Engineering Technology

Web Site: http://www.odu.edu/engtech (http://www.odu.edu/engtech/)

Vukica Jovanovic, Chair

Old Dominion University has the unique advantage of having both engineering technology and engineering programs. The Engineering Technology Department offers a Bachelor of Science in Engineering Technology degree with majors in Civil Engineering Technology, Electrical Engineering Technology, Manufacturing Engineering Technology, and Mechanical Engineering Technology as well as opportunities for specialization in multiple areas.

The primary goal of the Department of Engineering Technology and its programs is to provide a general yet sufficiently specialized education to equip the student for immediate employment in a variety of engineering and technical fields. In general, engineering technology programs provide an opportunity for students who desire a technical undergraduate education to apply engineering knowledge to solve actual industrial problems. As a result, the engineering technology programs emphasize the practical application of technical knowledge with a strong laboratory program supporting the lecture content of the curricula. For further information, please visit the department website: http://www.odu.edu/engtech (http://www.odu.edu/engtech/).

Mission Statement

The mission of the department is to educate technically savvy and socially responsible applied engineers ready to embrace the challenges of an expanding global economy. The Department of Engineering Technology offers ABET accredited programs in Civil Engineering Technology, Electrical Engineering Technology, and Mechanical Engineering Technology. In addition to offering quality academic programs that are infused with learning-by-doing experiences, the department offers opportunities for internship, field trips, engineering competitions and professional society meetings. All four programs can be completed on the main campus or at any one of ODU's distance learning sites throughout the state and at some sites that are out of state.

The department faculty take pride in their commitment to excellence in teaching, closely coupled with excellence in applied research and strong engagement with industry and community. The talented group of faculty are engineering professionals and possess a wealth of business and industrial experience. The faculty are engaged in applied research projects that are funded by industry and government agencies.

All upper-level courses required for all engineering technology programs are delivered via ODUGlobal. Thus, students with associate degrees may complete degree requirements without attending the main campus.

Computer Requirement

The Frank Batten College of Engineering and Technology requires that all incoming freshmen to the college have a notebook or laptop computer that meets or exceeds the Mobile Monarch Student Notebook Program's recommended models for engineering majors. Students are strongly encouraged to consider purchasing one of the Mobile Monarch Student Notebook Program's notebooks; however, students may bring their own notebook if it meets the specifications.

PLEASE NOTE ** Apple computers (MacBook, iMac, etc.) are NOT compatible with engineering software.

Recommended Specs for Engineering Programs can be found at https://ww1.odu.edu/eng/ess/admitted#tab52=6&done1612907281342 (https://ww1.odu.edu/eng/ess/admitted/#tab52=6&done1612907281342).

Programs

Bachelor of Science in Engineering Technology Programs

- Engineering Technology with a Major in Civil Engineering Technology (BSET) (http://catalog.odu.edu/undergraduate/engineering-technology/engineering-technology/engineering-technology-civil-bset/)
- Engineering Technology with a Major in Electrical Engineering Technology (BSET) (http://catalog.odu.edu/undergraduate/engineering-technology/engineering-technology/engineering-technology-electrical-bset/)
- Engineering Technology with a Major in Manufacturing Engineering Technology (BSET) (http://catalog.odu.edu/undergraduate/engineering-technology/engineering-technology/engineering-technology-manufacturing-bset/)
- Engineering Technology with a Major in Mechanical Engineering Technology (BSET) (http://catalog.odu.edu/undergraduate/engineering-technology/engineering-technology/engineering-technology-mechanical-bset/)

Minor Programs

- Civil Engineering Technology - Construction Minor (http://catalog.odu.edu/undergraduate/engineering-technology/engineering-technology/civil-engineering-technology-construction-minor/)
- Electrical Engineering Technology Minor (http://catalog.odu.edu/undergraduate/engineering-technology/engineering-technology/electrical-engineering-technology-minor/)
- Engineering Solutions for Climate Adaptation and Resilience Minor (http://catalog.odu.edu/undergraduate/engineering-technology/engineering-technology/engineering-solutions-climate-adaptation-resilience-minor/)
- Marine Engineering Minor (http://catalog.odu.edu/undergraduate/engineering-technology/engineering-technology/marine-engineering-minor/)
- Mechanical Engineering Technology Minor (http://catalog.odu.edu/undergraduate/engineering-technology/engineering-technology/mechanical-engineering-technology-minor/)

Courses

Civil Engineering Technology (CET)

CET 120 Civil 2D Computerized Aided Drafting (3 Credit Hours)
This course is computer based drafting, where methods are taught with a major emphasis on practical application using two-dimensional AutoCAD software in the computer lab. This includes the basic principles of Civil Engineer drawings to include but not limited to: dimensioning and tolerances, spot elevations, contours, plan and profile view, section views, details, scaling, measurements. It will introduce students to site plan drawings, mechanical view, structural views, architectural views, roadway plan and profiles, as well as buried infrastructure plan and profiles. Finally, it will be the basis for preparation of a working set of plans, for use in all follow-on CET courses.

CET 200 Statics (3 Credit Hours)
Scalar methods and free body diagrams are employed in the analysis of discrete and distributed force systems and their application to bodies in external equilibrium. Friction, moment of inertia, and center of gravity are also included.
Pre- or corequisite: MATH 211

CET 205 Principles of Surveying (3 Credit Hours)
Basic plane surveying measurements and computations, survey control systems, elementary digital mapping and simple curves, and building construction survey and stakeout. Field exercises using standard surveying instrumentation, traverse and leveling techniques, topographic mapping and curve layout.
Prerequisites: MATH 163 and MET 120 or CET 120

CET 210 Fundamentals of Building Construction (3 Credit Hours)
Introduction to various materials and methods available for design and construction of buildings. Covers application and combination of traditional materials and methods, and recent innovations in construction systems.

