Engineering & Technology

Burchan Aydin (Department Head)
Location: AG/ET Building, Room 213-D, 903-886-5174, Fax 903-886-5960
Engineering & Technology Web Site (http://www.tamuc.edu/et/)

Mission: Pursuit of Practical Ingenuity
The framework of the Department of Engineering & Technology, built upon instruction, research, and infusion of real-world experiences, strives to fosters the development of effective problem solver, and innovative problem solvers who create pioneering solutions to global challenges.

The Department of Engineering & Technology offers Bachelor of Science (B.S.) degree programs leading to career opportunities in technical management, supervision, engineering, manufacturing and construction. Majors offered include: Technology Management, Construction Engineering, Electrical Engineering and Industrial Engineering.

Engineering & Technology majors are required to complete the Core Curriculum Requirements and major area requirements. For a course to transfer into an E&T major, a grade of “C” or better must be earned in the course. A grade of “C” or better is required in all E&T major and required support courses. Courses must be repeated if a grade of “C” or better is not earned in the course.

Fast-Track Bachelors + Masters Technology Management (ACTM) (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/engineering-technology/bs-ms-tmgt/)

Construction Engineering (CONE) B.S. (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/engineering-technology/construction-engineering-cone-bs/)

Electrical Engineering (EE) B.S. (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/engineering-technology/electrical_engineering/)

Industrial Engineering (IE) B.S. (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/engineering-technology/industrial-engineering-ie-bs/)

Technology Management (TMGT) B.S. (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/engineering-technology/technology-management-tmgt-bs/)

Applied Arts and Sciences in Technology Management (TEMG) BAAS (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/engineering-technology/applied-arts-and-science-in-technology-management/)

Engineering Mathematics Minor (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/engineering-technology/engineering-mathematics-minor/)

Engineering and Systems Management Minor (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/engineering-technology/engineering-systems-management-minor/)

Technology Management Minor (https://coursecatalog.tamuc.edu/undergrad/colleges-and-departments/college-of-science-and-engineering/engineering-technology/technology-management-minor/)

CONE 221 - Building Construction I
Hours: 3
A study of the construction materials and methods used in commercial building projects. Students will examine the selection, acquisition, and utilization of concrete, steel, masonry and wood in a variety of building projects. The course will include introduction to blueprint reading, quantity takeoff, mechanical and electrical systems of building projects. Prerequisites: ENGR 2303 with a minimum grade of C.

CONE 321 - Construction Estimating
Hours: 3
Study of the principles and application of construction estimating including quantity takeoff, pricing of materials, classification of work, labor, overhead, specifications, bid procedures, and project scheduling. Students will be introduced to computerized estimating and scheduling software. Prerequisites: CONE 221 with a minimum grade of C and ENGR 2308 with a minimum grade of C.

CONE 322 - Construction Planning and Scheduling
Hours: 3
A study of planning and scheduling of time, costs, and other resources for a construction project. Computerized scheduling software will be introduced. Prerequisites: CONE 321 with a minimum grade of C.

CONE 324 - Building Construction II
Hours: 3
This course is designed to equip students with a comprehensive understanding of technology and its practical application in the construction industry. Throughout this course, students will engage in hands-on experiences with Building Information Modeling (BIM) software tools, mastering the creation of 3D models, efficient project management, and effective collaboration among project stakeholders. Students will have the chance to explore the tangible application of BIM in real-world construction projects. Students will demonstrate how these digital technologies enhance both the efficiency and precision of construction projects. Prerequisites: CONE 221 with a minimum grade of C.

CONE 331 - Mechanics of Materials
Hours: 3
Applications of conservation principles and stress/deformation relationships for continuous media to structural members; axially loaded members; thin-walled pressure vessels; torsional and flexural members; shear; moment; deflection of members; combined loadings; stability of columns; nonsymmetrical bending, shear center; indeterminate members; elastic foundations. Prerequisites: CONE 221 with a minimum grade of C.

CONE 332 - Structural Analysis and Design
Hours: 3
Functions of structure, design loads, reactions and force systems; analysis of statically determinate structures including beams, trusses and arches; energy methods of determining deflections of structures; influence lines and criteria for moving loads; analysis of statically indeterminate structures including continuous beams and frames. Prerequisites: CONE 331 with a minimum grade of C.

CONE 341 - Engineering Hydrology & Hydraulics
Hours: 3
Design of water distribution systems and open channels; selection of pumps and turbines; hydraulics of wells; basic engineering hydrology including precipitation, infiltration, runoff, flood routing, fluid flow in pipe, statistical measures and water resources planning. Prerequisites: CONE 331 with a minimum grade of C.

