MATERIALS, MECHATRONICS AND MANUFACTURING ENGINEERING

The School of Materials, Mechatronics and Manufacturing Engineering (MMME) houses four programs: Materials Science and Engineering, Mechatronics and Robotics, Mechanical Engineering Technology, and Electrical Engineering Technology. In each program, we focus on rigorous preparation of students for practical application of science, mathematics and engineering principles to produce superior professionals for industry and academia.

Materials Science and Engineering (MSE)

Materials Science and Engineering is a graduate-only program focused on the close connection between structure, processing and property relationship inherent in ceramics, metals, polymers, electronic materials and composites. Most other fields of engineering eventually experience materials limitations such as high-temperature strength in engines, corrosion resistance in structures, vehicles and energy exploration infrastructure, miniaturization of electronics and photonics devices, biocompatibility, strength and corrosion resistance of medical implants, reliability of advanced composites for aerospace structures, etc. Materials scientists and engineers use a knowledge of physics, chemistry and mathematics to both understand molecular structure and how processing affects this structure to impact macroscopic performance. MSE students receive an education focused on foundational sciences of thermodynamics, kinetics, characterization and processing. The field of materials science and engineering is expanding into a period of unprecedented intellectual challenges, opportunities and growth. Products created using materials science and engineering research contribute to the economic strength and security of not only the state, but also the country.

MSE is located at OSU-Tulsa campus at the Helmerich Research Center (HRC), a premier facility in the historic Greenwood district. The HRC is home to electron microscopy, x-ray diffraction, destructive and non-destructive evaluation tools, spectroscopy and thermal analysis tools, a class-100 clean room, and other world-class facilities for materials fabrication and processing.

MSE Program Educational Objectives

The MSE program features both research-intensive and course-intensive paths for graduate degrees. In either path, students study advanced thermodynamics of materials, kinetic processes in materials, advanced materials processing, and materials characterization as core courses. Students typically select specialty elective courses from MSE, Chemistry, Physics, Mechanical and Aerospace Engineering, Civil Engineering, Chemical Engineering and Electrical and Computer Engineering to round out their curriculum. Students holding Bachelor of Science degrees in any of these fields can succeed in MSE. Graduates of the MSE program find employment throughout industry, in government labs and in academia. A hallmark of either the MS or PhD graduate is the publication of peer-reviewed academic articles related to their research. Likewise, during the course of study, students attend national and international conferences to present their work to other materials scientists and engineers.

MSE Degrees

Master of Science: Two options exist to receive an MS degree: (1) a 30 credit hour, thesis-based program where the student conducts research and submits a thesis for examination, and (2) a 32 credit hour, non-thesis-based program (MEN) where the students complete a creative project and submit a report for examination.

Doctor of Philosophy: The PhD is a research-intensive program consisting of 42-60 credit hours beyond the MS degree where the candidate is expected to formulate an original research proposal, conduct research and write an authoritative dissertation to be submitted for examination.

Mechatronics and Robotics (MERO) Engineering

Mechatronics and Robotics is an integrated engineering program comprised of mechanical engineering, electrical/electronic engineering, control systems, and computer science principles. MERO systems are pervasive throughout our modern society (e.g, advanced manufacturing, transportation, healthcare, automation, service robots, military and police services, etc.) with demand for qualified engineers growing at a rapid pace. MERO is an excellent choice for students with an aptitude toward mechanical, electrical and computer engineering who like to build smart systems.

The MERO undergraduate curriculum emphasizes application of mathematics, science and engineering principles to solve practical problems. A hallmark of the program is significant laboratory experience led by expert faculty in: mechatronics, industrial robots, Programmable logic controller (PLC), DC/AC circuits, fluid power, materials, basic instrumentation, 3D printing, computer-aided design, manufacturing, and engineering (CAD/CAM/CAE). The latest computer software is provided and supported for the courses that MERO students take. Where appropriate, laboratories with modern computer data acquisition systems and on-screen displays are available.

Senior capstone design integrates the knowledge and skills learned during this course of study. MERO graduates are prepared to enter the workforce either as employees of major companies or small businesses, entrepreneurs, or to continue to pursue graduate studies. Multiple MERO major courses are popular among engineering undergraduate and graduate students from other disciplines who want to augment their resume for their job search or improve the impact of thesis/dissertation research.

In addition to the required mechatronics and robotics courses, students are provided with a solid foundation in calculus, physics, linear algebra, differential equations, statistics, chemistry, and computer science.

MERO Degrees

The MERO program offers Bachelor of Science in Engineering Technology (BSET) and Master of Science degrees. Additionally, Minors can be obtained by students in the Electrical Engineering Technology and Mechanical Engineering Technology programs.

MERO Program Educational Objectives

MERO at Oklahoma State University focuses on preparing students for a dynamic, rapidly growing workforce. OSU MERO graduates should be able to:

1. Integrate new technologies and methods into their workplace to maximize value to their employer.

2. Employ the latest design, analysis and simulation tools in the mechatronics and robotics discipline.
3. Work independently and collaboratively with professionalism and high ethical standards.
4. Communicate effectively and professionally across all mediums, from written reports to electronic communications.
5. Be a life-long learner through participation and membership in professional organizations, a continuation of professional/graduate studies, and/or self-study.

MERO Student Outcomes
Students graduating from the MERO program are expected to achieve the following:

1. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
2. an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
3. an ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments, and an ability to identify and use appropriate technical literature;
4. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
5. an ability to function effectively as a member as well as a leader on technical teams.

MERO Accreditation
The Mechatronics and Robotics Engineering Technology program is applying for accreditation by the Engineering Technology Accreditation Commission of ABET (www.abet.org (http://www.abet.org/)) in 2026.

Mechanical Engineering Technology (MET)
The Mechanical Engineering Technology (MET) program prepares students for practical, hands-on engineering careers in fields such as mechanical design, manufacturing, automation, fluid power, materials, and thermal systems. Students receive extensive laboratory training in areas including mechatronics, fluid mechanics, thermal science, instrumentation, CAD/CAM/CAE, and 3D printing—using modern, industry-relevant tools under the guidance of expert faculty.