CET 220 Strength of Materials (3 Credit Hours)
Mechanical behavior of materials subjected to various external loads. Stress-strain relationships are utilized to design members subjected to shear, axial, bending, and torsional loads. Deformations are predicted and Mohr's circle is introduced.
Prerequisites: MATH 211 and a C or better in CET 200

CET 260 Plan and Specifications (3 Credit Hours)
A detailed study of the form and content of typical plans and specification documents used in the construction industry. The use of computer-aided-drafting (CAD) in assembling a set of plans and specifications.
Prerequisites: CET 120 or MET 120 and CET 210

CET 295 Topics (1-3 Credit Hours)
Study of selected topics.

CET 296 Topics (1-3 Credit Hours)
Study of selected topics.

CET 301 Structural Analysis (3 Credit Hours)
Determination of forces, moments, and deflections in statically determinate and indeterminate beams, frames, and trusses due to various load cases and load combinations. Methods of analysis will include matrix stiffness analysis, moment distribution and other approximate and computer methods.
Prerequisites: CET 220 and MATH 211

CET 325 Introduction to Land Development (3 Credit Hours)
Applications of fundamental site engineering principles, land design principles and permitting issues. A brief historical review of exemplary subdivision, urban designs and their impact on current practice. Site surveying and engineering issues including hydrology, storm water management, site geometry, grading, design of roads, engineering design standards, and computer applications in site engineering are examined. The principles of siting and theories of design for aesthetic and efficient alignment of roads, layout of structures, and subdivision parcels are introduced.
Prerequisites: CET 210

CET 330 Fluid Mechanics (4 Credit Hours)
Elementary mechanics of fluids. Fluid properties; hydrostatics; fluid kinematics; equations of motion; energy equation; momentum principles; flow of liquids and gasses in closed conduits; flow in open channels and/or compressible flow. Laboratory will demonstrate principles from the lecture material. All experiment results will be submitted in a written report format, including presentation and interpretation of experimental data. Use of spreadsheets is required.
Prerequisites: CET 220 and MATH 211

CET 332 Water Resources Engineering (3 Credit Hours)
Hydrologic and Hydraulic principles are utilized in the planning, design, operation and construction of water management projects. The course addresses fundamental Hydrology - the occurrence and movement of surface water including weather and climate; precipitation; evaporation; transpiration; runoff; infiltration; stream flow; hydrograph analysis; erosion; and sedimentation. Additional topics covered will include water distribution, use of water, and sustainability of water as a natural resource.
Prerequisites: CET 330

CET 334 Computer Applications in Hydraulic Engineering (3 Credit Hours)
Application of computer software in solving water resources problems; program development or application of available packages to solve assigned water resources problems. Use and application of commercial software for analysis and design of water distribution networks and gravity sewer collection systems.
Prerequisites: CET 330

CET 335 Fluid Mechanics Laboratory (1 Credit Hour)
A laboratory to demonstrate the verification of fluid equations and principles as well as the characteristics of fluid machinery. All experimental results will be submitted in a report format, including presentation and interpretation of experimental data. Use of spreadsheets is required. This is an online asynchronous class open only to transfer students with credit for the lecture portion of CET 330.
Prerequisites: CET 330

CET 340 Soils and Foundations (3 Credit Hours)
A study of the engineering properties of soil including stress, shear strength, and bearing capacity. Movement of water through soils, consolidation and settlement of structures and the design of shallow and deep foundations are also covered. Use of Excel spreadsheets is a requirement.
Prerequisites: CET 330

CET 341W Soils Testing Laboratory (2 Credit Hours)
Course includes standard methods for inspecting, sampling, testing, and evaluating soils. Students use typical test equipment and perform tests on samples of local soils. A written report is required for each experiment. This is a writing intensive course.
Prerequisites: a grade of C or better in ENGL 211C or ENGL 221C or ENGL 231C
Corequisites: CET 340

CET 345W Materials Testing Laboratory (2 Credit Hours)
Standard methods of inspecting and testing structural materials used in construction are followed. A written report is required for each experiment. This is a writing intensive course.
Prerequisites: grade of C or better in ENGL 211C or ENGL 221C or ENGL 231C
Corequisites: CET 220

CET 355 Sustainable Building Practices (3 Credit Hours)
The course will examine industry trends in sustainable building practices. It explores the green building strategies used in the design and construction of sustainable buildings. The role of site selection, water efficiency, energy, materials and resources, and indoor environmental quality will be explored.
Prerequisites: Junior standing

CET 365 Building Information Modeling (BIM) (3 Credit Hours)
This course is an introduction to building information modeling (BIM) and its implementation in building design and construction. Topics include the fundamentals of information modeling; business benefits of BIM; impacts of BIM on design and construction processes; integrated design process and project delivery; popular software applications and basic modeling techniques; and popular areas and best practices of BIM implementation.
Prerequisites: CET 260

CET 367 Cooperative Education (1-3 Credit Hours)
Available for pass/fail grading only. Student participation for credit based on the academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and Career Management prior to the semester in which the work experience is to take place. (offered fall, spring, summer) (qualifies as a CAP experience)
Prerequisites: Approval by the CET program director and Career Development Services (CDS) in accordance with the policy for granting credit for Cooperative Education programs; a student who needs to add additional credit to maintain full-time status should contact the program director

CET 368 Internship (1-3 Credit Hours)
Available for pass/fail grading only. Academic requirements will be established by the department and will vary with the amount of credit desired. Allows students to gain short duration career-related experience.
Prerequisites: approval by department and Career Development Services

CET 369 Practicum (1-3 Credit Hours)
Available for pass/fail grading only.
Prerequisites: approval by department and Career Development Services

CET 395 Topics (1-3 Credit Hours)
Topics in Civil Engineering Technology.
Prerequisites: permission of the instructor

CET 396 Topics (1-3 Credit Hours)
Topics in Civil Engineering Technology.
Prerequisites: permission of the instructor

CET 400 Computer Applications in Structural Design (3 Credit Hours)
Use and application of commercial software for analysis and design of building and non-building type structures. Determination of compliance with strength, serviceability, and fabrication requirements. Introduction to computer modeling in 2D and 3D, pre and post processors, interpretation of results and development of professionally written reports.
Pre- or corequisite: CET 301

