Engineering Technology (ENGT)

To register for courses and see a real-time listing of classes and sections offered, view the add/drop system *(*https://userve.uvu.edu/StudentRegistrationSsb/ssb/term/termSelection/?mode=search*).*

ENGT 3010. Applied Mathematics I for Engineering Technologists. (2 Credits)
Prerequisite(s): AET 1060, MATH 1050 and University Advanced Standing
Review concepts taught in college algebra with focus on application into engineering technology. Investigates trigonometry concepts applied to power systems. Analyzes industry matrix models. Includes an introduction to applied calculus within engineering technology.

ENGT 3020. Applied Mathematics II for Engineering Technologists. (2 Credits)
Prerequisite(s): ENGT 3010 and University Advanced Standing
Applies calculus to applications in engineering technology. Introduces basics of applied differential equations and introductory solutions via the Laplace transform technique. Mathematical computations include derivations and problems related to power electronics, power converters, motion control, machines and drives, and proportional, integral, and derivative loops.

ENGT 3050. Programming and Applied Analytics. (3 Credits)
Prerequisite(s): University Advanced Standing
Pre- or Corequisite(s): ENGT 3010
Applies programming and analytics to engineering technology problems. Applies loops, functions, logical statements, and analysis to power, automation, and mechatronic scenarios. Implements trigonometry, linear algebra and calculus based concepts utilizing modern based software and tools.

ENGT 3100. Power Systems and Automation. (3 Credits)
Prerequisite(s): AET 1060, AET 2270, AET 2275, MATH 1050 and University Advanced Standing
Pre- or Corequisite(s): ENGT 3010
Introduces power systems and the steady-state analysis of its major components from generation to the delivery of electrical power. Discusses the flow of active and reactive power and basic control concepts. Introduces equipment nameplates, testing, troubleshooting, and basic automation in power systems. Focuses on fundamental introductory concepts in measurement equipment and Intelligent Electronic Devices (I.E.D.). Introduces the per unit system. Discusses the role of automation, protection, and smart control in power systems. Introduces fault analysis of balanced systems. Provides an introduction to the important topic of symmetrical components. Includes hands-on exercises and demos in the classroom. Canvas Course Mats $103/Cengage applies.

ENGT 3130. Electrical Safety Standards. (1 Credit)
Prerequisite(s): MATH 1050 and University Advanced Standing
Emphasizes industrial safety and focuses heavily on electrical safety in the workplace as stated in NFPA 70E and other relevant standards. Includes practices and topics to help mitigate workplace injuries. Discusses when it is appropriate to work on live systems and focuses on the latest NFPA 70E consensus standard. Introduces arc flash hazards, analysis and mitigation strategies.

ENGT 3150. Power System Analysis and Design. (3 Credits)
Prerequisite(s): ENGT 3100 and University Advanced Standing
Reviews electrical one-line diagrams, per unit system, and electrical models for transformers, synchronous generators, induction machines, power lines, and other pertinent apparatus. Discusses analysis techniques utilizing both equivalent circuits and Y-bus methods. Introduces unbalanced fault analysis, symmetrical components, and sequence networks for single-line to ground, phase-phase, and phase-phase-ground faults. Focuses on design concepts and codes related to medium and low voltage power systems.

ENGT 3160. Power Quality and Reliability. (3 Credits)
Prerequisite(s): ENGT 3100, ENGT 3010, and University Advanced Standing
Pre- or Corequisite(s): ENGT 3020
Introduces concepts of power quality measurement and the reliability measures used in the electric power industry. Teaches power quality measures such as VSSI, crest factor, flicker, harmonics and THD. Discusses these PQ measures, common causes of poor PQ and possible mitigation strategies. Emphasizes the concepts and mathematical basis for common power system reliability indices and measures such as SAIDI, CAIDI, MAIFI, and SAIFI. Introduces common strategies for improving power system reliability measures. Discusses power quality problems on distribution systems, application standards, and proper grounding techniques.