Backed by rigorous classroom instruction, the MET curriculum equips students with strong foundations in mathematics, physics, chemistry, and computer programming, while building applied skills in mechanical engineering principles. Students also gain essential experience in communication, ethics, and teamwork, ensuring they are well-rounded professionals ready for the workplace. Our ABET-accredited MET program encourages the Fundamentals of Engineering (FE) exam before graduation and Professional Engineer (PE) licensure – credentials that support success in engineering careers across a wide range of roles, including field engineer, project manager and entrepreneur.

Students earn a Bachelor of Science in Engineering Technology with a major in Mechanical Engineering Technology. Options include a minor in Mechatronics or Entrepreneurship, and a senior capstone experience that features industry-sponsored, team-based design projects integrating skills acquired throughout the program.

MET Educational Objectives
A few years after graduation, OSU MET graduates will:

- Seek Professional Engineer (PE) licensure as their career assumes greater responsibility and leadership roles.
- Apply the latest tools and methods in engineering and manufacturing design.
- Integrate new technologies and innovations to add value in their organizations.
- Work effectively in collaborative, interdisciplinary team settings.
- Demonstrate professionalism, ethics, and personal integrity in the workplace.
- Engage in life-long learning through professional societies, graduate studies, and independent development.

MET Student Outcomes
Graduates of the program will have:

1. An ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems.
2. An ability to design systems, components, or processes that meet specified needs in mechanical engineering contexts.
3. Proficiency in written, oral, and graphical communication in technical and non-technical environments, and the ability to use relevant technical literature.
4. An ability to conduct standard tests and experiments, analyze data, and use results to improve processes.
5. An ability to function effectively as a team member or leader on technical teams.

MET Career Relevance and Industry Demand
Graduates of the MET program are prepared for immediate contribution in a wide variety of industries. These include:

- Manufacturing (e.g., aerospace, automotive, industrial machinery)
- Energy (e.g., oil & gas, power generation)
- Engineering services (e.g., HVAC, design firms, transportation)

Graduates possess both the technical depth and applied skills to design, analyze, test, and implement mechanical systems and processes with minimal additional training.

MET Degree
Students earn a Bachelor of Science in Engineering Technology (BSET) with a major in Mechanical Engineering Technology. Program options include a Computer emphasis or a minor in Mechatronics and Robotics (MERO).

MET Accreditation
The Mechanical Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET (www.abet.org (http://www.abet.org/)).

Electrical Engineering Technology (EET)
The Electrical Engineering Technology (EET) program prepares students for practical engineering careers in electronics control, power systems, communications, and computation. Our ABET-accredited program emphasizes hands-on learning, with laboratory-intensive coursework guided by expert faculty using modern industrial tools. Rigorous classroom instruction complements this experience by reinforcing fundamental concepts in mathematics, science, and engineering.

The program encourages students to take the Fundamentals of Engineering (FE) exam before graduation and pursue Professional Engineer (PE) licensure, supporting diverse career paths as field engineers, project managers, or entrepreneurs.

EET Program Educational Objectives

A few years after graduation, OSU EET graduates will:

- Stay current with evolving industry standards through continuing education or graduate studies and apply this knowledge to their professional practice.
- Demonstrate professionalism and ethical standards through both independent and collaborative work.
- Show continuous career improvement, evidenced by assumption of greater responsibility or leadership, promotion, participation in continuing education or graduate studies, or transition into other technical or professional careers.

EET Program Outcomes

Graduates of the program will have:

(1) An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline;

(2) An ability to design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline;

(3) An ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;

(4) An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and

(5) An ability to function effectively as a member as well as a leader on technical teams.

EET Career Relevance and Industry Demand

EET graduates are equipped to enter a wide array of dynamic and growing fields within electrical engineering and applied technology. Demand remains strong for professionals skilled in both electrical and electronic system design and application. The Computer option equips graduates for careers in computer hardware and software engineering, aligning with rising demand in automation, robotics, and artificial intelligence.

EET Degree

Students earn a Bachelor of Science in Engineering Technology (BSET) with a major in Electrical Engineering Technology. Program options include a Computer emphasis or a minor in Mechatronics and Robotics (MERO).

EET Accreditation

The Electrical Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org (http://www.abet.org/).

Courses

EET 1003 Introduction to Microcomputer Programming
Prerequisites: Consent of instructor.
Description: Programming a microcomputer using a spreadsheet and in BASIC. Application of algorithms to solve defined problems and an introduction to the numerical limitations of small machines. Previously offered as ECT 1003.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 1101 Fundamentals of DC Circuits Lab
Prerequisites: Consent of instructor.
Description: Elementary principles of dc electricity laboratory for Non-EET students who have taken a dc circuits course without a lab component. This is the same curriculum and lab experience that students would experience taking EET 1114. May not be used for degree credit with EET 1134 or EET 1104.
Credit hours: 1
Contact hours: Lab: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lab
Department/School: Engineering Technology

EET 1104 Fundamentals of Electricity
Prerequisites: Concurrent enrollment in MATH 2123 or MATH 2144 or Consent of Instructor.
Description: Elementary principles of electricity covering basic electric units. Ohm's law, Kirchoff's law, circuit solutions, network solutions, magnetism, inductance and capacitance. Previously offered as ECT 1104. May not be used for degree credit with EET 1134 or EET 1101.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 1134 Fundamentals of DC Circuits
Prerequisites: Concurrent enrollment in MATH 2123 or MATH 2144 or consent of instructor.
Description: Elementary principles of dc electricity laboratory for Non-EET students covering basic electrical units, Ohm's Law, Kirchoff's Law, circuit solutions, network solutions, magnetism, inductance and capacitance. May be substituted for EET 1104 and grade of "B" or better and consent of the department. May not be used for degree credit with EET 1101.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 1201 Fundamentals of AC Circuits Lab
Prerequisites: "C" or better in EET 1104 OR "C" or better in EET 1134 or consent of instructor.
Description: Elementary principles of ac electricity laboratory for Non-EET students who have taken an ac circuits course without a lab component. This is the same curriculum and lab experience that students would experience taking EET 1214. May not be used for degree credit with EET 1214 or EET 1244.
Credit hours: 1
Contact hours: Lab: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lab
Department/School: Engineering Technology

