable to online students)

Course Catalog Description: Introduction to quality management principles including its history, the role of total quality, and the philosophical perspectives supporting total quality. In- depth look at the management system and its relationship to total quality. Investigation of technical issues and the role of tools and techniques in the quality management process including methods, quality improvement and associated management models, and reliability in design and production. Exploration of methods of building and sustaining quality organizations. 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. Background in undergraduate statistics or equivalent is strongly recommended (Example: ENCE 2220, MGT 2110, or MATH 2100).

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

1) Understand the major milestones in the history of quality management and the challenges and prospectus of organizational quality systems in the 21st century.
2) Provide an in-depth understanding of the roles of quality management systems at an enterprise level, including the sector/industry specific quality standards.
3) Analyze basic quality tools and models aimed at investigating organizational processes and systems (including an overview to the supply chain level) to enhance a reliable delivery of products and services and sustain quality improvements initiatives.
4) Describe quality management principles, methods, and some of the key elements of quality management systems including but not limited to total quality, lean and six sigma systems,

quality function deployment, and their impact on organizational excellence.

5) Develop skillsets for the assessments, applications, and review of quality management systems.

6) Develop an applicable case study in quality management systems and discuss it in an oral presentation and/or submit a written report.

Course Fees: Differential Course Fee will be assessed.

Required Course Materials: S. Thomas Foster (2017). *Managing Quality: Integrating the Supply Chain*. 6th edition. Pearson Education.

Supplemental/Optional Course Materials:

1. David L. Goetsch and Stanley Davis (2016). *Quality Management for Organizational Excellence: Introduction to Total Quality*. 8th edition. Pearson Education.
2. Russell T. Westcott (2013). *The Certified Manager of Quality/Organizational Excellence Handbook*. 4th edition. ASQ Press.
3. Howard S. Gitlow (2000). *Quality Management Systems: A Practical Guide*. 1st edition. CRC Press.

Technology Requirements for Course: Your electronic device should be compatible to allow access to UTC Learn (Canvas), to read announcements and course materials, and to submit assignments and examinations. Grades will also be posted on Canvas. If you are unfamiliar with Canvas, enroll in an online training (https://www.utc.edu/learn/), or contact the Walker Center for Teaching and Learning. Minimum requirements: Microsoft – Excel, Word, and PowerPoint (versions 2010 or later), and Adobe Acrobat Pro.

Technology Skills Required for Course: Canvas will serve as a key platform in the conduction of this class. Student is expected to be skilled enough to access Canvas and be familiar to Microsoft office products (Excel, Word, and PowerPoint), and Adobe Acrobat.

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Generative Artificial Intelligence (AI) - Use with Acknowledgement: In this course, you will be permitted to use Generative AI tools. However, any coursework created with the assistance of Generative AI must include quotation marks as appropriate and proper citations, using the accepted citation style for this course.

Course Assessments and Requirements: Click here to enter text.

A. Quizzes: There are two online quizzes. Each quiz will be open on the pre-determined day in the schedule at 6:00 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. Midterm 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. Assignments: Students are required to submit the completed assignment on Canvas and comment on other postings for each assignment.

Course Grading

Course Grading Policy: The final letter grade 90.0-100.0 points = A; 80.0-89.9 points = B; 70.0-79.9 points = C, 60.0-69.9 points = D; < 60.0 points = F.

Quizzes (2)	20 points
Midterm Exam (1)	20 points
Final Exam (1)	20 points
Assignments (4)	40 points
Total	100 points

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

Course and Institutional Policies

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

Academic Integrity: As a student of the University of Tennessee at Chattanooga ("UTC" or "University"), you are expected to abide by the University's Honor Code. Any suspected violation of the UTC Honor Code will result in a referral to the Office of Student Conduct and may result in a grade of F (0) on an assignment, examination, or course should you be found responsible for the alleged violation. UTC's Student Code of Conduct and Honor Code (Academic Integrity Policy) can be found on the Student Conduct Policy page (https://www.utc.edu/student-conduct/codes.php).

Honor Code Pledge: As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity.

Course Attendance Policy: Attendance and participation is required either face-to-face or online.

Course Participation/Contribution: Active participation in class and the contribution to learning of other students will be considered for extra credit.

