ENGT - Engineering Technology

Courses numbered 100 to 299 = lower-division; 300 to 499 = upper-division; 500 to 799 = undergraduate/graduate.

ENGT 201. Introduction to Engineering Technology (1).
Introduces students to history, concepts, roles and trends in engineering technology in society and industry. Prerequisite: WSUE 102A.

ENGT 222. Applied Computing and Networking I (3).
Information technology (IT) connects people and businesses in the world, and operations of organizations in the public and private sector rely on this connectivity. Course allows students to gain vital concepts in computer hardware, operating systems, networking, and security to solve real-world computing challenges. Students collaborate effectively and think critically to develop specialized foundational skills in computing and networking. Students learn to use industry-standard tools through hands-on class projects. Covers fundamental concepts in computer hardware, Linux and Windows operating systems, virtualization, computer networking including OSI layer, LAN, WAN, VPN, and basic network security including hashing and encryption. Prerequisite: none.

ENGT 281. Cooperative Education (1).
Introduces the student to engineering practice by working in industry in an engineering/technology related job. Provides a planned professional experience designed to complement and enhance the student's academic program. Repeatable for credit.

ENGT 281I. Noncredit Internship (0).
Complements and enhances the student's academic program by providing an opportunity to apply and acquire knowledge in a workplace environment as an intern. Prerequisite: departmental consent.

ENGT 301. Fundamentals of Engineering Technology (3).
Introduces students to engineering design concepts with an entrepreneurial mindset, engineering report writing, and engineering technology software programs including Multisim and MS Project. Prerequisite: sophomore standing or departmental consent.

ENGT 312. Applied Statics (3).
2 Classroom hours; 2 Lab hours. Studies force systems, resultants and equilibrium, centroids of areas and centers of gravity of bodies; trusses, frames, beams, friction, and moments of inertia of areas and bodies. Prerequisite: PHYS 213. Pre- or corequisite: MATH 243 or MATH 252.

ENGT 313. Applied Dynamics (1).
Introduces concepts of applied dynamics including particle kinematics, force and acceleration methods for particles, and energy methods for particles. Prerequisite: PHYS 213. Pre- or corequisites: ENGT 312 or AE 223; and MATH 243 or MATH 252.

ENGT 320. Circuits Technology with Lab (4).
3 Classroom hours; 2 Lab hours. Studies electric circuit technology principles and their applications. Includes DC circuits, network theorems, capacitance and inductance, AC circuit analysis, phasor plane techniques, complex power and balanced three-phase circuits. Includes a laboratory. Prerequisite: MATH 242 or 251. Corequisite: ENGT 320L.

ENGT 322. Applied Programming and Scripting (3).
Designed for IT professionals interested in learning basic coding and scripting skills. Teaches the vital skills needed to develop as well as customize applications that interact with file systems, databases, networks and websites. Scripting is a method that automates the long or complex commands in a specific environment and allows professionals to be more productive by avoiding repetitive works. Covers command shell scripting (cmd, powershell, bash) in Windows and Linux operating systems. Emphasizes scripting cybersecurity tasks such as system configuration, system auditing, and penetration testing. Also covers Arduino microcontrollers, coding Arduino in Python, and coding TCP Traceroute. Python language is used in this course. Prerequisite: ENGT 222 or MIS 325.

ENGT 323. Introduction to Fluids (3).
2 Classroom hours; 2 Lab hours. Provides a fundamental study of fluid mechanics in various applications. Studies include closed and open systems, conservation laws, velocity and acceleration fields, deformation of fluid elements, constitutive relations, flow boundary conditions, nonisothermal flows, dynamics of external flows, Euler and Bernoulli equations, turbomachinery and more. Prerequisite: MATH 243 or MATH 252) or equivalent. Pre- or corequisite: ENGT 312 or AE 223.

ENGT 324. Applied Web Applications and Database Development (3).
When browsing on a web application, look for two things: how user-friendly the web app is and how the information is stored, controlled and used. Each web application has a set of requirements such as financial transaction, customer information, etc. Course covers web and database technologies, services, protocols, design and operation. Students learn a variety of languages including HTML, CSS, Apache and MySQL. Course is designed to apply the languages through hands-on projects. Prerequisite: ENGT 222 or MIS 325.