EET 1214 Fundamentals of AC Circuits
Prerequisites: ("C" or better in EET 1104 OR "C" or better in EET 1134) AND ("C" or better in MATH 2123 OR "C" or better in MATH 2144) or consent of instructor.
Description: Elementary principles of ac electricity laboratory for Non-EET students covering basic electrical units, The use of network theorems and phasors, coupled circuits, resonance, filters and power will be studied. May be substituted for EET 1244 with grade of "B" or better and consent of the department. May not be used for degree credit with EET 1201.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 1244 Circuit Analysis I
Prerequisites: ("C" or better in EET 1104 OR "B" or better in EET 1134) AND ("C" or better in MATH 2123 OR "C" or better in MATH 2144) OR consent of instructor.
Description: Analysis of AC electric circuits. The use of network theorems and phasors, coupled circuits, resonance, filters, and power. Course previously offered as ECT 1244. May not be used for degree credit with EET 1214 or EET 1201.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 2303 Technical Programming
Prerequisites: Consent of instructor.
Description: Introduction to machine programming using industrial standard languages, emphasis on problems from science and technology. Course previously offered as ECT 2303.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 2544 Pulse and Digital Techniques
Prerequisites: "C" or better in EET 1104 or "B" or better in EET 1134 OR ("C" or better in ENSC 2613 and ENSC 2411A) OR equivalent. Prerequisites may be taken concurrently.
Description: Electronic circuits used in digital control and computation. Pulse generation, Boolean algebra and logic circuits. Course previously offered as ECT 2544.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 2 Contact: 5
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 2633 Solid State Devices and Circuits I
Prerequisites: ("C" or better in EET 1244 OR "B" or better in EET 1214 OR ("C" or better in both ENSC 2613 AND ENSC 2411)) AND ("C" or better in MATH 2123 OR MATH 2144).
Description: Diodes, Circuit protection, wave shaping, rectifiers, load switching, and power supplies. Transistors and Op amps and their applications. Course previously offered as ECT 2635 and EET 2635.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 2643 Solid State Devices and Circuits II
Prerequisites: EET 2633.
Description: A continuation of EET 2633. Transistors and their applications - amplifiers. Op-amp circuits, comparators, instrument amplifiers, and filters and their analysis.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 3005 Electronics Analysis I
Prerequisites: EET 1244 and EET 2544 and EET 2635.
Description: Extensive use of mathematics in analyzing discrete, linear device, linear systems and non-linear circuits. Development of the analytic skills necessary for upper-division work. The use of basic calculus in circuit analysis. Must obtain a "C" or better before admission to other 3000 level EET courses. Intended for transfer and returning students. Enrollment by adviser consent.
Credit hours: 5
Contact hours: Lecture: 5 Contact: 5
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3104 Elements of Electricity and Electronics
Prerequisites: MATH 1513.
Description: Essentials of electricity, controls, and electronics for non-majors. No credit for EET majors. Course previously offered as ECT 3104.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 3113 Circuit Analysis II
Prerequisites: (EET 1244 with a grade of "C" or better OR EET 1214 with a grade of "B" or better AND EET 2635 OR EET 2633 with a grade of "C" or better AND MATH 2133 with a grade of "C" or better OR MATH 2153 with a grade of "C" or better) or (ENSC 2613 and ENSC 2411 with "C" or better).
Description: Application of elementary switching functions and LaPlace transforms to electronic circuit analysis. Circuit analysis in the S-plane, transfer functions and the application of circuit analysis software. Course previously offered as ECT 3113.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3123 Project Design and Fabrication
Prerequisites: ("C" or better in EET 2544 AND ("C" or better in EET 2635 OR "C" or better in EET 2633)) OR ("C" or better in ENSC 2613 and ENSC 2411 AND (a "C" or better in EET 2635 OR EET 2633)) OR Instructor Approval.
Description: Methods of designing, analyzing and fabricating electronic circuits using standard software packages. Heat transfer characteristics and problem solutions are included. Course previously offered as ECT 3124 and EET 3124.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3253 Microprocessors I
Prerequisites: EET 2544.
Description: An introduction to microcontrollers and their uses in embedded applications. Topics include system architecture, assembly language, structured programming, memory systems, user I/O, timers, peripherals, etc. Course previously offered as ECT 3254 and EET 3254.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3263 Microprocessors II
Prerequisites: EET 2303 with a grade of "C" or better and ((EET 3254 or EET 3253) with a grade of "C" or better).
Description: A continuation of EET 3253. Programming and interfacing of microcontrollers in embedded application, including interrupts, EEPROM, serial programming, interfacing, power management, algorithms, stepper motor control. Course previously offered as ECT 3264 and EET 3264.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3303 Python Programming for Technology and Engineering
Prerequisites: MATH 2123 or MATH 2144 plus previous programming experience in any language.
Description: The Python programming language including syntax, collections, modules, object-oriented programming, functions, and graphical user interfaces with emphasis on applications in technology and engineering.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3354 Communication and Signal Processing
Prerequisites: "C" or better in (EET 2635 or EET 2643) and "C" or better in EET 3423.
Description: Bandpass signaling principles and circuits. The Fourier transform; AM, SSB, FM, and PM signaling; binary modulated bandpass signaling (FSK and PSK); superheterodyne receiver; phase locked loop (PLL); modulators and mixers; frequency multiplication; special purpose IC's. Course previously offered as ECT 3354.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 3363 Data Acquisition
Prerequisites: "C" or better in EET 2544 AND "C" or better in EET 2635 OR EET 2633.
Description: Methods used to convert physical variables to digital signals and vice versa. Signal conditioning, digital-to-analog converters, analog-to-digital converters, sample-and-hold circuits, sensors, and transducers. The use of computers in data acquisition and signal processing. Course previously offered as ECT 3363.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 3423 Applied Analysis for Technology
Prerequisites: MATH 2133 with a grade of "C" or better OR MATH 2153 with a grade of "C" or better.
Description: Applications of elements of matrix algebra, ordinary differential equations, Fourier series, and infinite series to problems in engineering technology. Previously offered as GENT 3123.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3523 Advanced Logic Circuits
Prerequisites: EET 2544 with a grade of "C" or better.
Description: Computer-based design, simulation and implementation of digital/mixed-signal systems using programmable logic, field programmable gate arrays, ASICs and system-on-chip technology. Previously offered as EET 3524.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3533 Introduction to Telecommunications
Prerequisites: "C" or better in EET 2544 AND "C" or better in EET 2635 OR EET 2633.
Description: Introductory course to the field of telecommunications. Study of the various technologies and how the application of these technologies work together to form functioning systems and networks.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 3713 Introduction to Electric Power Technology I
Prerequisites: ("C" or better in EET 1244 OR "B" or better in EET 1214 AND ("C" or better in MATH 2133)) OR ("C" or better in ENSC 2613 AND ENSC 2411).
Description: Physical principles of electromagnetic and electromechanical energy conversion devices and their application to conventional transformers and rotating machines.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3723 Introduction to Electric Power Technology II
Prerequisites: "C" or better in EET 3713.
Description: Physical principles of electromagnetic and electromechanical energy conversion devices and their application to conventional transformers and rotating machines.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 3803 Fundamentals of Mechatronics
Prerequisites: Grade of “C” or better in EET 2635 OR Grade of "C" or better in EET 2633.
Description: Fundamentals of mechatronic systems and components. Different modelling approaches used for mechatronics systems, sensors and actuators, data acquisition and interfacing, signal conditioning, and PLC’s. Previously offered as GENT 3503. Same course as MET 3803.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 4050 Advanced Electronic Problems
Prerequisites: Junior standing and consent of head of department.
Description: Junior standing and consent of head of department. Special problems in the electronic area. Course previously offered as ECT 4050. Offered for variable credit, 1-4 credit hours, maximum of 4 credit hours.
Credit hours: 1-4
Contact hours: Contact: 1-4 Other: 1-4
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Engineering Technology

