

# ET - ENGINEERING TECHNOLOGY

---

## **ET 1500 Engineering Technology Trades Internship Cr. 1-6**

Industrial practice dealing with specific skill trades in engineering technology, under supervision in cooperative internship program. Offered Intermittently.

## **ET 2140 Computer Graphics Cr. 3**

Solution of drafting problems and development of graphic presentations using computer-assisted drafting techniques. Use of programming techniques for direct solution of drafting/graphic problems and available software routines. Introduction to the use of computer plotters, CRTs, digitizers. Offered Fall.

**Course Material Fees:** \$15

## **ET 2160 Computer Applications for Engineering Technology Cr. 2**

Various software programming environments and programming skills for engineering technology applications, including programming logic, file IO, data acquisition and processing, computer simulation, and communication protocols. Offered Fall.

**Prerequisites:** EET 2000 with a minimum grade of C-

**Restriction(s):** Enrollment is limited to Undergraduate level students.

## **ET 2200 Engineering Materials Cr. 3**

Application and characteristics, both physical and chemical, of metallic and nonmetallic materials, polymers, and composites used in industry. The primary process involved in producing these materials. Offered Yearly.

**Prerequisites:** CHM 1020 with a minimum grade of C-

## **ET 2500 Co-op Experience Cr. 1-4**

Industrial practice under supervision in cooperative education. Work-study program. Report required. Offered Every Term.

**Repeatable for 4 Credits**

## **ET 3030 Statics Cr. 3**

The objective of this course is to provide the student with a basic understanding of the analytical and graphical techniques that are used to determine the forces acting upon and within a body or structural component under static load. This course provides the necessary foundation for later studies in the analysis and design of structures as well as mechanical and electrical equipment. Offered Fall, Winter.

**Prerequisite:** ET 2140 with a minimum grade of C- and PHY 2130 with a minimum grade of C- and ET 3430 (may be taken concurrently) with a minimum grade of C-

## **ET 3050 Dynamics Cr. 3**

Kinematics; kinetics of particles; kinetics of translation and rotation of a rigid body; relative motion; use of equations of plane motion. Application of impulse and momentum principles; work and efficiency. Offered Yearly.

**Prerequisites:** ET 3030 with a minimum grade of C- and MAT 3430 with a minimum grade of C-

## **ET 3430 Applied Differential and Integral Calculus Cr. 4**

Limits, derivatives, applications of derivatives, definite integrals and their applications, and trigonometric functions. No degree credit in College of Liberal Arts and Sciences. Offered Every Term.

**Prerequisites:** MAT 1800 with a minimum grade of C-

**Equivalent:** MAT 3430

## **ET 3450 Applied Calculus and Differential Equations Cr. 4**

Continuation of MAT/ET 3430, including logarithmic and exponential functions, first and second order ordinary differential equations, vectors, polar coordinates, Laplace transforms, Taylor series, and Fourier series. No degree credit in College of Liberal Arts and Sciences. Offered Every Term.

**Prerequisites:** ET 3430 with a minimum grade of C- or MAT 3430 with a minimum grade of C-

**Equivalent:** MAT 3450

## **ET 3850 Reliability and Engineering Statistics Cr. 3**

Probability, hypergeometric, binomial, Poisson, and normal probability distribution; confidence intervals; inferences concerning means; linear regression; introduction to statistical quality control and reliability; use of computers. Offered Fall, Winter.

**Prerequisites:** MAT 1800 with a minimum grade of C-

## **ET 3870 Engineering Economic Analysis Cr. 3**

Techniques to economically evaluate major technical projects, rate of return and present worth, interest formulae, federal taxes, risk, inflation, and non-economic constraints. Offered Every Term.

**Prerequisites:** MAT 1800 with a minimum grade of C-

## **ET 4990 Guided Study Cr. 1-6**

Supervised study and instruction in field selected by student. Offered Intermittently.