CET 405 Environmental Loads (3 Credit Hours)
Familiarize the student with the analysis of environmental design loads required for the design of building and non-building type structures in the United States. A thorough study of loading categories and load combinations for ASD and LRFD is also covered. Extensive use of the International Building Code (IBC) and the Minimum Design Loads for Building and Other Structures (ASCE 7) is expected.
Prerequisites: CET 301

CET 408 Hydraulic Engineering (3 Credit Hours)
Analysis of hydraulics problems associated with the design of civil engineering structures. Uniform, steady flow in open channels; hydraulic models; design problems for dams; spillways and hydraulic structures; hydraulic machinery and other related topics will be discussed. Use of spreadsheets is required.
Prerequisites: CET 330

CET 410 Reinforced Concrete Design (3 Credit Hours)
Structural analysis and design of reinforced concrete members. Topics include flexural analysis and design of structures, including slabs, beams and columns using strength design procedures.
Prerequisites: Junior standing
Pre- or corequisite: CET 301

CET 415 Design of Structural Systems (3 Credit Hours)
This course focuses on assembly design as opposed to member design as learned in structural design courses. The students are able to work on the overall stability of structures using one or more building materials such as concrete, wood, steel, cold-formed steel, and/or masonry. The use of building codes, standards and specifications is required. The main objective of this class is to adequately prepare the student for the senior design project. The course also offers an introduction to low-rise building design.
Prerequisites: CET 450 or CET 410 or CET 452

CET 420 Hydrology and Drainage (3 Credit Hours)
Hydrologic and hydraulic principles are utilized in the planning, design, operation and construction of water management projects. Topics include elements of stormwater drainage pertaining to hydrology, hydraulics of open channel and pipe flow, stormwater management, and issues pertinent to state stormwater regulations and the Chesapeake Bay Preservation Act.
Prerequisites: CET 330

CET 428 Buried Infrastructure (3 Credit Hours)
This is a capstone design course in the field of water resources. It incorporates pressurized pipe flow, gravity flow, and hydrology into the design of municipal infrastructure for water, sewer and stormwater projects. Topics will also cover rehabilitation and replacement of aging infrastructure in urban and neighborhood settings. Use of spreadsheets is required.
Prerequisites: CET 332 or CET 334 or CET 325

CET 435 Design of Reinforced Concrete Foundations (3 Credit Hours)
Analysis and design of reinforced concrete foundations typically used in buildings and bridges. Topics include loads and loading groups, methods of analysis and design, abutments, and isolated and continuous footings. The class will be focused on the load and resistant factor design method. Use of the ASCE 7, ACI and AASTHO codes is necessary.
Prerequisites: CET 340 and CET 410

CET 440 Contract Documents (3 Credit Hours)
The basic concepts of contracts and the standard contract documents used in construction. Also included is a study of the dispute resolution process in arbitration.
Prerequisites: CET 210

CET 445 Construction Planning and Scheduling (3 Credit Hours)
The basic elements of planning and scheduling building construction projects. All elements of building construction, including the precedence methods of scheduling. Use of computers and planning and scheduling software are emphasized.
Prerequisites: CET 210

CET 450 Structural Steel Design (3 Credit Hours)
Structural analysis and design of steel structures, including beams, girders, columns, composite sections, trusses, rigid frames and connections using the LRFD method. Analysis of statically-determinate cantilever (hungspan) systems also are covered.
Prerequisites: Junior standing
Pre- or corequisite: CET 301

CET 452 Wood Design (3 Credit Hours)
Analysis and design of wooden structural elements of buildings to satisfy design codes. Included are shearwall design and connections as well as beams, columns and other elements.
Pre- or corequisite: CET 301

CET 456 Resilience and Sustainability (3 Credit Hours)
An investigation of emerging construction industry trends in resilience and sustainability. Evaluation of applications for vulnerable, small-scale and rural projects. Quantify increases in project value by incorporating life cycle analysis, planning for continuity of function, and deliberate risk management.
Prerequisites: CET 355

CET 458 Managing the Climate Crisis (3 Credit Hours)
This course provides a structured framework for developing resilience. It focuses on addressing the impacts of the climate crisis like flooding, heat, water, and wildfire through principles, designs, and real-world solutions. This is achieved by examining hard engineering structures, nature-based design, and hybrid solutions to protect communities and create a resilient design future.
Prerequisites: Junior standing

CET 460 Construction Cost Estimating (3 Credit Hours)
Evaluation and analysis of the basic elements of estimating construction costs for buildings. Elements of take off and pricing for Division 1 through Division 6 are covered. Use of computers and estimating software are emphasized.
Prerequisites: CET 210

CET 465 Construction Project Management (3 Credit Hours)
An introduction to the procedures and methods that are used by a contractor during the construction phase of a project. Special emphasis on planning, managing and documenting project activities. Topics include job site layout and control, subcontracting and purchasing and changes and claims/progress payments.
Prerequisites: CET 210

CET 468 Construction Finance (3 Credit Hours)
A study of financial management in construction for civil engineering projects based on conceptual and construction plans. The emphasis of the course is on building construction but equally applicable to other construction type projects. Development of techniques required to effectively monitor the financial aspects of construction projects. This course is practice oriented. Use of spreadsheets is highly recommended.
Prerequisites: Junior Standing

CET 470 Infrastructure, Heavy Highway and Equipment (3 Credit Hours)
Methods and resources used to construct traditional civil infrastructure systems. Equipment utilization.
Prerequisites: CET 205 and CET 210

CET 485 Bridge Design (3 Credit Hours)
Familiarize the student with the analysis and design of simple and continuous span bridge structures utilizing the Load and Resistance Factor Design (LRFD) methodology. Determination of the most common design loads used in bridge design. Introduction to the AASHTO Specification for Structural Bridge Design used in United States.
Prerequisites: CET 410 or CET 450

CET 495 Topics (1-3 Credit Hours)
Topics in civil engineering technology.
Prerequisites: permission of the instructor