EET 4314 Elements of Control
Prerequisites: "C" or better in EET 3113 AND "C" or better in EET 3363 AND "C" or better in EET 3423.
Description: Principles of analog and digital control, with emphasis on the analysis of feedback control systems in their various conceptual configurations. Application of feedback control theory to the analysis and design of present day circuits and systems. Use of circuit analysis software. Course previously offered as ECT 4314.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 4323 Applied Artificial Intelligence
Prerequisites: "C" or better in EET 3303 AND "C" or better in EET 4813 AND ("C" or better in STAT 4033 OR "C" or better in STAT 4033).
Description: The course will follow a project based learning approach to introduce students with the theoretical and implantation of artificial intelligence algorithms. Topics include supervised learning, unsupervised learning, and deep reinforcement learning.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 4363 Digital Signal Processing
Prerequisites: "C" or better in EET 3354 AND "C" or better in EET 3363.
Description: Introduction to Digital Signal Process. Theoretical development of Fourier transforms, IIR and FIR filters. Significant Design and programming projects.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

EET 4514 Advanced Telecommunication Topics
Prerequisites: "C" or better in EET 3533.
Description: Study of data transmission techniques between digital electronic devices.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 2 Contact: 5
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 4654 Microwave Techniques
Prerequisites: "C" or better in EET 2635 OR EET 2633 AND "C" or better in EET 3354.
Description: Study of topics pertaining to VHF behavior of circuits and systems. Transmission line theory: wave equations, SWR, impedance calculations and transformations, and lossy lines. Extensive use of the Smith chart to solve transmission line problems. Introduction to Maxwell's equations, with emphasis on steady state. Wave propagation in rectangular waveguides. Introduction to antennas. Modeling of transistors at VHF, UHF, and microwave frequencies. Design and analysis of transistor amplifiers at VHF using y and s parameters. Designing LC impedance matching networks. Previously offered as ECT 4654.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 4803 Mechatronic System Design
Prerequisites: Grade of "C" or better in EET 3423 and EET 3803 (can be concurrent enrollment in EET 3423 with instructor approval).
Description: Modelling of mechanical, electrical, and hydraulic components. Feedback control systems, electro-hydraulic drives, electrical drives, and microcontroller programming. Previously offered as GENT 4503. Same course as MET 4803.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 4833 Industrial Project Design I
Prerequisites: ("C" or better in EET 3123 or EET 3124 AND ("C" or better in EET 3363 OR concurrently enrolled in EET 3363 with instructor approval)) OR ("C" or better in EET 3363 AND 10 credit hours of upper-division EET courses).
Description: Course mirrors the design process in industry. Topics covered are design team formation, identify objectives, define design specifications, write specifications, create a state of work and Gantt chart, create a project budget, perform a preliminary design review, design prototype. Previously offered as EET 4832 and ECT 4832.
Credit hours: 3
Contact hours: Lecture: 1 Lab: 4 Contact: 5
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 4843 Industrial Project Design II
Prerequisites: "C" or better in EET 4833 OR a "C" or better in ENGR 4403 OR ENGR 4404.
Description: Student continues in the project steps of Change Board Review, Critical Design Review, developing & writing test specs., product fabrication and testing, formal technical report submission and outcomes assessment exam. May be substituted with ENGR 4403 OR ENGR 4404.
Credit hours: 3
Contact hours: Lecture: 1 Lab: 4 Contact: 5
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

EET 4903 Mechatronics of Autonomous Systems
Prerequisites: "C" or better in EET 3803 OR "C" or better in MET 3803.
Description: The course will follow a project based learning approach to introduce students with the mechatronics of autonomous systems.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MERO 3373 Programmable Logic Controller Fundamentals
Prerequisites: "C" or better in (EET 2544 or MERO 2544).
Description: The course will introduce students with fundamentals of programming logic controllers, sensors and actuaors interfacing and control using Ladder logic programming. Previously offered as EET 3373.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 4213 Industrial Robots
Prerequisites: ("C" or better in ENSC 2123 or MET 3003) and (MATH 3263 or EET 3423).
Description: This is an introductory course on robotics. The course introduces technology students to the dynamics and kinematics of industrial robots.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MERO 4833 Senior Design
Prerequisites: "C" or better in EET 2633 and (EET 3803 or MET 3803), and MET 4003.
Description: The course introduces students to the industrial design process in the area of mechatronics and robotics. The students will work in teams to engage in the design and development of industrial projects.
Credit hours: 3
Contact hours: Lab: 6 Contact: 6
Levels: Undergraduate
Schedule types: Lab
Department/School: Engineering Technology

MERO 4843 Senior Design II
Prerequisites: "C" or better in MERO 4833.
Description: This course is the second semester of the Senior Design Course. The students will be introduced to the industrial design process in the area of mechatronics and robotics.
Credit hours: 3
Contact hours: Lab: 6 Contact: 6
Levels: Undergraduate
Schedule types: Lab
Department/School: Engineering Technology