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: Click here to enter text.

Week #	Topics	Assignment
Week 1 (8/21-)	Review of syllabus Overview of the course	Assignment: Introduce Yourself
Week 2 (8/28-)	Differing Perspectives on Quality	
Week 3 (9/4-)	9/4 Labor Day (NO CLASS) Quality Theory	
Week 4 (9/11-)	Global Supply Chain Quality and International Standards	Assignment: Baldrige Award recipient
Week 5 (9/18-)	Strategic Quality Planning	Quiz 1
Week 6 (9/25-)	The Voice of the Customer; The Voice of the Market	
Week 7 (10/2-)	Quality in Products and Processes	
Week 8 (10/9-)	Quality in Services 10/11 Midterm Exam	
Week 9 (10/16-)	10/16-10/17 Fall Break (NO CLASS) Managing Supplier Quality in the Supply Chain	Assignment: SERVQUAL survey
Week 10 (10/23-)	The Tools of Quality	
Week 11 (10/30-)	Quality Improvement for Variables and Attributes – an Overview	
Week 12 (11/6-)	Lean Six Sigma Management and Tools	Quiz 2
Week 13 (11/13-)	Managing Quality Improvement Teams and Projects	Assignment: Lean method
Week 14 (11/20-)	Implementing and Validating the Quality System 11/12 Thanksgiving Holiday Travel Day (NO CLASS)	
Week 15 (11/27)	Final Exam	

Schedule subject to change

Appendix H. Graduate Syllabi Examples

Quality Management Systems Fall 2023
Department of Engineering Management and Technology

Course number: ENGM 5560, CRN: 46470, Modality: Online (Internet), Credit hours: 3

Instructor: Seong Dae Kim, Ph.D., PMP, aCAP, LSS BB

Email and Phone Number: SeongDae-Kim@utc.edu; 423-425-5786

Office Hours and Location: Mondays 9:30 am – 3:00 pm, Wednesdays 9:30 am – 2:00 pm, or Zoom meeting by appointment.

Course Meeting Days, Times, and Location: Mondays, 2:00 – 3:15 pm, Wednesdays, 2:00 – 3:15 pm, ECS 231 (not applicable to online students)

Course Catalog Description: Introduction to quality management principles including its history, the role of total quality, and the philosophical perspectives supporting total quality. In-depth look at the management system and its relationship to total quality. Investigation of technical issues and the role of tools and techniques in the quality management process including methods, quality improvement and associated management models, and reliability in design and production. Exploration of methods of building and sustaining quality organizations. 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. Background in undergraduate statistics or equivalent is strongly recommended (Example: ENCE 2220, MGT 2110, or MATH 2100).

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

1) Understand the major milestones in the history of quality management and the challenges and prospectus of organizational quality systems in the 21st century.
2) Provide an in-depth understanding of the roles of quality management systems at an enterprise level, including the sector/industry specific quality standards.
3) Analyze basic quality tools and models aimed at investigating organizational processes and systems (including an overview to the supply chain level) to enhance a reliable delivery of products and services and sustain quality improvements initiatives.
4) Describe quality management principles, methods, and some of the key elements of quality management systems including but not limited to total quality, lean and six sigma systems, quality function deployment, and their impact on organizational excellence.
5) Develop skillsets for the assessments, applications, and review of quality management systems.
6) Develop an applicable case study in quality management systems and discuss it in an oral presentation and/or submit a written report.

Course Fees: Differential Course Fee will be assessed.

Required Course Materials: S. Thomas Foster (2017). *Managing Quality: Integrating the Supply Chain*. 6th edition. Pearson Education.

Supplemental/Optional Course Materials:

1. David L. Goetsch and Stanley Davis (2016). *Quality Management for Organizational Excellence: Introduction to Total Quality*. 8th edition. Pearson Education.
2. Russell T. Westcott (2013). *The Certified Manager of Quality/Organizational Excellence Handbook*. 4th edition. ASQ Press.
3. Howard S. Gitlow (2000). *Quality Management Systems: A Practical Guide*. 1st edition. CRC Press.