CET 496 Topics (1-3 Credit Hours)
Topics in civil engineering technology.
Prerequisites: permission of the instructor

Electrical Engineering (EET)

EET 110 Electrical Circuits I (3 Credit Hours)
Fundamentals of electrical circuits including basic electrical parameters and variables, circuit laws and theorems, mesh analysis, node analysis, Thevenin's and Norton's Theorems, capacitance, inductance, magnetism, and elementary RC and RL transients.
Prerequisites: MATH 162M

EET 120 Logic Circuits and Microprocessors (3 Credit Hours)
An introduction to logic circuits, Boolean algebra, digital interface devices, combinational and sequential logic design, and microprocessor fundamentals. (Offered Fall)

EET 125 Logic and Microprocessor Laboratory (1 Credit Hour)
Team-oriented experiments in basic combinational and sequential logic circuits and an introduction to fundamental microprocessors. (offered fall)
Pre- or corequisite: EET 120

EET 195 Topics (1-3 Credit Hours)
Study of selected topics.

EET 200 Electrical Circuits II (3 Credit Hours)
A continuation of EET 110 with emphasis on steady-state ac circuit analysis and applications. Topics include alternating current and voltage, phasors and complex numbers and their applications in circuit analysis, series and parallel resonance, complex power, and polyphase circuits. (offered fall)
Prerequisites: MATH 163 and a grade of C or better in EET 110

EET 205 Circuits Laboratory (1 Credit Hour)
Electrical laboratory instruction including test equipment, measurements, data analysis, verification of circuit laws, formal report preparation, and circuit construction.
Pre- or corequisite: EET 200

EET 210 Electronic Devices and Circuits (3 Credit Hours)
Semiconductor properties and semiconductor devices including diodes, MOS field-effect transistors, junction field-effect transistors and bipolar junction transistors. The ideal operational amplifier and its applications. FET and BJT biasing, including constant current biasing, and amplifier circuits with emphasis on dc modeling and graphical analysis. Multisim simulation of circuit biasing.
Prerequisites: EET 110

EET 225 Electronics Laboratory (1 Credit Hour)
Practical design, construction, testing and troubleshooting of electronic circuits including single state and multistage amplifiers, power amplifiers, linear integrated circuits, and control devices.
Prerequisites: EET 205
Pre- or corequisite: EET 210

EET 261 Introduction to Microprocessors and Microcontrollers (3 Credit Hours)
Introduction of software and hardware that relates to PIC16FXXX 8 bit microprocessor and microcontroller architectures, interface circuitry, and system designs. Programming in controls of internal and external hardware/peripherals, communication protocols between the logic circuits, peripherals, and MCUs. The ASM programming and design is the focus and C coding will also be introduced.
Prerequisites: EET 120 and EET 125

EET 263 Introduction to Programmable Logic Controllers (PLCs) (3 Credit Hours)
An introduction to the design and programming of automatic machine controls. Topics include controls diagrams, programmable logic controllers, ladder logic programming, interfacing, sensors, transducers, encoders, analog I/O, PID, motor controls, codes and standards, controls programming languages, controls safety, and pneumatics. Lab assignments include ladder logic program simulations.
Prerequisites: EET 120 or EET 350
Pre- or corequisite: EET 210

EET 295 Topics (1-3 Credit Hours)
Study of selected topics.

EET 300 Advanced Circuit Analysis (3 Credit Hours)
General analysis of linear networks using classical methods, Laplace transforms and computer-aided methods. Topics include single element transients, first- and second-order circuits, transfer function analysis, and phasor analysis, Bode plots and waveform analysis. Circuit analysis software is used to supports the analytical methods.
Prerequisites: MATH 211 and a grade of C or better in EET 200

EET 310 Digital Electronics (3 Credit Hours)
First course in an upper division sequence in digital electronics circuits and systems. Topics include a comprehensive treatment of Boolean algebra, computer arithmetic, and applications of digital integrated circuits.
Prerequisites: EET 120, EET 125, EET 205, and EET 210

EET 312 Principles of Communication Systems (4 Credit Hours)
Overview of communications systems including both time and frequency domain analysis. Topics include spectrum analysis, analog modulation methods, digital modulation methods, receiver design, and multiplexing methods. Virtual laboratory projects utilizing simulation software.
Prerequisites: EET 300 and ENGT 305

EET 315 Digital Electronics Laboratory (2 Credit Hours)
Application-oriented experiments and design problems in digital electronics. Multistage prototype construction requiring system design, module interface, and Engineering Design Journaling.
Prerequisites: junior standing
Pre- or corequisite: EET 310

EET 320 Advanced Microprocessors and Microcontrollers (3 Credit Hours)
This is the second course in the digital electronics course sequence. The course will focus on software/hardware design of microprocessors and microcontrollers in C under ARM M4 and PIC microcontrollers, interface circuitry, simulation, and system designs in CAD circuit layout. The focus will be on application of microprocessor-based systems design.
Prerequisites: EET 261 and EET 310

EET 325 Microprocessor Laboratory (2 Credit Hours)
Hands-on implementation of microprocessor and microcontroller systems and peripheral interfacing experiments. Emphasis is placed on the hardware and software design and firmware construction in embedded system applications.
Prerequisites: junior standing
Pre- or corequisite: EET 320

EET 330 Linear Electronics (3 Credit Hours)
General treatment of linear electronic circuits with emphasis on the operational amplifier and integrated circuits derived from it. Topics include various amplifier circuits and converters, integrators and differentiators, comparators, waveform generators, active filters, A/D and D/A converters, and regulators. Design of circuits to meet specifications. Circuit analysis software is used to validate some of the designs.
Prerequisites: EET 210 and EET 300

EET 335 Linear Electronics Laboratory (2 Credit Hours)
Design testing, and evaluation of 'linear' electronic circuits and subsystems with primary emphasis on circuit components and modules. Measurement techniques, instrumentation and error analysis. Simulation of circuit designs using Multisim including transient response and frequency response.
Prerequisites: junior standing
Pre- or corequisite: EET 330