CONE 351 - Surveying for Construction
Hours: 3
Surveying techniques and procedures used in engineering projects. Surveying instruments, topographic maps, building site layout, route surveying, precision, significant figures, errors, and closure. Prerequisites: ENGR 1304 with a minimum grade of C.

CONE 413 - Design and Construction of Steel Structures
Hours: 3
Design and construction of steel structures including tension members, compression members, flexural members, and connections utilizing the building codes. Prerequisites: CONE 414 with a minimum of C.

CONE 414 - Design and Construction of Concrete Structures
Hours: 3
Design and construction of concrete structures including reinforced concrete beams, slabs, columns, walls and footings utilizing the building codes Prerequisites: CONE 332 with a minimum grade of C.

CONE 423 - Contracts & Specifications
Hours: 3
This course will examine the legal and contractual aspects of construction, types of construction contracts, contractual relationships among different parties, construction administration, construction insurance, concepts in value engineering, professional ethics, and construction safety issues. Prerequisites: CONE 322.

CONE 424 - Construction Accounting and Financial Management
Hours: 3
Students will have an integrated overview of finance, costs, revenues, and expenditures at the construction company and project level. Prerequisites: CONE 324 with a minimum grade of C.

CONE 432 - Design and Construction of Foundations
Hours: 3
Determination of civil engineering properties of soil and their behavior, identification, grain size analysis, compaction, permeability, consolidation, and shear strength. Attention is given to foundation system selection, design, and construction methods Prerequisites: CONE 414 with a minimum grade of C.

CONE 433 - Construction Project Controls
Hours: 3
This course is designed to equip students with a comprehensive understanding of technology and its practical application in the construction industry. Throughout this course: 1. Students will engage in hands-on experiences with Building Information Modeling (BIM) software tools, mastering the creation of 3D models, efficient project management, and effective collaboration among project stakeholders. 2. Students will have the chance to explore the tangible application of BIM in real-world construction projects. 3. Students will demonstrate how these digital technologies enhance both the efficiency and precision of construction projects. Prerequisites: CONE 322- Construction Planning and Scheduling with a minimum grade of C.

CONE 441 - Highway and Heavy Construction
Hours: 3
Highway planning, driver characteristics, geometric design, traffic flow and control, highway materials, pavement design, and how highways are constructed, maintained, and upgraded. Students will apply the knowledge of estimating and scheduling to heavy construction projects such as highways, bridges, approaches, pipelines, or related structures. Prerequisites: CONE 322 with a minimum grade of C and CONE 332 with a minimum grade of C.

CONE 470 - Preparation for Construction Engineering Capstone Project
Hours: 3
All phases of the capstone project are developed as a team, including preliminary engineering design process, construction constraints, interaction with clients, identification of engineering problems, developments of proposal, identification of design criteria, cost estimating, planning and scheduling, application of codes and standards, development of alternatives and selection of best alternative. All deliverables are identified. Prerequisites: CONE 322 with a minimum grade of C and CONE 332 with a minimum grade of C.

CONE 471 - Construction Engineering Capstone Project
Hours: 3
Application of team design concepts to the capstone project Prerequisites: CONE 470 with a minimum grade of C.

CONE 489 - Independent Study
Hours: 1-4
Individualized instruction/research at an advance level in a specialized content area under the direction of a faculty member. May be repeated when the topic varies.

CONE 490 - H Honor Thesis
Hours: 3
Honors Thesis. Three semester hours.

CONE 491 - H Ind Honors Reading
Hours: 3
Individual Honors Reading.

EE 200 - Computing for Electrical Engineers
Hours: 3
This course introduces students to the use of computational tools to solve engineering problems. Topics include: problem identification and formulation, computational programming techniques, data transformation and visualization, effective plotting, regression analysis, interpretation of results, team collaboration, and introductory machine learning. Students will solve problems using modern computational tools such as MATLAB, Python, and Excel. Prerequisites: MATH 2413 with min grade C.

EE 210 - Digital Circuits
Hours: 3
This course introduces theory and design of digital logic circuits, including number systems, Boolean algebra, logic gates, combinational and sequential circuit design and analysis, Karnaugh maps, truth tables, logic optimization, arithmetic circuits, flip-flops, counters, memory and storage, synchronous and asynchronous state machines, and introduction to programmable logic. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment. Prerequisites: PHYS 2426 with a minimum grade of C or concurrent enrollment or COSC 1436 with a minimum grade of C.