Technology Requirements for Course: Your electronic device should be compatible to allow access to UTC Learn (Canvas), to read announcements and course materials, and to submit assignments and examinations. Grades will also be posted on Canvas. If you are unfamiliar with Canvas, enroll in an online training (https://www.utc.edu/learn/), or contact the Walker Center for Teaching and Learning. Minimum requirements: Microsoft – Excel, Word, and PowerPoint (versions 2010 or later), and Adobe Acrobat Pro.
Technology Skills Required for Course: Canvas will serve as a key platform in the conduction of this class. Student is expected to be skilled enough to access Canvas and be familiar to Microsoft office products (Excel, Word, and PowerPoint), and Adobe Acrobat.

Technology Support: If you have problems with your UTC email account or with UTC Learn (Canvas), contact IT Help Desk at 423-425-4000 or email helpdesk@utc.edu.

Generative Artificial Intelligence (AI) - Use with Acknowledgement: In this course, you will be permitted to use Generative AI tools. However, any coursework created with the assistance of Generative AI must include quotation marks as appropriate and proper citations, using the accepted citation style for this course.

Course Assessments and Requirements: Click here to enter text.

A. Quizzes: There are two online quizzes. Each quiz will be open on the pre-determined day in the schedule at 6:00 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. Midterm 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. Assignments: Students are required to submit the completed assignment on Canvas

and comment on other postings for each assignment.

Course Grading

Course Grading Policy: The final letter grade 90.0-100.0 points = A; 80.0-89.9 points = B; 70.0-79.9 points = C, 60.0-69.9 points = D; < 60.0 points = F.

Quizzes (2)	20 points
Midterm Exam (1)	20 points
Final Exam (1)	20 points
Assignments (4)	40 points
Total	100 points

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

Course and Institutional Policies

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

Academic Integrity: As a student of the University of Tennessee at Chattanooga ("UTC" or "University"), you are expected to abide by the University's Honor Code. Any suspected violation of the UTC Honor Code will result in a referral to the Office of Student Conduct and may result in a grade of F (0) on an assignment, examination, or course should you be found responsible for the alleged violation. UTC's Student Code of Conduct and Honor Code (Academic Integrity Policy) can be found on the Student Conduct Policy page (https://www.utc.edu/student-conduct/codes.php).

Honor Code Pledge: As a student of the University of Tennessee at Chattanooga, I pledge that I will not give or receive any unauthorized assistance with academic work or engage in any academic dishonesty in order to gain an academic advantage. I will exert every effort to insure that the Honor Code is upheld by myself and others, affirming my commitment to a campus-wide climate of honesty and integrity.

Course Attendance Policy: Attendance and participation is required either face-to-face or online.

Course Participation/Contribution: Active participation in class and the contribution to learning of other students will be considered for extra credit.

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: Click here to enter text.

Week #	Topics	Assignment
Week 1 (8/21-)	Review of syllabus Overview of the course	Assignment: Introduce Yourself
Week 2 (8/28-)	Differing Perspectives on Quality	
Week 3 (9/4-)	9/4 Labor Day (NO CLASS) Quality Theory	
Week 4 (9/11-)	Global Supply Chain Quality and International Standards	Assignment: Baldrige Award recipient
Week 5 (9/18-)	Strategic Quality Planning	Quiz 1
Week 6 (9/25-)	The Voice of the Customer; The Voice of the Market	
Week 7 (10/2-)	Quality in Products and Processes	
Week 8 (10/9-)	Quality in Services 10/11 Midterm Exam	
Week 9 (10/16-)	10/16-10/17 Fall Break (NO CLASS) Managing Supplier Quality in the Supply Chain	Assignment: SERVQUAL survey
Week 10 (10/23-)	The Tools of Quality	
Week 11 (10/30-)	Quality Improvement for Variables and Attributes – an Overview	
Week 12 (11/6-)	Lean Six Sigma Management and Tools	Quiz 2
Week 13 (11/13-)	Managing Quality Improvement Teams and Projects	Assignment: Lean method
Week 14 (11/20-)	Implementing and Validating the Quality System 11/12 Thanksgiving Holiday Travel Day (NO CLASS)	
Week 15 (11/27)	Final Exam	