EET 340 Transmission Networks (3 Credit Hours)
Transmission line theory including both transients and steady-state conditions. Smith chart and its application to RF design. Introduction to electric and magnetic fields and plane wave propagation. Circuit analysis software is used to support the analytical methods.
Prerequisites: EET 300

EET 350 Fundamentals of Electrical Technology (3 Credit Hours)
A comprehensive course in electrical engineering technology for nonmajors. Major topics are basic electricity (AC and DC), circuit analysis, linear electronics and digital electronics. Not open to electrical engineering technology majors except as a substitute for EET 110 in special cases.
Prerequisites: junior standing
Pre- or corequisite: MATH 211

EET 355 Electrical Laboratory (1 Credit Hour)
Selected electrical laboratory topics for nonmajors including basic measurements, instrumentation, operational amplifiers, digital circuits, and rotating machines. Not open to electrical engineering technology majors.
Prerequisites: junior standing
Pre- or corequisite: EET 350

EET 360 Electrical Power and Machinery (3 Credit Hours)
A study of synchronous and asynchronous AC machinery, DC machinery, power distribution systems,and instrumentation.
Prerequisites: EET 200 or EET 350

EET 365W Electrical Power and Machinery Laboratory (2 Credit Hours)
A laboratory course dealing with electrical power and machinery as covered in EET 360. Formal written reports will be required. This is a writing intensive course.
Prerequisites: A grade of C or better in ENGL 211C or ENGL 221C or ENGL 231C; EET 205 or EET 355
Pre- or corequisite: EET 360

EET 366 Electrical Power and Machinery Laboratory (1 Credit Hour)
A laboratory course dealing with electrical power and machinery as covered in EET 360. Students taking this lab should not take EET 365W.
Prerequisites: EET 205 or EET 355
Pre- or corequisite: EET 360

EET 367 Cooperative Education (1-3 Credit Hours)
Available for pass/fail grading only. Student participation for credit based on the academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and Career Development Services prior to the semester in which the work experience is to take place.
Prerequisites: approval by the department and Career Development Services in accordance with the policy for granting credit for Cooperative Education programs

EET 368 Internship (1-3 Credit Hours)
Available for pass/fail grading only. Academic requirements will be established by the department and will vary with the amount of credit desired. Allows students to gain short duration career-related experience.
Prerequisites: approval by department and Career Development Services

EET 369 Practicum (1-3 Credit Hours)
Available for pass/fail grading only.
Prerequisites: approval by department and Career Development Services

EET 370 Energy and The Environment (3 Credit Hours)
A study of existing and new energy production methods, energy as a purchased/traded commodity, physics of energy, positive and negative implications for the environment, economics of energy alternatives, and resulting human/social impacts.
Prerequisites: PHYS 101N or PHYS 111N or PHYS 226N or PHYS 231N

EET 373 Instrumentation (3 Credit Hours)
Fundamental concepts of electro-mechanical devices used in mechatronics and automation control systems. The working principles, calibration, interfacing methods and control loops of analog and digital instrumentation devices in a process control system. The instrumentation devices, including sensors, actuators, signal conditioning circuits and data acquisition boards, will be used in class projects as basic feedback control blocks in practical simulation and PLC based mechatronics systems. The simulation projects will use PLC hardware, MATLAB and/or LabView software.
Prerequisites: EET 210 and EET 363 or EET 263, or MET 370

EET 395 Topics (1-3 Credit Hours)
Study of selected topics.
Prerequisites: junior standing

EET 396 Topics (1-3 Credit Hours)
Study of selected topics.
Prerequisites: junior standing

EET 400 CAD Electronics (3 Credit Hours)
An upper-division study of the fundamentals of electronic schematic capture, circuit simulation, and printed circuit board design using microcomputers. Schematic symbols, simulation models, and pcb modules are developed by the students.
Prerequisites: EET 310, EET 320, and EET 325

EET 405 Data Communications and Computer Networks (3 Credit Hours)
The course provides an overview of the local area networks (LANs), wide-area networks (WANs), and backbone technologies. It combines the fundamental concepts of data communications and networking with practical applications and emphasizes the OSI reference model and its relationship to traditional and next-generation LAN/WAN technologies, as well as general topics such as network topology, network interface, client/server hardware, bridges and routers. Hands-on activities using Wireshark are included.
Prerequisites: ENGT 305

EET 410 Communication Principles (3 Credit Hours)
Fourier series and transforms, spectral analysis, signal transmission, analog modulation and detection methods, sampling theorem, pulse and digital modulation methods, and time-division and frequency-division multiplexing.
Prerequisites: EET 300 or EET 350

EET 412 Wireless Communication Systems (3 Credit Hours)
Topics include digital encoding techniques, signal-to-noise comparisons of different analog and digital modulation methods, link analysis, basic data transmission, cellular networks, wireless standards, basic computer networks framing and protocols, and satellite communication. System level simulations for determining subsystem design requirements and overall performance.
Prerequisites: ENGT 305

EET 420 Advanced Logic Design (3 Credit Hours)
Advanced digital logic design and circuit reduction. Topics include lattice structure, symmetry recognition and simplification, threshold logic, design-for-testing techniques, shortest path test planning, adaptive testing, and fuzzy logic. Computer assignments include design simulation and testing.
Prerequisites: EET 310

EET 430 Advanced Motion Control Systems (3 Credit Hours)
A study of modern control devices and applications including electrical, mechanical and pneumatic types. This course is a study of modern electro-mechanical devices and advanced PLCs as applied to modern automation process control systems. The course covers motion control mathematical modeling, design using advanced PLCs and motion control PLC module cards, closed loop control theory and simulations. The emphasis is on understanding the underlying principles that support the building blocks of industrial process control systems.
Prerequisites: ENGT 305, EET 360, and EET 373

EET 440 High Frequency and Microwave Technology (3 Credit Hours)
Methods for generating, transmitting, and detecting signals in the VHF, UHF, and microwave frequency ranges. Laboratory will emphasize high frequency and microwave measurements including bridges, slotted lines, spectrum analyzers and reflectometers.
Prerequisites: EET 340