**Repeatable for 6 Credits**

## **ET 4999 Senior Design Project Cr. 3**

**Satisfies General Education Requirement:** Writing Intensive Competency Student designs, builds, and tests product; philosophy of design. Project proposal to be submitted by second week, final outcome to be completed by thirteenth week; progress reports, and oral presentation required. Offered Fall, Winter.

**Prerequisites:** ENG 3050 with a minimum grade of C

**Restriction(s):** Enrollment limited to students with a class of Senior.

## **ET 5100 Fundamentals of Mechatronics and Industrial Applications Cr. 3**

Fundamentals of mechatronics and their applications in industry; building blocks of mechatronic products including sensors, proximity, displacement and rotational measurement sensors, force and torque measurement sensors, pressure sensors, accelerometers, and actuators; introduction of closed-loop control, electrohydraulic motion control, PLC mechatronics design by embedding sensors, actuators and controllers into mechanical components. Offered Fall.

**Prerequisites:** EET 3180 with a minimum grade of C- or MCT 3010 with a minimum grade of C-

## **ET 5110 Advanced Programmable Controllers and Industrial Applications Cr. 3**

Introduces basic concepts and architecture of industrial control systems, sensors, measurement devices, PID controllers, and operating principles of PLCs. Students will learn how to operate the PLC programming software. Ladder logic programs are the main language, and functions and function blocks will also be taught for students to grasp high-level PLC-programming skills. Offered Winter.

**Prerequisites:** EET 3720 with a minimum grade of C- or MCT 3010 with a minimum grade of C-

## **ET 5500 Graduate Industrial Internship Cr. 1-4**

Industrial practice under supervision in cooperative education. Oral presentation and written report describing professional experience required. Offered for graduate credit only. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Repeatable for 6 Credits**

**ET 5600 Python: Industrial Applications Cr. 3**

Provides a combination of lectures and hands-on projects on how computer programming is applied in various industrial applications including robotics, automation and visualization applications. After an introduction to the basics of Python programming, students will then be provided with the opportunity to perform industrial projects using Python. Offered Yearly.

**Restriction(s):** Enrollment limited to students with a class of Applicant Masters, Candidate Masters, Unranked Grad, Graduate Certificate, Doctorate, Senior or Post Bachelor; enrollment is limited to Graduate or Undergraduate level students.

**ET 5800 Industrial Robots Programming Cr. 3**

Provides an understanding of basic robotic theory (direct kinematics, inverse kinematics, links, joints, coordinates systems, and robotic vision theory) and applications. Students will program and maintain an R-J or higher robot controller with a standard application software package; identify the components of a vision system; install vision hardware; develop an application; perform error recovery procedures; and follow recommended safety practices. Labs, assignments and projects will be done using industrial robots: FANUC S 430 iw, FANUC LR Mate 200 iC, FANUC LR Mate 200 iD, and FANUC CR 4iA collaborative robot. Simulation and off-line programming will be done using Visual Components and ROBOGUIDE simulation software packages. Students will have the opportunity to receive an industrial certificate if they successfully complete the required test. Offered Fall.

**ET 5870 Engineering Project Management Cr. 3**

Provides the student with insights into human and organizational behavior affecting projects, in addition to the quantitative tools for the successful management of engineering projects. The course addresses a variety of project types and deals with how to select, initiate, operate and control as well as terminate a project. The role of project managers and their interaction with the rest of the organization is highlighted. Offered Fall, Winter.

**Prerequisites:** MAT 1800 with a minimum grade of C-

**ET 5995 Special Topics in Engineering Technology I Cr. 1-4**

Topics to be announced in Schedule of Classes. Offered Intermittently.