ENGT 3220. Motion Control for Engineering Technologist. (3 Credits)
Prerequisite(s): (AET 2270, AET 2275) OR (MECH 2550, MECH 2555) and University Advanced Standing
Corequisite(s): ENGT 3225
Examines design and integration of servo systems in automated systems. Applies mathematical principles to design concepts. Analyzes PID tuning and feedback control. Investigates servo motors for single axis control, multi-axis control, and coordinated motion control.

ENGT 3225. Motion Control for Engineering Technologist Lab. (1 Credit)
Prerequisite(s): (AET 2270, AET 2275) OR (MECH 2550, MECH 2555) and University Advanced Standing
Corequisite(s): ENGT 3220
Analyzes servo motors in automated systems. Applies servo motors to automated systems including wiring and programming. Explores PID tuning. Examines internal and external feedback loops. Apply servo motors to single axis control, multi-axis control, and coordinated motion control.

ENGT 3250. Automated Safety Systems. (2 Credits)
Prerequisite(s): AET 2270, AET 2275 and University Advanced Standing
Corequisite(s): ENGT 3255
Explores safety systems in industrial automation including instrumented safety systems, risk assessment, and design. Focuses on a life-cycle approach to automation engineering safety design. Incorporates safety standards such as ISO 13849, ISA 84, IEC 61508 and IEC 61511. Examines safety controllers, peripheral equipment, and relevant technology.

ENGT 3255. Automated Safety Systems Lab. (1 Credit)
Prerequisite(s): AET 2270, AET 2275, and University Advanced Standing
Corequisite(s): ENGT 3250
Applies safety systems and technology in a lab environment. Discusses wiring of safety relays and other hardwired safety devices. Explores interface wiring and programming of safety programmable relays. Teaches wiring of safety I/O and programming a safety PLC including safety instructions. Focuses of troubleshooting safety systems.

ENGT 3600. Capstone I Design WE. (3 Credits)
Prerequisite(s): ENGT 3020 and University Advanced Standing.
Integrates previous course work to design senior capstone project. Analyzes electrical AC/DC/Servo/Stepper motors, pneumatics, hydraulics for application in capstone project. Develops automated systems layouts of mechanical, actuators, electrical box, safety, and wiring diagrams. Applies project based proposal writing and approval process. Requires selection and documentation of components needed to complete project.

ENGT 4100. Power System Protection and Automation. (3 Credits)
Prerequisite(s): ENGT 3100 and University Advanced Standing
Pre- or Corequisite(s): ENGT 3150, ENGT 4105
Reviews phasors and polarity, symmetrical components, sequence networks, and the per unit system. Introduces general protection philosophies, definitions, and ANSI device numbers. Discusses relay input devices, instrument transformers, and accuracy classes. Focuses on introductory concepts related to power system protection fundamentals including protecting, lines, feeders, buses, transformers, motors, and generators. Introduces standardized protection methods and emphasizes system grounding methods and principles. Teaches trip circuits and automation principles in multi-function microprocessor based relays. Emphasizes troubleshooting and testing of protection elements.

ENGT 4105. Power System Protection and Automation Lab. (1 Credit)
Prerequisite(s): ENGT 3100 and University Advanced Standing
Corequisite(s): ENGT 4100
Applies phasors, symmetrical components, sequence networks, and relaying theory to electrical mechanical and microprocessor based protective relays in a lab setting. Configures, programs, tests, and troubleshoots various types of protective relays, protective elements, and field circuits. Utilizes a current and voltage industry test set. Emphasizes relay settings, testing, and troubleshooting protection elements. Introduces revenue metering, industrial automation controllers, and communications.