EET 460 Modern Communication Systems (3 Credit Hours)
Overview of the principles of satellite communications, television systems, fiber optics, antennas and other relevant topics.
Prerequisites: EET 410

EET 470 Microcontrollers/Embedded-Based Designs (3 Credit Hours)
Advanced embedded system designs. Topics focus in ADC, DAC, EEPROM External Memories, temperature sensor, digital RF wireless communications, communications in synchronous and asynchronous serial forms of SCI, SPI, & I2C, and parallel communication in system integration and design. The 32 bit ARM M4 in C code designs will be used in the course.
Prerequisites: EET 310, EET 320, and EET 325

EET 483 Introduction to Smart Grids (3 Credit Hours)
The course introduces the fundamental principles and techniques in smart grids, with focus on information and communication technologies (ICT) deployed to modernize the electric energy infrastructure. It provides an overview on: the smart grid and its main components; smart devices at transmission, distribution and customer level; distributed energy resources (DER) and emerging technologies; customer systems, including demand response, home energy management and smart appliances; communications technologies and standards/protocols for the smart grid; and smart distribution and customer system projects from real-world smart grid projects.
Prerequisites: EET 360 and ENGT 305

EET 485 Electrical Power Systems (3 Credit Hours)
Fundamentals of electrical power transmission and distribution systems. Transformer operation/application, balanced/unbalanced loads, power factor correction, per-unit system system applications, fault calculations, power quality, over-current protection, relay construction/application, lighting system design, grounding, and introduction to the National Electric Code.
Prerequisites: EET 360 and ENGT 305

EET 490 Computer-Aided Circuit Simulation (3 Credit Hours)
Advanced treatment of computer-aided analysis software such as Multisim and MATLAB and the applications to electronic circuit analysis and design. Topics include non-linear models, distortion analysis, spectral analysis, and Monte Carlo techniques.
Prerequisites: EET 300, EET 330, EET 335, and EET 340

EET 495 Topics in Electrical Engineering Technology (1-3 Credit Hours)
Study of selected topics.
Prerequisites: junior standing

EET 496 Topics in Electrical Engineering Technology (1-3 Credit Hours)
Study of selected topics.
Prerequisites: junior standing

Engineering Technology (ENGT)

ENGT 111 Engineering Technology Information Literacy/Research (2 Credit Hours)
Fundamental information literacy and research as applied to engineering technology. Course includes where and how to efficiently locate and critically evaluate technical information. Proper use of technical information and the associated ethical and legal issues will be examined.
Prerequisites: ENGN 110

ENGT 305 Advanced Technical Analysis (3 Credit Hours)
Analytical and computational methods to support upper-division engineering technology courses. Topics include linear algebra, ordinary differential equations of engineering systems, elements of vector analysis, introductory statistical concepts, and software usage/development. MATLAB is used throughout the course to support all the topics. Presentation of various topics is adjusted for CET, EET or MET programs.
Prerequisites: a grade of C or better in MATH 211

ENGT 434 Introduction to Senior Project (1 Credit Hour)
This course must be taken in the semester prior to the Senior Project course. A collection of career-related topics pertaining to engineering technology. Topics include engineering codes and standards, engineering ethics, technical report writing, job search and resume writing techniques, patents and property rights, and professional engineering licensure. The course concludes with the selection of the student's project topic for the subsequent Senior Project course.
Prerequisites: ENGT 305

ENGT 435W Senior Design Project (3 Credit Hours)
A capstone course utilizing upper-level coursework involving independent or group design projects under the direction of a sponsoring faculty member. Projects may involve analytical and/or experimental results. Formal written and oral reports will be required. This is a writing intensive course.
Prerequisites: ENGT 434; senior standing or faculty approval; grade of C or better in ENGL 211C or ENGL 221C or ENGL 231C

Mechanical Engineering Technology (MET)

MET 120 Computer Aided Drafting (3 Credit Hours)
Computer based drafting methods are taught with a major emphasis on 'Hands On' practice using 2-D AutoCAD software in the computer lab, along with the various methods of editing, manipulation, visualization and presentation of technical drawings. This course includes the basic principles of engineering drawing/hand sketching, dimensioning and tolerancing.

MET 200 Manufacturing Processes and Methods (3 Credit Hours)
Application and characteristics, both physical and chemical, of the materials most commonly used in industry as well as procedures and processes used in converting raw materials into a finished product.

MET 210 Statics (3 Credit Hours)
Scalar methods and free body diagrams are employed in the analysis of discrete and distributed force systems and their application to bodies in external equilibrium. Friction, moment of inertia, and center of gravity are also included.
Prerequisites: PHYS 111N
Pre- or corequisite: MATH 211

MET 220 Strength of Materials (3 Credit Hours)
Mechanical behavior of materials subjected to various external loads. Stress-strain relationships are utilized to design members subjected to shear, axial, bending, and torsional loads. Deformations are predicted and Mohr's circle is introduced.
Prerequisites: MET 210 or CET 200

MET 225 Strength of Materials Laboratory (1 Credit Hour)
A laboratory course dealing with the standard methods of inspecting and testing materials used in engineering applications with emphasis on laboratory reports, including presentation and interpretation of experimental data.
Pre- or corequisite: MET 220

MET 230 Engineering Graphics and Computer Solid Modeling (3 Credit Hours)
Graphical communication for engineers studies the concept of 3D parametric modeling and its application in industry. In this course students will learn the fundamentals of sketching, basics of surface design, assembly modeling, and dynamic modeling of mechanisms using industry standard parametric modeling software. Emphasis on developing the skills needed for engineering design.

MET 295 Topics (1-3 Credit Hours)
Study of selected topics.