Schedule subject to change

Statistics for Engineering Managers
Fall 2023
Department of Engineering Management and Technology
Course number: ENGM 5030, CRN: 46468, Modality: Online, Credit hours: 3

Instructor: Wolday D. Abrha, Ph.D.
Email and Phone Number: Wolday-Abrha@utc.edu; 423-425-5678
Office Hours and Location**:** Online or by appointment. Office: ECS 328
Course Meeting Days, Times, and Location**:** Online - asynchronous.
Course Catalog Description: Advanced associational, descriptive, and inferential statistics for decision-making by engineering managers. Topics include statistics applications in engineering

management context, basic probability theory, discrete and continuous probability distributions, univariate, bivariate, and multivariate data visualizations, design of experiments, analysis of variance, regression and correlation analysis, and hypothesis testing.

Course Prerequisite: Department head approval.

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

1) Apply selected statistical tools/techniques to address engineering issues or case studies.
2) Describe and demonstrate various statistical methods, the assumptions of the methods, and procedures for validating the methods.
3) Explain the relationship between statistical methods and quality improvement.
4) Illustrate how to present information graphically and numerically, validate decisions based on the information, and clearly communicate conclusions.
5) Recognize the basic types of statistics such as associational, descriptive, and inferential.
6) Utilize statistical software to analyze data numerically, graphically, and to compute probabilities and probability distributions.

Required Course Materials**:** *Introduction to Probability and Statistics for Engineers and Scientists*, by Sheldon M. Ross, 6th Edition.

Supplemental/Optional Course Materials**:**

1) Probability and Statistics for Engineering and Science by Jay L. Devore
2) Modern Statistical Theory and Inference: an information-based model selection approach with MATLAB by Hamparsum Bosdogan.
3) Additional materials such as case studies, journal articles, and notes will be posted on Canvas as needed.

Technology Requirements for Course**:** Your electronic device should be compatible to allow access to UTC Learn (Canvas), to read announcements and course materials, and to submit assignments and examinations. Grades will also be posted on Canvas. Minimum requirements: Microsoft – Excel, Word, and PowerPoint (versions 2010 or latest), and Adobe Acrobat Pro.

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

Course Assessments and Requirements**:** Course assessments will be based on total points earned from quizzes/exams, project, and participation. One or more of the quizzes/exams will be remotely proctored using Proctorio.

1) All assessments, individual and team based, should be typed, and uploaded to UTC Learn.
2) Only pdf, PowerPoint, and word documents are acceptable file formats.
3) All sources should be properly cited using an APA style. 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.
4) While some justifiable circumstances may be considered at my discretion (on case-by-case basis), late submissions will be penalized (see late/missing work policy for details).

5) The general evaluation criteria for written works are 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.
6) You are expected to submit your work only after a thorough analysis of a problem. Hence, discussions using real-life case studies, work experiences, scenario analysis, etc. are expected.

Proctorio: This course requires one or more remotely proctored tests using Proctorio through Canvas. I will specify the proctoring parameters, rules, and policies that will be used (e.g., the percentage limit for suspicious activity, numbers of red flags, etc.). Students must make sure to have:

- access to a quiet (preferably private) space for testing,
- a webcam (USB or internal),
- a microphone (USB or internal), and
- their ID ready for verification process.

Students understand that recording hardware (webcam and microphone) is purchased and controlled by the student and that recordings from any location must be approved. If you are unable to complete a proctored exam and/or need to request alternative test taking options, contact me at least one week in advance from the exam date. Any form of academic misconduct during proctored exams are subject to the policies specified by UTC' Academic Integrity (see student conduct policy). Guideline for test takers can be found at https://www.utc.edu/walker-center-teaching-learning/pdfs/proctorio-student-guide.pdf. Additional information, FAQ, and support about Proctorio can be found at https://proctorio.com/support.

Course Grading

Course Grading Policy**:**

1) ***Quizzes (60%):*** There will be at least one quiz per module.
2) ***Project/Research Paper (30%):*** This is a comprehensive team assignment, and each team will cover an application of techniques/tools covered.
3) ***Participation (10%):*** This comes from an active participation in discussion forums.