**Repeatable for 8 Credits**

**ET 7030 Building Information Modeling Cr. 3**

Building Information Modeling or BIM is a new standard of technology within the construction industry. When used effectively, BIM can provide several benefits to the totality of a project through the ability of improved visualization, communication, and detail. In several case studies, BIM has shown significant cost savings with spatial coordination and value engineering. This course will focus on improving skills in Revit and Navisworks while using advanced knowledge of the construction industry to manipulate models to create deliverables. Students will focus on completing detailed quantitative takeoffs for several building services including structural, mechanical, electrical, and plumbing. Additionally, students will implement construction schedules with the BIM environment to overlay documentation. Offered Yearly.

**Restriction(s):** Enrollment is limited to Graduate level students.

**ET 7050 Technologies in Construction Management Cr. 3**

Virtual Reality is a new implementation to the construction industry which allows all stakeholders of the project to visualize the building. This technology has improved the way the BIM model can be viewed on the jobsite to solve coordination issues firsthand. Several new products using VR are still being tested on jobsites and continually updating their software to streamline this process. For this course, students will get hands-on experience with VR technology before spending time researching different products. This research will give students an understanding of the limitations of the software and which companies are proving to have an edge on the competition. Offered Yearly.

**Prerequisite:** ET 7030 with a minimum grade of C

**Restriction(s):** Enrollment is limited to Graduate level students.

**ET 7060 Project Risk Management Cr. 3**

Students will learn topics related to project risk management, including project risks and opportunities, plan risk analysis, implement risk responses and construction risk register templates and tools. Offered Yearly.

**Restriction(s):** Enrollment is limited to Graduate level students.

**ET 7300 Advanced Battery Systems for Electric-drive Vehicles Cr. 3**

Aims to familiarize students with advanced battery technologies and their applications in hybrid and electric vehicles. Contents include: a descriptive overview of energy sources and conversions, HEV/PHEV/ EV technology, hybrid powertrain configuration and components, in-vehicle energy storage systems, electrochemistry fundamentals, battery power and capacity/energy, battery system design (cell, module and pack), Battery Management System (BMS), cell monitoring and balancing, thermal management, on-board diagnostics, battery charging schemes and systems. Offered Fall.

**Prerequisite:** MCT 5150 with a minimum grade of C

**Restriction(s):** Enrollment is limited to Graduate level students.

**Equivalent:** EVE 7300

**ET 7430 Methods of Engineering Analysis Cr. 4**

This course aims to provide the theory and computer applications of differential equations, partial derivatives, Laplace transforms, Fourier series, matrices, and vectors. It also encourages students to use software programming environments to solve numerical problems. Offered Fall, Winter.

**Restriction(s):** Enrollment is limited to Graduate level students.

**ET 7800 Industrial Robots Dynamics and Control Cr. 3**

Covers the direct and inverse dynamic problem for industrial robots; Newton-Euler and Lagrange-Euler equations of robot arm motion; a new automatic separation method (ASM) for automatic generation of dynamic equations; robot trajectory generation; control of Robot Manipulators (PID control, design of control systems in State-Space and computed torque technique); sensing (range sensing, proximity sensing, touch sensing, force and torque sensing) using available Robots and Collaborative robots; current trends and research in Industrial Robotics and Cobotics. Offered Winter.

**Prerequisite:** MIT 5700 with a minimum grade of C or ET 5800 with a minimum grade of C

**Restriction(s):** Enrollment is limited to Graduate level students.

**ET 7990 Directed Study Cr. 1-8**

Supervised study and instruction in an advanced topic. Outline of proposed study and petition must be submitted to graduate committee in advance of registration for approval. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Repeatable for 8 Credits**

**ET 7995 Special Topics in Engineering Technology II Cr. 1-4**

Topics to be announced in Schedule of Classes. Offered Intermittently.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Repeatable for 8 Credits**

**ET 7999 Master's Project Cr. 1-6**

Design, fabrication, system optimization, and applications of graduate level material. Offered Every Term.

**Restriction(s):** Enrollment limited to students with a class of Candidate Masters; enrollment is limited to Graduate level students.

**Repeatable for 6 Credits**