MET 300 Thermodynamics (3 Credit Hours)
The basic laws of thermodynamics, properties of fluids, heat, and work and their applications in processes and cycles and an introduction to conduction heat transfer.
Prerequisites: CHEM 121N, MATH 211, and PHYS 111N or PHYS 231N

MET 305 Fundamentals of Mechanics (3 Credit Hours)
Selected topics in statics and strength of materials are applied to mechanical engineering technology. Coverage includes force systems, equilibrium, friction, and stress-strain relationships and their application to the mechanical behavior of materials.
Prerequisites: PHYS 111N and MATH 211

MET 310 Dynamics (3 Credit Hours)
A fundamental treatment of coplanar and three-dimensional kinematics and kinetics of particles and rigid bodies, including relative motion, mass moment of inertia, Newton's laws, work and energy and impulse and momentum.
Prerequisites: MATH 211, and MET 210 or CET 200

MET 320 Design of Machine Elements (3 Credit Hours)
Practical analyses of fundamental machine elements such as shafts, springs, and screws. Fundamental principles required for the correct design of the separate elements which compose the machine with attention given to problems of synthesis and the interrelationships of the design of elements within the sub-assembly. Topics include stress analysis of screws, belts, clutches, brakes, chains and thin and thick cylinders, and lubrication and bearings
Prerequisites: MATH 211, and a grade of C or better in MET 220 or CET 220

MET 330 Fluid Mechanics (3 Credit Hours)
The study of fluid statics and dynamics, including momentum, energy, Bernoulli's equation, laminar and turbulent fluid flow and friction in pipes, fluid machinery, and open-channel flow.
Prerequisites: MET 310

MET 335 Fluid Mechanics Laboratory (1 Credit Hour)
A laboratory course dealing with the verification of fluid equations and principles and the characteristics of fluid machinery with emphasis on presentation and interpretation of experimental data.
Prerequisites: Junior standing
Pre- or corequisite: MET 330 or CET 330

MET 350 Thermal Applications (3 Credit Hours)
A study of the applications of thermodynamics. Topics include the basic steam and gas turbine power cycles, internal combustion engines, introduction to refrigeration systems, gas mixtures, and psychrometrics applied to air conditioning processes.
Prerequisites: MET 300 with a grade of C or better

MET 367 Cooperative Education (1-3 Credit Hours)
May be repeated for credit. Available for pass/fail grading only. Student participation for credit based on the academic relevance of the work experience, criteria, and evaluative procedures as formally determined by the department and the Career Development Services program prior to the semester in which the work experience is to take place. (offered fall, spring, summer)
Prerequisites: approval by the department and Career Development Services in accordance with the policy for granting credit for Cooperative Education programs

MET 368 Internship (1-3 Credit Hours)
Available for pass/fail grading only. Academic requirements will be established by the department and will vary with the amount of credit desired. Allows students to gain short duration career-related experience.
Prerequisites: approval by department and Career Development Services

MET 369 Practicum (1-3 Credit Hours)
Available for pass/fail grading only.
Prerequisites: approval by department and Career Development Services

MET 370 Automation and Controls (3 Credit Hours)
A study of the design and analysis of feedback control system. Includes the fundamentals of programmable controllers as well as practical applications of interfacing mechanical, electrical, pneumatic and hydraulic feedback control circuits. Computer simulation software is used to model system responses.
Prerequisites: MATH 211 and either EET 350 or EET 360
Corequisites: MET 386

MET 386 Automation and Controls Laboratory (1 Credit Hour)
Laboratory and computer simulation of control systems including programmable controllers as well as practical applications of interfacing mechanical, electrical and pneumatic control systems.
Prerequisites: MATH 211 and either EET 350 or EET 360
Corequisites: MET 370

MET 387 Power and Energy Laboratory (2 Credit Hours)
Experiments dealing with applied thermodynamics, mechanical power and energy systems with emphasis on laboratory report writing, including presentation and interpretation of experimental data.
Prerequisites: MET 350, and MET 335 or MET 335W

MET 395 Topics (1-3 Credit Hours)
Study of selected topics.
Prerequisites: permission of the instructor

MET 396 Topics (1-3 Credit Hours)
Study of selected topics.
Prerequisites: permission of the instructor

MET 400 Computer Numerical Control in Production (3 Credit Hours)
Principles of computer numerical control consistent with most recently developed standards, industry practices, and CAD/CAM systems including such topics as types of CNC machines, CNC milling, CNC turning and CNC electro-discharge machinery. A significant portion of the course includes programming in multiple axes.
Prerequisites: ENGT 305

MET 405 Introduction To Welding Technologies (3 Credit Hours)
An introduction to conventional and non-conventional welding processes. This course is intended to provide the student with a basic understanding of the various welding processes, welding terminology, joints, symbols, welding defects, equipment. Topics covered include welding processes, heat and fluid flow, structure of metals, solidification phenomena, phase transformations, residual stresses, and nondestructive examination techniques. Real life examples will be used to illustrate the fundamental concepts of the course. The student will also be introduced to career opportunities in the welding field. Lab time will be used to enforce lecture topics when needed.
Prerequisites: MET 200 and ENGT 305

MET 406 Additive Manufacturing (3 Credit Hours)
This course provides an overview of various additive manufacturing (AM) processes. Topics include fundamentals of polymer, composite, and metal AM processes, process parameters, AM software, AM cost, and AM's industrial potential such as prototyping, tooling, production customization, spare parts, art, design, architecture and construction.
Prerequisites: ENGT 305

MET 410 Advanced Manufacturing Processes (3 Credit Hours)
A course in nontraditional manufacturing processes including ultrasonic machining, abrasive jet machining, waterjet cutting, electromechanical machining, electrical discharge machining, plasma arc machining and chemical milling. Semester project is required. (qualifies as a CAP experience)
Prerequisites: ENGT 305

MET 415 Introduction to Robotics (3 Credit Hours)
An introductory course in robotics dealing with the history and development of robots, mechanical components and control systems, actuators, robot programming and utilization. Included are laboratory experiments in robot motion and programming.
Prerequisites: ENGT 305