Instructor Grading and Feedback Response Time**:** The results of submitted works will be posted electronically within two weeks of the due date. You will be given up to two days to review your final letter grade before it is submitted to My MocsNet. Any grading issues will not be accepted past the review period. You are expected to adhere to a formal e-mail writing style when sending e-mails. For effective communication, make sure to include course code and CRN in the subject, start your message with greetings, and close it professionally. Use

your UTC e-mail instead of other external e-mail addresses (e.g., Gmail, Yahoo, etc.). External emails are subject to deletion to ensure our common benefit in cyber security.

Letter grading:

90 – 100	A
80 - 89	B
70 - 79	C
60 - 69	D
Below 60	F

Course and Institutional Policies

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

Course Attendance Policy**:** No attendance. However, participation will be monitored via discussion forums.

Course Participation/Contribution**:** Active participation by responding to questions on discussion boards on Canvas counts towards ***10%*** of your final grade.

Course Calendar/Schedule: This is a tentative course calendar/schedule. It should be used for planning purposes only. Additional information, updates, and announcements will be provided on canvas, as needed. The tentative schedule is subject to change. I reserve the right to adjust the scope and conduct of the course with the intent of best addressing the course learning objectives. This includes but is not limited to the outlined topics, the number and timing of assessments as deemed appropriate.

Week	**Chapter/Topic**	**Due dates and Notes**
1	Introduction	Discussion 1
2	Descriptive Statistics	Quiz 1
3	Descriptive Statistics (cont'd) Probability Theory	
4	Probability Theory (cont'd) Commonly Used Distributions	Quiz 2
5	Commonly Used Distributions (cont'd)	Discussion 2; Project phase 1
6	Parameter Estimation	
7	Parameter Estimation (cont'd)	Quiz 3
8	Hypothesis Testing	
9	Hypothesis Testing (cont'd)	Quiz 4; Discussion 3
10	Regression and Correlation Analysis	
11	Regression and Correlation Analysis (cont'd) Analysis of Variance	Quiz 5; Project phase 2
12	Design of Experiments	
13	Nonparametric hypothesis test, simulation, and bootstrap methods – optional Machine Learning and Big Data – optional	Quiz 6; Project phase 3
14	Review	
15	Project presentation	

Additional Notes:

1. If you have any grading issues that I am not aware of, you need to let me know by 5 pm on the last day of classes.
2. Unless specifically mentioned as part of an assignment or announcement, all due dates in this course are based on the time zone where the UTC campus is located. That is, Eastern Standard Time (EST).

Technical Project Management

Spring 2022

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.

Required Course Materials: *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* 6th Edition. Project Management Institute

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.

Quizzes	30%
Mid-term Exam	30%
Term Project	30%
Participation	10%
Total	100%

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:

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

Course schedule subject to change

Term Project presentation evaluation rubric:

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

Dimension (multiplier)	1 very poor (very low)	2 poor (low)	3 neutral (medium)	4 good (high)	5 very good (very high)

Explanation of the problem of focus (1)					
Explanation of how the problem is linked to the technique(s) used (1)					
Clearly stated research question(s) (1)					
Level of technique(s) used (1)					
Number of technique(s) used (.5)					
Professional look of presentation slides (.5)					
Visualization of the results (.5)					
Quality of time allocation (.5)					
Total score = _____ (add multiplier*score from the above rows. Total possible points = 30)					

Advanced Quality Control

Fall 2023

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.

Required Course Materials: Introduction to Statistical Quality Control, 7th Edition. Montgomery, D. C. Wiley, ISBN-13: 978-1118146811; ISBN-10: 1118146816
Supplemental/Optional Course Materials:

1) Foster, S. T. (2016). *Managing quality: Integrating the supply chain*. Pearson.
2) Westcott, R. T. (Ed.). (2013). *The certified manager of quality/organizational excellence handbook*. ASQ Quality Press.
3) Pyzdek, T. (2001). *The Six Sigma handbook: a complete guide for greenbelts, blackbelts, and managers at all levels*. New York: McGraw-Hill. Use latest edition, if possible.
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 on-line 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 latest), 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:

90 – 100	A
80 - 89	B
70 - 79	C
60 - 69	D
Below 60	F

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.