EE 220 - Circuit Theory I
Hours: 3
This course introduces the theory and principles of DC/AC circuit analysis. Topics include electrical circuit laws, network theorems, operational amplifiers, RLC networks, topology of electrical networks, sinusoidal steady-state analysis, AC power analysis, multiphase circuits, magnetically coupled circuits, transformer, and introduction to frequency domain analysis. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment. Prerequisites: PHYS 2426 with a minimum grade of C. Corequisites: MATH 2320

EE 309 - Circuit Theory II
Hours: 3
This course is the second of two courses that addresses DC and AC circuit analysis. The topics include AC circuit analysis techniques, AC power concepts, polyphase circuits, magnetically coupled circuits, application of Laplace transform in circuit analysis, bode plots, passive filters, and two-port networks. This course includes the use of simulation software to model circuits. Prerequisites: EE 220 with a minimum grade of C.

EE 310 - Digital Systems /Embedded Control
Hours: 3
This course introduces the hardware and software architecture of the AVR Microcontrollers and its applications. It also includes embedded system types, programming the microcontroller in assembly and C, serial and parallel data transfer, interfacing I/O devices. Practical applications using Arduino and other devices will be developed through Lab exercises and course project design. Prerequisites: EE 210 Digital Circuits with a minimum grade of C.

EE 320 - Electronics I
Hours: 3
This course is the first of two courses in the use of electronic devices in analog and digital circuits. The course covers characteristics of semiconductor devices; diodes, bipolar junction transistors (BJT), and field-effect transistors (FET). This course also covers diode applications, AC and DC analysis for BJT, models for electronic devices and circuit, analysis of diode, transistor, and FET amplifier circuits. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment. Prerequisites: EE 220 with a minimum grade of C.

EE 321 - Electronics II
Hours: 3
This course is the second of two courses that cope with electronic devices in analog and digital circuits. The topics include FET biasing and FET amplifiers, frequency response analysis of BJT and FET, and the characteristics and applications of operational amplifiers (op amps). The course also discusses the design features and operation principles of power amplifiers, in addition to selected topics on linear digital integrated circuits as well as feedback and oscillator circuits. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment. Prerequisites: EE 320 with a minimum grade of C.

EE 330 - Continuous Signals and Systems
Hours: 3
This course presents the theoretical and practical aspects of analog communication systems. Includes the signal analysis using Fourier series and Fourier transform; spectral and time domain considerations related analog modulation techniques such as Amplitude Modulation (AM) and Frequency Modulation (FM). AM and FM demodulation, Pulse Code Modulation (PCM), effects of noise on communication system performance, and signal and noise modeling using probabilistic descriptions. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. MATLAB, LABVIEW) and hardware equipment. Prerequisites:EE 309 with a minimum grade of C, and MATH 2320 with a minimum grade of C.

EE 340 - Electromagnetics
Hours: 3
The course presents the principles of electromagnetic (EM) fields and their propagation, power and energy contents, and their properties in guided and unguided structures. It aims to bridge between circuit theory and the EM fields through detailed treatment of guided structure, particularly transmission lines. The course introduces Maxwell's equations for the general case of time-varying and dynamic EM fields. Characterization of electrostatics, magnetostatics and dynamic fields and their associated laws and principles are discussed, and the electric and magnetic boundary conditions are also explained in detail. The course is supported by simulation software (e.g. MATLAB, LABVIEW). Prerequisites: PHYS 2426 with a minimum grade of C, MATH 2320 with a minimum grade of C, MATH 2415 with a minimum grade C, EE 309 with a minimum grade of C.

EE 430 - Discrete Signals & Systems
Hours: 3
This course presents the theoretical and practical aspects of digital communication systems. Advance Pulse Code Modulation(PCM), line coding, matched filter, inter-symbol interference (ISI), equalization, signal space representation and correlation receiver, digital modulation techniques (ASK, FSK, PSK, DPSK, QAM, and M-ary), effects of noise on digital communication system performance, introduction to error correction and detection codes. The material is complemented by Laboratory experiments that address digital communication system design and applications, which will require the use of simulation software tools (e.g. Matlab/Simulink, LabView) and hardware equipment. Prerequisites: EE 330 with a minimum grade of C.

EE 433 - Digital Signal Processing
Hours: 3
This course presents the fundamental concepts and techniques of digital signal processing (DSP). Time domain operations and techniques include difference equations and convolution summation. This course also covers Z transform methods, frequency- domain analysis of discrete-time signals and systems, discrete Fourier transform, and fast Fourier transform. FIR and IIR filter design techniques. This course emphasizes the frequency response of discrete-time systems and its relationship to analog systems. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. MATLAB, LABVIEW) and hardware equipment. Prerequisites: EE 321 with a minimum grade of C, EE 330 with a minimum grade of C.