MERO 5000 Thesis Research
Prerequisites: Consent of instructor.
Description: Methods used in research and thesis writing. Same course as FSEP 5000. Offered for variable credit, 1-6 credit hours, maximum of 18 credit hours.
Credit hours: 1-6
Contact hours: Contact: 1-6 Other: 1-6
Levels: Graduate
Schedule types: Independent Study
Department/School: Engineering Technology

MERO 5060 Emerging Topics in Engineering Technology
Prerequisites: Consent of instructor.
Description: Advanced and emerging topics normally not included in existing MSET program. Repeat credit may be earned with different course subtitles assigned. Same course as FSEP 5060. Offered for fixed credit, 3 credit hours, maximum of 6 credit hours.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5070 Directed Studies
Prerequisites: Consent of instructor.
Description: Individual report topics in processes, equipment, experiments, literature search, theory, computer use or combinations or these. Offered for variable credit, 2-4 credit hours, maximum of 4 credit hours. Same as FSEP 5990.
Credit hours: 2-4
Contact hours: Contact: 2-4 Other: 2-4
Levels: Graduate
Schedule types: Independent Study
Department/School: Engineering Technology

MERO 5113 Mechatronic Systems I
Prerequisites: Consent of instructor.
Description: Applications of mechatronics, basic building blocks of mechatronics systems, electronic components, mechanical components, interface between electronic and mechanical components, and considerations of mechatronics system design.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5123 Mechatronic Systems II
Prerequisites: MERO 5113 or equivalent.
Description: Modeling of mechanical, electrical, and hydraulic components and robotic manipulators. Mechatronic control systems design, electro-hydraulic drives, electrical drives, robotic manipulator and intelligent control design.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5133 Mechatronic System Hardware and Software Integration
Prerequisites: MERO 5113.
Description: This course offers a comprehensive foundation for computer-based analysis of signals, digital and analog communication to support mechatronic application and troubleshooting. Various computing tools for mechatronic systems development such as MATLAB, LABVIEW, and ROS, will be introduced with a focus on software and hardware integration.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5213 Introduction to Robot Dynamics and Kinematics
Prerequisites: MERO 5113.
Description: This is an introductory course on robotics. The course introduces technology students with the modeling of robotics manulators. Dynamics and kinematics of industrial robots. Sensing and actuation systems used in the industry.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5303 Feedback Control Systems for Mechatronic Systems
Prerequisites: Graduate standing or instructor permission.
Description: This course introduces mechatronic system modeling, feedback control, time and frequency domain analysis.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5313 Linear Control Systems for Mechatronics
Prerequisites: MERO 5113.
Description: The course is an application specific course. Applications of feedback control in mechatronics, mathematical models of mechatronics systems and components, time-domain analysis, and stability, and state-variable models of feedback systems.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5323 Intelligent Control of Mechatronic Systems
Prerequisites: MERO 5123.
Description: The course introduces students with applications machine intelligence for control of mechatronic systems. Topics covered are neural network control, fuzzy logic control, and other evolutionary control approaches in mechatronics. The course will also introduce machine vision and image processing for mechatronic applications.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5333 Learning-Based Control for Mechatronics and Robotics
Prerequisites: Graduate standing or instructor permission.
Description: The goal of this course is to give the students an introduction to a variety of intelligent control techniques and their applications in mechatronics and robotics systems.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5413 Robotic Underwater Vehicles
Prerequisites: MERO 5213 or consent of instructor.
Description: Analyze the current design of a robotic underwater vehicle and contribute a substantial design improvement.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5423 Engineering Acoustics
Prerequisites: Graduate standing or consent of instructor.
Description: A first course in engineering acoustics dealing with the nature of sound. A mathematical basis for the analysis of sound is progressively developed beginning with first principles.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5433 Industrial Noise Control
Prerequisites: MERO 5423 or MAE 5083.
Description: Design and analysis of industrial noise creation and the methods of attenuation.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5513 Electrohydraulics
Prerequisites: Graduate standing, department permission required or consent of instructor.
Description: Proportional electrohydraulic control valves, servo valves, pressure transducers, position sensors, motion control of hydraulic cylinders, synchronization of two cylinders, and control of press circuits.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MERO 5523 Electropneumatics
Prerequisites: Graduate standing, department permission required or consent of instructor.
Description: Electronic components for pneumatic systems, sensor switches, ladder logic diagram, programmable logic controller, and sequence control.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MERO 5613 Smart Manufacturing for Mechatronics
Description: The course introduces the basic concepts, applications, and current advancements of SMART manufacturing in process industries. This course also shows overview of new technologies, such as Industry 4.0, Industrial Internet, manufacturing based on cyber-physical system (CPS), cloud computing, Internet of Things (IoT), big data analytics, artificial intelligence (AI), and digital twins, etc. Digital twin (DT) is introduced as a pragmatic way for the cyber-physical fusion. It helps to develop a smarter manufacturing system with higher efficiency and reliability.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5633 Multiphysics Computational Modeling and Simulation
Prerequisites: Graduate standing or consent of instructor.
Description: The course will introduce the basic concepts of computation through modeling and simulation that are increasingly being used by designers, architects, planners, and engineers to shorten design cycles, innovate new products, and evaluate designs and simulate the impacts of alternative approaches. Students will use COMSOL® Multiphysics, a commercially available finite-element modeling software, to explore a range of programming and modeling concepts while acquiring those skills.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5713 Advanced CAD for Electro-Mechanical Systems
Description: Advanced computer-aided design methodologies and processes for mechatronic system. Design methodologies on electronic, mechanical components, and whole system will be taught using state-of-the-art technologies and modules in CAD system.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5723 Mechanism Design with CAD
Prerequisites: Consent of instructor.