Week #	Chapter & Topic	Assessments Due	Additional Notice
1	Introduction & Overview Ch 1: Quality Improvement in Modern Business Env't Ch 2: The DMAIC Process	Learning assessment (August 21 – 23)	
2	Ch 3: Modeling Process Quality	Introductory profile, group preference (August 28)	
3	Ch 4: Inferences About Process Quality		Labor Day (September 3)
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

UTC COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

ORAL COMMUNICATION RUBRIC FOR GRADUATE STUDENTS

Name of Student: _____ **Major:** _____ **Date:** _____

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

	1	2	3	4	Score
Organization	Unclear focus, no background information, no outline	Clear focus but no background information, little or no outline	Development is clear with a well- defined outline, but transitions need refinement	Development is clear through use of specific and appropriate examples; transitions are clear and create a succinct and even flow	
Content	Topic is unclear, information appears randomly chosen, poor application of fundamentals	Topic is clear, but supporting information is disconnected and shows poor application of fundamentals	Topic is clear and contains many relevant points and appropriate application of fundamentals, but somewhat unstructured	Exceptional use of material that clearly relates to the focus; abundance of various supported materials	
Presentation Length	Greatly exceeding or falling short of allotted time	Exceeding or falling short of allotted time	Remained close to the allotted time	Presented within the allotted time	
Visual Aids	Poor selection and use of visual aids technology, and not readable images	Appropriate selection and use of visual aids, but use of poorly resolved images	Appropriate selection and use of visual aids, well-focused images	Very good selection and use of visual aids with clearly readable images that complimented talk	
Attention to Audience	No attempt to engage audience	Little attempt to engage audience	Engaged audience and held their attention most of the time	Engaged audience and held their attention throughout with creative articulation, enthusiasm, and clearly focused presentation	
Speaking Skills	Monotone; speaker seemed uninterested in material	Little eye contact; fast speaking rate, little expression, mumbled	Clear articulation of ideas, but some lack of confidence with material	Exceptional confidence with material displayed through poise, clear articulation, eye contact, and enthusiasm	
Comments:				**TOTAL SCORE**	

Name of Reviewer: _____ **Signature of Reviewer:** _____

WRITTEN COMMUNICATION RUBRIC FOR GRADUATE STUDENTS

Name of Student: _____ **Major:** _____ **Date:** _____

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

	1	2	3	4	Score
Drafting	Requires excessive guidance and prompting from teacher. Is unable to write independently.	Requires occasional guidance and prompting from teacher to write independently. Written work is inconsistent.	An independent writer who requires little guidance or prompting from teacher to write. Written work is usually detailed and creative.	Requires no guidance or prompting from teacher to write independently. Written work is creative and detailed. Student enjoys writing.	
Editing	Student often ignores peer and teacher edits, turning in final products with grammatical and spelling errors. Student does not edit his or her own work at all.	Student accepts peer and teacher edits, but does not edit his or her own work.	Student accepts peer and teacher edits. Student usually edits his or her own work, catching accidental grammatical and spelling errors.	Student accepts peer and teacher edits. Student is also exceptionally meticulous about editing his or her own work, catching most grammatical and spelling errors.	
Revision	Student resists the revision process, making few or no changes from first to final draft.	Student makes minor revisions when necessary. Accepts some constructive criticism from teacher.	Student accepts constructive criticism well from peers and teachers and often comes up with creative and appropriate revision ideas of his or her own.	Student makes full use of the revision process, soliciting and accepting constructive criticism from peers and teachers and implementing his or her own ideas for revision.	
Final Draft	Final draft shows little evidence of editing and revision.	Final draft shows some evidence of editing and revision.	Final draft shows clear evidence of editing and revision.	Final draft shows clear evidence of thoughtful editing and revision.	
Attitude	Shows no enthusiasm for or commitment to the writing process.	Shows some enthusiasm for and commitment to the writing process.	Usually shows enthusiasm for and commitment to the writing process.	Shows exceptional enthusiasm for and commitment to the writing process.	
Timing	Student does not submit any written work on time.	Student submits the work on time with minimum changes.	Student submits the work on time with required changes.	Student submits the work on time with required changes and by providing additional writing materials.	
Comments:				**TOTAL**	

Name of Reviewer: _____ **Signature of Reviewer:** _____