EE 435 - Control Systems
Hours: 3
This course teaches approaches to analyze and interpret dynamic engineering systems to implement proper feedback control methods that can achieve proper design performance. It covers various topics including transient response analysis and systems stability and damping. It also presents frequency and time domains techniques to analyze and design various dynamic control systems, such as root locus, frequency response analysis, and PID controllers, and state space representation and its applications. The material is complemented by Laboratory experiments that treat control systems for various applications using simulation software tools (e.g. Matlab/Simulink, LabView) and hardware equipment. Prerequisites: EE 321 with a minimum grade of C and EE 330 with a minimum grade of C.

EE 440 - Electric Machinery
Hours: 3
This course studies the design and the performance of electrical machines during the steady state and transients. The topics covered include the operational principles of direct current electrical machines, single phase and three phase circuits, voltage regulation, transformers, motors, and generators. This course also provides an introduction about electric power system. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. MATLAB, LABVIEW) and hardware equipment. Prerequisites: EE 340 with a minimum grade of C, EE 321 Electronics II with a minimum grade of C.

EE 450 - Advanced Digital Signal Processing
Hours: 3
This course covers advanced topics in digital signal processing, multi-rate filter structures, time-varying and adaptive systems, linear prediction and optimal filtering of random signals, power spectrum estimation. The course has associated experiments set, which will require the use of simulation software (e.g. MATLAB, LABVIEW). Prerequisites: EE 433 with a minimum grade of C.

EE 451 - Digital Systems Design
Hours: 3
This course addresses topics on digital systems design, including programmable Logic, data encoding & decoding, architectures, and testing. The topics related to programable logic aim to cover complex programmable logic devices (CPLDs), field programmable gate arrays (FPGAs), designing with FPGAs, with the use of design Flow, tools, and libraries. Encoding and decoding target the topics on clocking for high-speed digital design, stability issues, clock synchronization, and encoding and error detection and correction. Hardware architectures aim to cover topics on parallel vs serial and systolic architectures, and distributed arithmetic, and digital testing deals with modern packaging and Board testing issues. Prerequisites: EE 310 wth a minimum grade of C, EE 330 with a minimum grade of C.

EE 452 - Antenna Theory and Design
Hours: 3
This course presents an advanced material that specifically deals with time-varying electromagnetic (EM) waves and their transmission, propagation, and reflection in dielectric media, conducting media, and guided/unguided structures. The course presents the principles and applications of EM wave radiation and various antenna elements and antenna arrays. The course describes some practical applications of the covered topics, such as satellite systems, target detection, and radar. Prerequisites: EE 340 with a minimum grade of C.

EE 453 - RF Networks
Hours: 3
This course presents topics related to passive and active RF and microwave components and circuits. It includes topics on impedance matching, network theory, S-parameters, and transmission lines with the use of smith chart. The course also discusses passive component operation and design, such as power dividers, couplers, switches, attenuators, phase shifters, microwave high-gain amplifiers (HGAs) and low-noise amplifiers (LNAs). Prerequisites: EE 321 with a minimum grade of C, EE 340 with a minimum grade of C.

EE 454 - Power Electronics
Hours: 3
The course presents the principles of design, analysis and control of solid-state power electronics devices. The covered topics include power computations, RLC transients, power semiconductor devices and switches. The course also addresses DC-DC converter topologies, buck converters, boost and buck/boost converters, and feedback control of DC-DC Converters. Moreover, it discusses voltage mode and current mode control, AC voltage controllers, DC power supplies, AC-DC rectification, PWM rectifiers, fly-back converters, DC-AC single phase inversion, and 3-phase inverters. The material is supported by experiments work using of simulation software (e.g. Matlab/Simulink, PSpice). Prerequisites: EE 321 with a minimum grade of C.

EE 455 - Digital Design with HDL
Hours: 3
The course presents techniques for system design and implementation. It uses hardware description languages, such as VHDL (VHSIC (Very high-speed IC) hardware description language). The course aims to build solid experience on modeling systems with VHDL and to explain its alternatives. It also presents VHDL-AMS (Analog and mixed-signal VHDL) design and analysis of combinational and sequential components. The course also includes topics that deal with target architectures, FPGA synthesis, asynchronous/synchronous state machines and data busses. The course is associated with experiments set using software (e.g. VHDL (VHSIC (very high-speed IC) hardware description language), Verilog HDL, verification: ModelSim (Mentor Graphics), VCS simulator (Synopsys). Prerequisites: EE 310 with a minimum grade of C.