Description: Mechanism design of robotic and mechatronic components and systems. Kinematic and kinetic studies using analysis module in a CAD program.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MERO 5733 Advanced Vibration for Electro-Mechanical Systems
Prerequisites: Consent of instructor.
Description: Analysis, modeling and control of electro-mechanical systems vibrations with an emphasis on practical applications. Mechanical system design methods for noise and vibration mitigation.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 1121 Technical Graphics
Prerequisites: A grade of "C" or better in ENGR 1332 or ENGR 1322.
Description: Visualization of 3-D objects, sketching, manual drafting of engineering drawings to ANSI standards, interpreting typical industrial drawings.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 1123 Technical Drawing and Basic CAD
Description: Sketching, manual drafting and CAD generation of engineering drawings to ANSI standards. Interpreting typical industrial drawings. Students with two years high school or one year practical ANSI drafting/CAD may substitute an advanced course in mechanical engineering technology with consent of their advisers. Previously offered as GENT 1153.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 2103 Industrial Materials
Prerequisites: CHEM 1314 or CHEM 1215 or CHEM 1414.
Description: A survey of the properties, characteristics and applications of metals, polymers, ceramics and other industrial materials. Terminology, concepts and principles involved in material selection, specification and processing. Laboratory activities include data collection and report generation, determination of material properties, and evaluation of material characteristics. Previously offered as GENT 1103.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 2223 Geometric Dimensioning and Tolerancing with Computer-Aided Design
Prerequisites: A grade of "C" or better in (GENT 1153 or MET 1123) or a grade of "C" or better in (ENGR 1332 or equivalent) and MET 1121 (can be concurrent enrollment in MET 1121).
Description: Theory and application of Geometric Dimensioning and Tolerancing (GD&T) technique. Creation and analysis of tolerances for manufacturing with advanced computer-aided design (CAD) and engineering drawings.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 2313 Fundamentals of Hydraulic Fluid Power
Prerequisites: A grade of "C" or better in ENSC 2113 or GENT 2323.
Description: Basic fluid power concepts. Standard hydraulic symbols, component design and application, fluid power system considerations, design, and operation. Previously offered as MPT 2313.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 3003 Dynamics
Prerequisites: A grade of "C" or better in GENT 2323 or ENSC 2113.
Description: Plane motion of particles and rigid bodies. Force-acceleration, work-energy, and impulse-momentum principles. Graphical analysis, mechanisms and vibrations.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 3113 Basic Instrumentation
Prerequisites: A grade of "C" or better in MATH 2123 or MATH 2144, and GENT 3323 or ENSC 2143, and ENGR 2421.
Description: Data analysis. Theory, operational characteristics and application of transducers for measurement of strain, force, velocity, acceleration, displacement, time, frequency, temperature, pressure. Previously offered as MPT 3114.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 3313 Applied Fluid Mechanics
Prerequisites: A grade of "C" or better in (MATH 2123 or MATH 2144), (PHYS 1114 or PHYS 2014), and (GENT 2323 or ENSC 2113).
Description: Practical analysis of fluid systems including static forces, the Bernoulli and general energy equations, laminar and turbulent flows, measurements of flow and pressure, lift and drag, pumps, and fans. Previously offered as MPT 3313.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 3343 Metallurgy and Polymers
Prerequisites: A grade of "C" or better in (CHEM 1215 or CHEM 1314 or CHEM 1414 or CHEM 1515).
Description: Provides an overview of common ferrous and nonferrous metals, metal crystal structures, grain development in metal, heat treating practices, and how these aspects impact a material's characteristics. Polymer properties, an introduction to thermoplastics and thermosets, physical and mechanical properties, polymer structure and arrangement, manufacturing methods and common additives. Previously offered as MFGT 3343.
Credit hours: 3
Contact hours: Lecture: 3 Lab: 0 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 3433 Basic Thermodynamics
Prerequisites: A grade of "C" or better in (MATH 2123 or MATH 2144) and (PHYS 1114 or PHYS 2014).
Description: Basic scientific principles of energy and the behavior of substances as related to engines and systems. Gas laws, vapor cycles, and power cycles. Previously offered as MPT 3433 and GENT 3433.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 3453 Heat Transfer
Prerequisites: A grade of "C" or better in (MATH 2144 or MATH 2123 and (PHYS 2014 or PHYS 1114).
Description: Conduction, convection, radiation, condensation, and boiling heat transfer. Heat exchangers. Prediction of heat transfer rates. Retardation and enhancement of heat transfer. Course previously offered as MPT 4433 and GENT 4433.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 3543 Manufacturing Processes
Prerequisites: Grade of "C" or better in (MET 1123 or ENG 1332) and (MET 3343 or ENSC 3313).
Description: Manufacturing processes used to transform new materials including metals and non-metals into finished goods. Traditional and nontraditional manufacturing processes. Introduction to CAD/CAM. Basic process selection. Meteorology and measurement fundamentals. Previously offered as GENT 1223 and MET 1213.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 3803 Fundamentals of Mechatronics
Prerequisites: Grade of "C" or better in EET 3104 or EET 2635.
Description: Fundamentals of mechatronic systems and components. Different modelling approaches used for mechatronics systems, sensors and actuators, data acquisition and interfacing, signal conditioning, and PLCs. Previously offered as GENT 3503. Same course as EET 3803.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 4003 Machine Elements
Prerequisites: A grade of "C" or better in (MATH 2133 or MATH 2153) and (GENT 3323 or ENSC 2143).
Description: Applications of statics and strength to the design of machine components. Problems of choosing materials, impact and fatigue loading. May not be used for degree credit with MET 4003 or BAE 4224.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4023 Advanced Mechanical Computer-Aided Design
Prerequisites: A grade of "C" or better in MET 1123 or ENGR 1332 or equivalent.
Description: Computer-aided design methodologies and processes. State-of-the-art technologies and methodologies in 3D modeling and design processes.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4033 Applied Vibration and Acoustics
Prerequisites: A grade of "C" or better in GENT 3323 or ENSC 2143.
Description: Free and forced vibration of mechanical systems with an emphasis on practical applications. Introduction to sound wave generation and propagation. Mechanical system design methods for noise and vibration mitigation.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4050 Advanced Mechanical Design
Prerequisites: Junior standing and consent of instructor.
Description: Special problems in mechanical engineering technology. Previously offered as MFGT 4050 and MPT 4050. Offered for variable credit, 1-3 credit hours, maximum of 6 credit hours.
Credit hours: 1-3
Contact hours: Contact: 1-3 Other: 1-3
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Engineering Technology