MET 420 Design for Manufacturing (3 Credit Hours)
Principles of design for manufacturing, materials and process selection for design, design for assembly, design for production and case studies. Also includes impact of product design, design for maintenance, recyclability, disassembly, quality and robustness. Semester project requires redesign of an existing product for manufacturing.
Prerequisites: ENGT 305

MET 426 Introduction to Mechatronics (3 Credit Hours)
A study of the mechatronics concepts and their application on actual problems encountered in engineering practice. Includes the basics of electromechanical systems, electrical circuits, solid-state devices, digital circuits and motors, all of which are fundamental to understanding mechatronic systems.
Prerequisites: ENGT 305

MET 427 Mechatronic System Design (3 Credit Hours)
A study of the integrated modeling and optimal design of a physical system, which includes sensors, actuators, electronic components, and its embedded digital control system. Includes simultaneous optimal design practice with respect to the realization of the design specifications related to different engineering domains.
Prerequisites: ENGT 305

MET 430 Mechanical Subsystem Design (3 Credit Hours)
Fundamental principles required for the correct design of the separate elements which compose the machine with attention given to problems of synthesis and the interrelationships of the design of elements within the sub-assembly. Topics include stress analysis of screws, belts, clutches, brakes, chains and thin and thick cylinders, and lubrication and bearings.
Prerequisites: MET 320

MET 431 Modeling and Simulation of Mechatronic Systems (3 Credit Hours)
The course provides foundations, principles, methods, and tools for modeling and simulation of electro-mechanical components and systems using appropriate modeling techniques. The course is focused on the multi-body dynamics systems, fluid, hydraulic, and electrical systems.
Prerequisites: ENGT 305

MET 440 Heat Transfer (3 Credit Hours)
A study of conduction, convection and radiation heat transfer and heat exchangers. Emphasis is on applications and problem solving using current techniques, and modern correlations.
Prerequisites: MET 300

MET 445 Computer Integrated Manufacturing (3 Credit Hours)
Principles of computer integrated manufacturing, system integration, architecture and data base development. Topics include part design specifications, process engineering, fixed automation and process planning.
Prerequisites: ENGT 305

MET 450 Energy Systems (3 Credit Hours)
A study of the application of thermodynamics to power plants, engines, compressors, turbines, and associated systems. A detailed study is made of fossil fuel power plants with an introductory study of nuclear power and other energy conversion systems.
Prerequisites: MET 350

MET 455 Lean Engineering (3 Credit Hours)
This course looks at the history of lean and six sigma philosophies, their principles and implementation methodologies for creating a world class enterprise. Topics in Lean include five s, value stream mapping, cellular manufacturing, pull system, performance metrics, Lean supplier network, Lean product development and Lean implementation models. Semester research report is a course requirement. Class activities may involve physical simulation of production environment.
Prerequisites: ENGT 305

MET 460 Refrigeration and Air Conditioning (3 Credit Hours)
The design and application of refrigeration and air conditioning systems. Studies are made of compressors, condensers, evaporators, psychometric processes, load calculations and air distribution systems. High performance vapor compression systems, absorption systems and other cycles are analyzed.
Prerequisites: MET 330 and MET 350

MET 465 Geometric Dimensioning and Tolerancing (3 Credit Hours)
Methods and rules of dimensioning and tolerancing, calculation of fits, and geometrical tolerances using ANSI-Y14.5M, tolerances of form, orientation, and profile, including flatness, straightness, circularity, cylindricity, angularity, etc. Student work consists of designing and detailing various product drawings.
Prerequisites: ENGT 305

MET 471 Nuclear Systems I (3 Credit Hours)
Reactor physics principles as applied to the design and operation of various types of commercial nuclear power reactors. Topics include sources of radiation and interaction with matter, neutron interactions, diffusion theory, and reactor kinetics.
Prerequisites: ENGT 305

MET 472 Nuclear Systems II (3 Credit Hours)
Complete study of the nuclear fuel cycle, from mining through fabrication, fuel management in an operating commercial power reactor, spent fuel management, and fuel reprocessing, with emphasis on chemical engineering considerations.
Prerequisites: ENGT 305

MET 475 Marine Engineering I (3 Credit Hours)
This course includes: fundamental principles of naval architecture including nomenclature, geometry, stability, hydrostatics, structures, and motions; ship design processes; and a basic introduction to shipboard systems such as HVAC, refrigeration, power generation, propulsion, hydraulics, electronics, cargo handling systems, seawater systems, freshwater systems, and fuel, lube and other oil systems.
Prerequisites: MET 330 and MET 350

MET 476 Marine Engineering II (3 Credit Hours)
This course builds upon MET 475 and provides a more in-depth look on how the marine shipbuilding industry is using various software including SIEMENS PLM, 3D CAD modeling and new technologies like laser scanners and augmented reality to reshape the future of shipbuilding, maintenance, and repair processes. Focus will be based on model-based learning and creating a 'digital thread' of information. Students will practice what they learn on shipbuilding concepts using commercial software that is widely used across automotive, aerospace, and marine industries.
Prerequisites: MET 475

MET 480 High Performance Piston Engines (3 Credit Hours)
A study of the fundamental principles and performance characteristics of spark ignition and diesel internal combustion engines. Overview of engine types and their operation, engine design and operating parameters; ideal and semi-empirical models of engine cycles; combustion, fluid flow and thermal considerations in engine design and performance. Laboratory evaluation of engine performance using flow and dynamometer systems. (cross-listed with MAE 477/MAE 577)
Prerequisites: MET 350 or MAE 312

MET 485 Maintenance Engineering (3 Credit Hours)
This course looks at maintenance systems: predictive, preventative and corrective; large scale maintenance systems, principles of reliability engineering, maritime logistics; planning for maintenance and repair, using and ordering spare parts, technical manuals, system specifications, and shipyard operations.
Prerequisites: ENGT 305

MET 495 Topics in Mechanical Engineering Technology (1-3 Credit Hours)
Study of selected topics.
Prerequisites: permission of the instructor

MET 496 Topics in Mechanical Engineering Technology (1-3 Credit Hours)
Study of selected topics.
Prerequisites: permission of the instructor