EE 456 - Internship
Hours: 3
The course is designed to develop field experience for Electrical Engineering students. The completion of this program is achieved through internship in industry and other field experience organizations approved by the Electrical Engineering program. The course is structured to help graduating seniors gain practical engineering experience in the real-world environment. Students will practice communication skills, engineering project management, critical thinking, and technical problem-solving methods to execute engineering projects in an industry standard. A technical written project report and final presentation are required at the end of internship. Prerequisites: Department Consent.

EE 470 - Senior Capstone Design Project I
Hours: 3
This course represents the first part of the senior engineering capstone design project. In this course, student will work in groups and will be engaged in a preliminary engineering design process including: design constraints, interaction with clients, identification of engineering problems, development of a design proposal, identification of design criteria, cost estimating, planning, and scheduling. Prerequisites: Senior Classification, EE Majors only. Course must be scheduled in the fall semester prior to the final spring semester before graduation and Instructor's consent.

EE 471 - Senior Capstone Design Project II
Hours: 3
This is the second part of the senior engineering capstone design project. This course requires completing the capstone senior design projects from concept through problem statement, project analysis, final design, prototype, technical report, project demo, and final oral presentation. Students will work in groups and apply the skills and knowledge they have acquired to demonstrate their mastery of the discipline through a successfully working porotype project. Prerequisites: Senior Classification, EE Majors only. Course must be scheduled the final spring semester of graduation and Instructor's consent.

EE 489 - Independent Study
Hours: 1-3
This course aims to give students the opportunity to pursue a specialized topic in their chosen field of study. The course can be in form of directed study, research problems, special problems or special projects. The faculty advisor and students meet to agree on the details of the study plans. After an approved area of study has been selected, weekly meetings with the course adviser are required. A final written report and oral presentation are required at the end of the term. Prerequisites: Departmental approval required.

EE 490 - Honors Thesis
Hours: 3
Individualized instruction/research at an advanced level in a specialized content area under the direction of a faculty member

EE 491 - H Honors Readings
Hours: 3
Individualized instruction/research at an advanced level in a specialized content area under the direction of a faculty member

EE 497 - Special Topics
Hours: 3
This course allows for studying emerging topics in electrical engineering that are not present in the curriculum. Topics of mutual interest to faculty and students can be explored with the approval of the department chairperson. This is an organized course and must contain regular schedule, student course work, and regular classroom meetings. The course may be associated with Laboratory work. It may be repeated when topic varies. Prerequisites: Departmental approval required.

ENGR 1304 - Computer-Aided Design (CAD)
Hours: 3
This is an introductory course in computer-aided drafting/design. Students will be taught basic CAD commands, tools, multi-view drawing and dimensioning techniques.

ENGR 2301 - Statics
Hours: 3
General principles of mechanics; concurrent force systems; statics of particles; equivalent force/moment systems; centroids and center of gravity; equilibrium of rigid bodies; trusses, frames, internal forces in structural members; friction; second moments of areas. Prerequisites: PHYS 2425.

ENGR 2302 - Dynamics
Hours: 3
Kinematics and kinetics of individual particles and systems of particles utilizing Newton’s Laws of Motion, the Principle of Work and Energy, and the Principle of Impulse and Momentum; steady and variable mass flow. Prerequisites: MATH 2414 with a minimum grade of C.

ENGR 2303 - Engineering Mechanics- Statics and Dynamics
Hours: 3
This course will focus on equilibrium of particles and rigid bodies; centroids and center of gravity; internal forces of trusses, frames, and machines; internal forces in structural members; friction; second moment of areas; kinematics and kinetics of individual and systems of particles; principles of work and energy, and impulse and momentum; steady and variable mass flow. Prerequisites: PHYS 2425 with a minimum grade of C.

ENGR 2304 - Computing for Engineers
Hours: 3
This course introduces students to the use of computational tools to solve engineering problems. Topics include: problem identification and formulation, computational programming techniques, data transformation and visualization, effective plotting, regression analysis, interpretation of results, team collaboration, and introductory machine learning. Students will solve problems using modern computational tools such as MATLAB, Python, or Excel. Prerequisites: MATH 2413 with a minimum grade of C.

ENGR 2308 - Engineering Economic Analysis
Hours: 3
Emphasizes the systematic evaluation of the costs and benefits associated with proposed technical projects. The student will be exposed to the concepts of the "time value of money" and the methods of discounted cash flow. Students are prepared to make decisions regarding money as capital within a technological or engineering environment. Prerequisites: ENGR 2304 for TMGT, CONE, and IE majors, EE 200 for EE majors with a minimum grade of C.