MET 4103 Senior Design I
Prerequisites: Grade of "C" or better in (MET 1123 or MET 1121) and ENSC 2143 and Senior Standing.
Description: First part of a two semester sequence for the MET capstone project. Focuses on finding and beginning a practical engineering design project. Includes selected topics in engineering design, project management, ethics, and intellectual property.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 4113 Practical Computational Fluid Dynamics
Prerequisites: A grade of "C" or better in MET 3313 or ENSC 3233 or MAE 3333.
Description: An introduction to the practical use of Computational Fluid Dynamics (CFD) commercial software. Students will be introduced to the concepts governing CFD, but the majority of the class will be utilized in learning the use of a popular commercial code. May not be used for degree credit with MET 5113.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4123 Senior Design II
Prerequisites: A grade of "C" or better in MET 4103 and ENGL 3323. Must be taken in the immediately subsequent semester after completing MET 4103.
Description: Second part of a two semester sequence for the MET capstone project. Finishes work on the practical engineering design project begun in MET 4103. Includes selected topics in engineering design, project management, ethics, and intellectual property.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 4133 Interdisciplinary Design I
Prerequisites: A grade of "C" or better in (MET 1223 or MET 2223) and MET 4003 and permission of the instructor.
Description: First part of an interdisciplinary capstone project for engineering technology seniors. Conduct mechanical design, prototype development, and project management on practical engineering design project. Same course as MET 4103.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 4143 Interdisciplinary Design II
Prerequisites: A grade of "C" or better in (MET 1223 or MET 2223) and MET 4003 and permission of the instructor.
Description: Second part of an interdisciplinary capstone project for engineering technology seniors. Conduct mechanical design, prototype development, and project management on practical engineering design project. Same course as MET 4123.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 4173 Additive Manufacturing: Materials, Methods and Applications
Prerequisites: Junior or higher standing.
Description: Theory and practice of additive manufacturing, materials and their applications in various fields. Discuss their applications in product development, data visualization, rapid prototyping, and specialized manufacturing, with special emphasis on direct digital manufacturing.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4203 Finite Element Methods
Prerequisites: A grade of "C" or better in GENT 3323 or ENSC 2143.
Description: Application of Finite Element Methods to machine component design. Problems involving stress, strain, temperature and vibration will be solved using state of the art Finite Element Software. May not be used for degree credit with MET 5203.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4223 Geometric Dimensioning and Tolerancing
Prerequisites: A grade of “C” or better in MET 1123 or ENGR 1332 or equivalent.
Description: Theory and Application of Geometric Dimensioning and Tolerancing (GD&T) technique based on ASME Y14.5. Creation, analysis, and inspection of tolerances for manufacturing. Previously offered as MET 3223.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4713 Internal Ballistics
Prerequisites: A grade of "C" or better in (ENSC 2123 or MET 3003) and ENSC 2143 and (ENSC 3233 or MET 3313).
Description: This course is about launching projectiles. Course topics include projectile launching systems, solid propellant combustion, design and manufacturing of projectiles and ammunition, internal ballistic models, design and manufacturing of the barrel, structural dynamics of the barrel, dynamics of guns, firing mechanisms and fire-control systems, SAAMI Standards, and project. May not be used for degree credit with MET 5713.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4723 External Ballistics
Prerequisites: A grade of "C" or better in (ENSC 2123 or MET 3003) and (ENSC 3233 or MAE 3333 or MET 3313).
Description: This course focuses on the motion of a projectile in the air. Course topics include vacuum trajectory, aiming principles and devices, aerodynamic forces and moments, ballistic coefficient, flat-tire point-mass trajectory, weather, Coriolis effects, gyroscopic effect, point-mass trajectory, pitching and yawing motion, measurement of projectile speed and environmental conditions, long-range shooting, and project. May not be used for degree credit with MET 5723.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4733 Terminal Ballistics and Armor
Prerequisites: Grade of "C" or better in (MET 3003 or ENSC 2123) and permission of the instructor.
Description: Practical applications of dynamics theories to the mechanical behavior of projectiles and targets at impact. Structural and body armor system design, test, and analyses. May not be used for degree credit with MET 5733.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4803 Mechatronic System Design
Prerequisites: Grade of “C” or better in GENT 3123 and MET 3803 (can be concurrent enrollment in GENT 3123).
Description: Modelling of mechanical, electrical, and hydraulic components. Feedback control systems, electro-hydraulic drives, electrical drives, and microcontroller programming. Previously offered as GENT 4503. Same course as EET 4803.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 4883 Tool Design
Prerequisites: A grade of "C" or better in MET 2213 and MET 3343.
Description: Basic design and development of special tools for processing or manufacturing engineering materials. Design and specification and inspection tools using appropriate techniques of engineering graphics and analysis. Previously offered as MFGT 4883.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Engineering Technology

MET 4953 Industrial Assessment and Improvement
Prerequisites: Junior or higher standing.
Description: Plant assessment and improvement-based concepts, strategies, and tools for manufacturing operations. Emphasis is on small to medium-sized manufacturing operations. Issues include energy, water, waste, quality, and productivity analysis across the organization from a systems perspective. Justification of improvement projects and measurement of results. May not be used for degree credit with IEM 4953 or IEM 5953.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 4993 Mechanical Engineering Technology Practice
Prerequisites: Junior standing and consent of department head.
Description: Supervised industrial experience in mechanical engineering technology practice with minimal continual duration of eight weeks. Comprehensive journal, written report, and oral presentation.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 5113 Practical Computational Fluid Dynamics
Prerequisites: Graduate standing.
Description: An introduction to the practical use of Computational Fluid Dynamics (CFD) commercial software. Students will be introduced to the concepts governing CFD, but the majority of the class will be utilized in learning the use of a popular commercial code. May not be used for degree credit with MET 4113.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 5203 Finite Element Methods
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 5713 Internal Ballistics
Prerequisites: Graduate standing.
Description: This course is about launching projectiles. Course topics include projectile launching systems, solid propellant combustion, design and manufacturing of projectiles and ammunition, internal ballistic models, design and manufacturing of the barrel, structural dynamics of the barrel, dynamics of guns, firing mechanisms and fire-control systems, SAAMI Standards, and project. May not be used for degree credit with MET 4713.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 5723 External Ballistics
Prerequisites: Graduate standing.
Description: This course focuses on the motion of a projectile in the air. Course topics include the vacuum trajectory, aiming principles and devices, aerodynamic forces and moments, ballistic coefficient, flat-tire point-mass trajectory, weather, Coriolis effects, gyroscopic effect, point-mass trajectory, pitching and yawing motion, measurement of projectile speed and environmental conditions, long-range shooting, and project. May not be used for degree credit with MET 4723.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