ENGT 4130. Distribution System Protection. (2 Credits)
Prerequisite(s): ENGT 4100, ENGT 4105, and University Advanced Standing
Corequisite(s): ENGT 4135
Discusses distribution system equipment and components including transformers, buses, feeders, fuses, circuit breakers, reclosers, sectionalizers, and capacitor banks. Outlines protection principles used in modern distribution systems. Includes system modeling, differential protection, overcurrent coordination, reclosing, power factor correction, and bus configurations. Covers concepts related to protection of induction motors.

ENGT 4135. Distribution System Protection Lab. (1 Credit)
Prerequisite(s): ENGT 4100, ENGT 4105, and University Advanced Standing
Corequisite(s): ENGT 4130
Applies distribution system protection principles to electrical equipment and apparatus including transformers, buses, and feeders. Discusses fuses, circuit breakers, reclosers, sectionalizers, and capacitor banks. Applies protection principles used in modern distribution systems in a lab environment.

ENGT 4150. Energy Systems and Power Converters. (3 Credits)
Prerequisite(s): ENGT 3150, ENGT 3020, and University Advanced Standing
Teaches concepts of electrical energy conversion, storage, and power electronic interface systems in modern electrical energy systems. Introduces AC-DC, DC-DC, DC-AC, AC-AC switching converters, voltage source converters, and other power electronic converters. Emphasizes modern applications of electrical energy conversion, storage, and power electronic interface systems. Analyzes models of power electronic converters, voltage source converters, and controls associated with utility power electronics. Uses mathematics and industry simulation software to analyze energy systems and power electronic converters.

ENGT 4160. Generator and Transmission Protection. (2 Credits)
Prerequisite(s): ENGT 4100, ENGT 4105, and University Advanced Standing
Corequisite(s): ENGT 4165
Discusses generator and transmission system equipment and components including generators, lines, transformers, buses, circuit breakers, and capacitor banks. Outlines protection principles used in generation and transmission systems. Includes differential protection, distance protection, traveling wave, reclosing, single-pole tripping, equal area criterion, and bus configurations. Introduces fault location considerations.

ENGT 4165. Generator and Transmission Protection Lab. (1 Credit)
Prerequisite(s): ENGT 4100, ENGT 4105, and University Advanced Standing
Corequisite(s): ENGT 4160
Applies generator and transmission system protection to equipment and components including generators, lines, transformers, and buses. Applies protection principles used in generation and transmission systems. Includes differential protection, distance protection, traveling wave, reclosing, and single-pole tripping.

ENGT 4200. Advanced Automated Systems. (3 Credits)
Prerequisite(s): (AET 2270, AET 2275) or (MECH 2550, MECH 2555) and University Advanced Standing
Reviews fundamentals of programming programmable logic controllers (PLCs) including fundamental instructions, UDTs, AOIs, function blocks, program efficiency, and organization. Reviews PLC programming languages including ladder diagram and function block diagram. Introduces structured text, STL, and SCL languages. Introduces multiple automation platforms including distributed control systems (DCS) and related programming and design specifications. Focuses on SCADA software to interface to the PLC in order to monitor, control, analyze data, and visualize the system. Introduces web-based deployment of SCADA software and alarm notifications.

ENGT 4600. Capstone II WE. (3 Credits)
Prerequisite(s): ENGT 3600 and University Advance Standing.
Integrates previous course work and capstone I design to build senior project machine for presentation at Engineering Technology Fair. Utilizes teamwork to apply previous design to build project. Includes creation of documentation of comprehensive project into a manual that is appropriate to industry.

ENGT 490R. Advanced Topics in Engineering Technology. (3 Credits)
Prerequisite(s): University Advanced Standing
Explores special topics in power systems and automation fields. Offers topics depending on demand and industry needs. May be repeated for a maximum of 6 credits toward graduation.

ENGT 495R. Advanced Topics Lab. (1 Credit)
Prerequisite(s): University Advanced Standing
Explores special topics of engineering technology in a lab environment. Teaches hands-on topics in an engaged learning environment. May be repeated for a maximum of 2 credits toward graduation.