ENGR 102 - Introduction to Engineering
Hours: 3
An introduction to engineering with emphasis on development and design processes. Interpretation of product/customer specifications, concept development, engineering drawings, design for prototyping, and manufacturing will be introduced through a hands-on team-based engineering project design.

ENGR 110 - Introduction to Engineering and Technology
Hours: 3
This course provides a solid foundation in fundamental skills needed for freshmen and transfer students to academically succeed and professionally prepare them for challenges within the disciplines of Engineering and Technology Management. The project-based assignments will provide students with opportunities to apply mathematics to solve engineering problems, acquire team working skills, practice written and verbal communication skills, and enhance problem solving and design skills. Early understanding of these skills will assist students throughout their undergraduate experience. Prerequisites: MATH 2312 with a minimum grade of C, or concurrent enrollment.

ENGR 113 - Product Design and Development
Hours: 3
This course includes the study of product development and design processes and methods, including product specifications, concept development, engineering drawings, design for prototyping, and manufacturing.

ENGR 213 - Engineering Probability and Statistics
Hours: 3
This course covers the role of statistics in engineering, probability, discrete and continuous probability distributions, joint probability distributions, random sampling and data description, point estimation, statistical intervals. Prerequisites: MATH 2414 with a minimum grade of C or concurrent enrollment.

ENGR 411 - Engineering Management
Hours: 3
Techniques relating to managing engineering activities; project management with Pert/CPM; engineer's transition into management; engineering managerial functions; productivity assessment/improvement; managing the quality function and communications. Prerequisites: IE 471 with a minimum grade of C, or concurrent enrollment.

ENGR 490 - H Honors Thesis
Hours: 3
Honors Thesis. Three semester hours.

ENGR 491 - H Ind Honors Readings
Hours: 3
Individual Honors Readings. Three semester hours.

IE 305 - Facilities Planning & Management
Hours: 3
Study of production facilities, including location, planning design and management. Emphasis on production systems, machine selection, facility location-allocation, material handling, and storage and warehousing. Prerequisites: IE 312 with a minimum grade of C.

IE 311 - Advanced Engineering Statistics
Hours: 3
This course emphasizes the application of statistical tools to real-world problems. You will learn how to process, analyze and visualize large data sets. The topics include hypothesis tests, simple and multiple linear regression, basic of machine learning via python, and design of experiment. Prerequisites: ENGR 213 with a minimum grade of C.

IE 312 - Industrial Operations Research
Hours: 3
This course focuses on the application of linear programming techniques. Most of the mathematical models presented in the course are normal prescriptive or optimization applications. The course includes discussions of the Simplex method, sensitivity analysis, duality and post optimal analysis. Prerequisites: MATH 2318 with a minimum grade of C.

IE 313 - Industrial Operations Research II
Hours: 3
This course focuses on the application of linear programming techniques. The models included in this course are Transportation, Assignment and Transshipment. The network models (Shortest Path; Maximum-Flow; and Minimum-Cost) are included. The course includes formulating integer programming problems. Prerequisites: IE 312 with a minimum grade of C.

IE 314 - Statistical Quality Control
Hours: 3
A comprehensive coverage of modern quality control techniques to include the design of statistical process control systems, six sigma, lean six sigma, and process improvement. Prerequisites: IE 311 with a minimum grade of C.

IE 316 - Manufacturing Systems Design and Control
Hours: 3
Advanced course emphasizing the analysis and design of job requirements, workplace arrangements, material handling devices/systems and machine controls which improve the human workplace. Students will research and create a system design project. Prerequisites: IE 311 and MATH 2413.

IE 318 - Analysis of Production Systems
Hours: 3
Analytical principles of production systems analysis and control; emphasis placed on demand forecasting; push versus pull production strategies; inventory models; and production planning and scheduling. Prerequisites: IE 311 with a minimum grade of C, IE 312 with a minimum grade of C.

IE 397 - Special Topics
Hours: 3
Special Topics. Three semester hours. Organized class. May be repeated when topic varies.

IE 403 - Human Factors Engineering
Hours: 3
The emphasis of this course is the design of the human-system interface. The principles of body mechanics, work safety, and anthropometry are applied to the human-system design for reduction of human errors and injuries. Prerequisites: ENGR 213 Min Grade C.

IE 407 - Production Systems Operations
Hours: 3
Analytical principles of manufacturing systems design, analysis and control; emphasis placed on stochastic analysis; role of variability and impact on cycle time; push versus pull production strategies including Kanban and constant WIP control; probability, queueing theory, Little's Law, heavy traffic approximation and queueing networks. Prerequisites: IE 316.