MET 5733 Terminal Ballistics and Armor
Prerequisites: Graduate standing.
Description: Practical applications of dynamics theories to the mechanical behavior of projectiles and targets at impact. Structural and body armor system design, test, and analyses. May not be used for degree credit with MET 4733.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Engineering Technology

Undergraduate Programs

- Electrical Engineering Technology, BSET (http://catalog.okstate.edu/engineering-architecture-technology/materials-mechatronics-manufacturing-engineering/electrical-engineering-technology-bset/)
- Electrical Engineering Technology: Computer, BSET (http://catalog.okstate.edu/engineering-architecture-technology/materials-mechatronics-manufacturing-engineering/electrical-engineering-technology-computer-bset/)
- Mechanical Engineering Technology, BSET (http://catalog.okstate.edu/engineering-architecture-technology/materials-mechatronics-manufacturing-engineering/mechanical-engineering-technology-bset/)
- Mechatronics and Robotics, BS (http://catalog.okstate.edu/engineering-architecture-technology/materials-mechatronics-manufacturing-engineering/mechatronics-robotics-bset/)

Graduate Programs

The School of Materials, Mechatronics and Manufacturing Engineering offers programs leading to the Master of Science and Doctor of

Philosophy. A program of independent study and research on a project under the direction of a member of the Graduate Faculty will be satisfactorily completed by all graduate students. For the Master of Science candidate, the project may result in a thesis. For the Doctor of Philosophy candidate, the project results in a dissertation.

Four research areas of strategic importance have been identified at the Helmerich Advanced Technology Research Center (HRC) at OSU by industry leaders in and around Tulsa. These include: Materials for Energy Technologies, Bio-Materials for Medical Technologies, Advanced Materials for Aerospace, and Materials for Electronics and Control Technologies. All areas fall under the broad umbrella of the School of Materials, Mechatronics and Manufacturing Engineering

Admission Requirements

Admission to either the Master of Science or Doctor of Philosophy degree program requires graduation from a materials science and engineering or related curriculum approved by the ABET or a recognized equivalent from any international program.

Students with related undergraduate degrees, such as chemistry, physics, engineering physics, applied physics, etc., can be admitted conditionally, subject to completing prescribed Materials Science and Engineering program core courses. Admission is competitive based on undergraduate GPA, GRE and TOEFL (for international students), statement of interests, experience and recommendations.

The Master of Science Degree

The **Master of Science in Materials Science Engineering (MSE)** has both thesis and creative component (non-thesis) options. The thesis option requires a total of 30 credit hours, which includes 24 hours of formal coursework (regularly scheduled classes, not independent study) and 6 hours of a thesis. The non-thesis option or creative component requires a total of 35 credit hours, which includes 33 hours of formal coursework (regularly scheduled classes, not independent study) and 2 hours of a creative component or project. The main difference between the two options is that in the thesis option, students conduct independent research, while in the creative component option, students conduct critical review of the literature on an advanced topic of interest to the MSE program. Both options require a professional report or thesis and an oral presentation. Students take 15 hours of core courses (required) with the remainder of the hours being MSE elective courses or their equivalent (to be approved by MSE graduate coordinator and the thesis advisor or has been considered as an equivalent MSE course). Students must complete no less than 21 hours of MSE 5000- and 6000-level courses through Oklahoma State University. For both options the courses taken must include:

Code	Title	Hours
MSE 5013	Advanced Thermodynamics of Materials	3
MSE 5023	Diffusion and Kinetics	3
MSE 5043	Advanced Materials Characterization	3
MSE 5093	Fundamentals of Materials Science	3
MSE 5193	Advanced Materials Processing	3
MSE 5010	Materials Science and Engineering Seminar for Masters Students	0

The **Master of Science in Engineering Technology (MSET)** degree in **Mechatronics and Robotics (MERO)** will provide students with an interdisciplinary applied engineering education through coursework, project, and thesis work. Students will learn fundamental and applied concepts of real world mechatronic and robotic systems including interface theory, sensing and actuation systems, hardware and software integration, modelling and control. Our faculty members have extensive industry experience. Students will have an option to specialize in one or more areas including control systems, artificial intelligence, autonomous vehicles, advanced manufacturing, and soft-robotics. All courses will focus on applied engineering via hands-on learning.

The Doctor of Philosophy Degree

The general credit requirement is a minimum of 90 credit hours beyond the BS degree, including at least 36 hours of credit for research and at least 30 hours of class work. It is expected that the courses must include:

Code	Title	Hours
MSE 5013	Advanced Thermodynamics of Materials	3
MSE 5023	Diffusion and Kinetics	3
MSE 5043	Advanced Materials Characterization	3
MSE 6010	Materials Science and Engineering Seminar for PhD Students	0

Students are responsible for consultation with their doctoral advisory committee in preparing the plan of study. Furthermore, students have to pass the PhD qualifying exam and the dissertation proposal defense to become eligible for candidacy for the PhD Degree, successfully conduct independent research for the dissertation, and pass the final dissertation defense in order to qualify for the PhD degree. More details can be found in the MSE Graduate Student Handbook.

Minors

- Mechatronic Engineering Technology for EET Students (EETM), Minor (http://catalog.okstate.edu/engineering-architecture-technology/materials-mechatronics-manufacturing-engineering/mechatronic-engineering-technology-eet-students-minor/)
- Mechatronic Engineering Technology for MET Students (METM), Minor (http://catalog.okstate.edu/engineering-architecture-technology/materials-mechatronics-manufacturing-engineering/mechatronic-engineering-technology-met-students-minor/)

Faculty

James E. Smay, PhD—MMME School Head and Colcord Chair
Associate Dean, Professor and Helmerich Family Chair: Raman P. Singh, PhD
Regents Professor and NAE Member: Raj N. Singh, PhD
Professor and Varnadow Chair: Ranji Vaidyanathan, PhD
Professors: Aaron Alexander, PhD; Richard A. Beier, PhD, PE (emeritus); Youn Chang, PhD, PE (emeritus)
Associate Professors: Pankaj Sarin, PhD; Do Young Kim, PhD; Hitesh Vora, PhD; Imad Abouzahr, PhD, PE; Brian Norton, MS; Warren L. Lewis, MS; Kenneth Belanus, MSEM (emeritus)
Assistant Professors: Yafeng Wang, PhD; Ellis C. Nuckolls, MS, PE
Professor of Practice: Jahan Bayat, PhD
Teaching Associate Professor: Laura Emerson, MS