IE 409 - Work Design
Hours: 3
Advanced course emphasizing the analysis and design of job requirements, workplace arrangements, human-machine system design processes and principles which improve the human workplace. Students will create a system design project. Prerequisites: IE 318 with a minimum grade of C.

IE 410 - Systems Simulation
Hours: 3
The application of simulation to facilities layout for manufacturing industries, service business models, entertainment and crisis management is emphasized. Areas covered include concepts of discrete event simulation, data collection, simulation modeling, and analysis of simulation outputs. Prerequisites: IE 311 with a minimum grade of C.

IE 431 - Manufacturing Support Systems
Hours: 3
Concepts and principles of automation and automation control, including sensors, actuators, process variable conversion, programmable logic controllers (PLCs), logic controllers, microcontrollers, industrial robotics, NC technology, and flexible manufacturing systems. Prerequisites: Phys. 2426 with a minimum of C.

IE 444 - Systems Engineering
Hours: 3
A study of the systems acquisition life cycle, life cycle cost (LCC) analyses, design for reliability, trade off analyses, design for manufacturability, design for manageability. Prerequisites: Senior classification in Industrial Engineering and instructor's consent.

IE 471 - Planning for Industrial System Design
Hours: 3
This course is a precursor for IE 495. Each student will enroll the following spring in IE 495 and as member of a student team. The objective of the course is for each team to prepare a proposal (technical and management sections) to outline the approach and methodology that the team plans to follow in working with industry sponsors on real-world industrial engineering process improvement activities. The proposed improvement activity will be the systems design project planned for the following spring semester in IE 495 Industrial Systems Design. The proposal prepared during this class is intended to present: the background for the problem, statement and description of the problem, the approach, the methodology and analytical support of the team's plans for the execution of the project. Prerequisites: IE 313 with a minimum grade of C, Senior Classification, IE Majors only, Course must be scheduled in the fall semester prior to the student's IE 495 enrollment in the final spring semester and Instructor's consent.

IE 486 - Service Systems Analysis
Hours: 3
This course focuses on analyses and visualization of engineering issues faced by service industries contrasted against production and manufacturing industries, service business models, development of facility location, technological tools used in serving various business, and metrics to measure quality of services. IE Major. Course scheduled in the final semester of the student's IE Program. Prerequisites: Senior Classification. Corequisites: IE 495.

IE 489 - Independent Study
Hours: 1-3
Independent Study. One to Three semester hours Individualized instruction/research at an advanced level in a specialized content area under the direction of a faculty member. May be repeated when the topic varies.

IE 490 - H HONORS THESIS
Hours: 1-6

IE 491 - Honors Reading
Hours: 3

IE 495 - Industrial Systems Design
Hours: 3
This course is the Industrial Engineering Capstone Design course, covering: flexible manufacturing systems and manufacturing integration; integrated knowledge to be gained from using all required industrial engineering courses in a system design project. Students are able to work with industry sponsors on real-world industrial engineering process improvement activities. Prerequisites: IE 471 with a minimum grade of C; Senior classification in Industrial Engineering and instructor's consent. Corequisites: IE 486.

IE 497 - Special Topics
Hours: 3
Special Topics. Three semester hours. Organized class. May be repeated when topic varies.

TMGT 240 - Quality in Technology Management
Hours: 3
This course is designed to provide the student with tools for quality in technology management, including continuous improvement, quality measurement systems, problem solving, system failure analysis, and corrective actions. Some of the concepts that are addressed are Customer Satisfaction, Process and Quality Standards, and Quality Control Activities. These topics include advanced quality systems such as six sigma, ISO 9001 (manufacturing excellence), change management, regulatory affairs, industry specific quality standards (ISO 13485, ISO / IEC 17025, Food Safety), and Root Cause Analysis.

TMGT 303 - Technical Communications
Hours: 3
This course is a study and application of technical writing documents, letters, manuals and reports. Emphasis is also placed on presentations, team building, employee training, interviewing, business etiquette and professionalism. Prerequisites: Junior standing.

TMGT 311 - Environmental and Safety Management
Hours: 3
The main goal of this course is to study the history and application of OSHA and EPA regulations and regulatory effects on program management. Safety and environmental management and its organizational impact will be emphasized. Hazard assessment, prevention, and control will be other key points of the course. Prerequisites: Junior Standing.

TMGT 335 - Managing Sustainability
Hours: 3
This course is designed to provide the student with an inclusive understanding of the management of three aspects of sustainability: environmental, economic, and social impacts. It will emphasize the methods and techniques of incorporating sustainability factors into any management decision. It is the study of globally accepted green rating systems, green policies, and sustainably built environments. Prerequisites: TMGT 311 with a minimum grade of C.

TMGT 336 - Construction Cost Estimating
Hours: 3
Study of the principles and application of construction estimating including quantity takeoff, pricing of materials, classification of work, labor, overhead, specifications, bid procedures, and project scheduling.

TMGT 340 - Managerial Statistics
Hours: 3
Explores methods of collecting, analyzing and interpreting data for managerial decision making. Includes data presentation, measures of central tendency, dispersion, and skewness; discrete and continuous probability distributions; sampling methods and sampling distributions; and confidence interval estimation of parameters and tests of hypotheses. Prerequisites: TMGT 240 with a minimum grade of C.

TMGT 350 - Principles of Technology Management
Hours: 4
Study of leadership and management methodologies necessary to be successful and effective in contemporary technology intensive organizations. Prerequisites: ENG 1302 with a minimum grade of C.

TMGT 351 - Organizational Behavior
Hours: 3
This course is designed to provide the student with a better understanding of how individuals, teams, and organizations function effectively in technologically advanced and culturally diverse work environments. It will emphasize the role of leaders in organizations, best leadership practices, and future leadership trends and change management. Prerequisites: ENG 1302 with a minimum grade of C.

TMGT 352 - Principles of Cost Engineering
Hours: 3
Cost engineering is concerned with the application of scientific principles and techniques to problems of cost estimating, cost control, business planning and management science, profitability analysis, project management, and planning and scheduling. Prerequisites: ACCT 2301 with a minimum grade of C.

TMGT 358 - Essentials of Project Management
Hours: 3
This course develops a foundation of concepts and solutions that supports the planning, scheduling, controlling, resource allocation, and performance measurement activities required for successful completion of a project. Basic project management tools will be introduced. Prerequisites: Junior Standing.

TMGT 411 - Risk Management
Hours: 3
This course explores the management of risk including environmental, occupational, financial, security, disaster, risk to the corporate image, and other risks. Prevention, mitigation, and transference of risk are presented. Prerequisites: TMGT 311 with a minimum grade of C.

TMGT 439 - Construction Management
Hours: 3
Study of construction operations, project management and project planning. Includes scheduling, rough diagram preparation, calculating costs, presentations, and controlling. Prerequisites: TMGT 352 with a minimum grade of C.

TMGT 444 - Decision Theory
Hours: 3
Decision theory deals with methods for determining the optimal course of action when a number of alternatives are available and their consequences cannot be forecast with certainty. This course will use quantitative methods (models) for problem solving and decision making. Theories and models to be covered include probability theory, utility theory and game theory, linear programming models, nonlinear programming models, and integer programming models. Prerequisites: TMGT 340 or MGT 340 with a minimum of C or better and instructor approval.

TMGT 454 - Contracts & Specifications
Hours: 3
Principles and analysis of construction contracts and specifications. Additional aspects of construction management will be included. Prerequisites: MGT 301 with a minimum grade of C.

TMGT 455 - Project Planning & Scheduling
Hours: 3
Study of the concepts used in planning and scheduling of projects in both industrial and construction applications. Prerequisites: TMGT 352 with a minimum grade of C.

TMGT 456 - Value Chain Control & Management
Hours: 3
Value chain is a high-level management model of how businesses receive raw materials as input, add value to the raw materials through various processes, and sell finished products to customers. Prerequisites: TMGT 350 with a minimum grade of C.

TMGT 457 - Decision Making for Emerging Technologies
Hours: 3
This course will explore current breakthrough technologies and disruptive innovations that have emerged over the past few years. A close examination will be conducted to understand the importance of management strategy in navigating the rapid climate of changing technology to ensure a company's success. Prerequisites: Senior Standing. Instructor approval.

TMGT 458 - Project Management
Hours: 3
The course covers key components of project management including project integration, project scope management, project time and cost management, quality management, human resource considerations, communications, risk management, and procurement management. Corequisites: TMGT 471.

TMGT 471 - Technology Management Capstone Project
Hours: 4
This is the capstone course for the Technology Management Program. It provides the opportunity for students to demonstrate that they have learned the material from the program and can apply it in the real world. It should be taken during students' last semester. It provides students the opportunity to develop a plan to solve a problem dealing with technology management issues today. Prerequisites: BS-TMGT Majors only, senior standing, and final semester.

TMGT 489 - Independent Study
Hours: 1-4
Individualized instruction/research at an advance level in a specialized content area under the direction of a faculty member. May be repeated when the topic varies.

TMGT 497 - Special Topics
Hours: 1-3
Special Topics. One to four semester hours. Organized class. May be repeated when topics vary.