ENGT 334. Introduction to Strength and Mechanics of Materials (3).
Provides students with a foundational knowledge of strength of materials, with an emphasis on applications and problem solving. Includes topics such as simple stresses and strains, shaft torsion, shear force and bending moment diagrams, beam stresses, combined stresses and experimental stress analysis. Prerequisite: (MATH 243 or MATH 252) or equivalent. Pre- or corequisite: ENGT 312 or AE 223.

Applies statics, dynamics and strength of materials methods to the selection of basic machine components. Develops the fundamental principles required for selection of individual elements that compose a machine. Prerequisites: ENGT 313 and ENGT 334 or equivalent.

ENGT 354. Statistical Process Control (3).
Focuses on the applied aspects of statistical process control. Includes an introduction to probability and statistics, applied control charts, acceptance sampling, and lean six sigma concepts. Pre- or corequisite: MATH 243 or 252.

ENGT 361. Industrial Controls and Instrumentation (4).
3 Classroom hours; 2 Lab hours. Cross-listed as IME 361. Introduces the principles of measurement and data acquisition, transmission and application in industrial and commercial systems. The theory and application of electronic programmable devices such as programmable logic controllers, temperature controllers, counters, etc., Ladder logic and input/output devices are emphasized. Laboratory exercises include loop wiring, calibration, controller configuration and troubleshooting. Prerequisite: ENGT 320 or EE 282 with a minimum grade of C (2.000).

ENGT 370. Environmental Engineering Technology (3).
Introduces students to the causes and effects of environmental problems, and to the engineering processes that can control them. Students get an overview of the major themes in the field of environmental engineering including the effect of human population growth and increased urbanization on the environment, energy consumption and production, water supply and treatment, air pollution and global climate change. Prerequisites: ENGT 301, CHEM 211; or departmental consent.
ENGT 399. Selected Topics (1-4).
New or special topics presented on sufficient demand. Students should enroll in the lettered courses with specific topics in the title (e.g. 399A, 399B, etc.) rather than in this root course. Repeatable for credit when subject material warrants. Prerequisite: instructor’s consent.

ENGT 399A. Cybersecurity Awareness (3).
The ability to secure information within a modern enterprise is a growing challenge. Threats to information security are global, persistent, and increasingly sophisticated. Effective information security at all levels requires participation, planning, and practice. It is an ongoing effort that requires all participants to work together from the same script. Fortunately, the information security community has developed a variety of resources, methods, and best practices to help modern enterprises address the challenge. Unfortunately, employing these tools demands a high degree of commitment, understanding, and skill—attributes that must be sustained through constant awareness and training. This course is designed to teach all functional levels within the enterprise to deliver information system security. To this end, the course addresses a range of topics, each of which is vital to securing the modern enterprise. These topics include inter alia plans and policies, enterprise roles, security metrics, risk management, standards and regulations, physical security, and business continuity. Each piece of the puzzle must be in place for the enterprise to achieve its security goals; adversaries will invariably find and exploit weak links.

ENGT 399B. Human Threats to Cybersecurity (3).
Kevin Mitnick, one of the most famous social engineers in the world, popularized the term “social engineering.” He explained that it is much easier to trick someone into revealing a password for a system than to exert the effort of hacking into the system. Mitnick claims that this social engineering tactic was the single-most effective method in his arsenal. This course will cover human threats in cybersecurity, in context to political, social, and economic contexts. This will include targeted exploitation/manipulation of individuals, small groups, larger groups through Social Engineering, marketing, propaganda/psychological operations by personal contact, email, social networking, web, RF transmission.

ENGT 401. Senior Project I (3).
Comprehensively covers the student’s concentration in engineering technology and its applications. Students work with faculty to determine their senior project. Prerequisites: ENGT 201, and departmental consent.

ENGT 402. Senior Project II (3).
Continuation of ENGT 401, Senior Project I. Prerequisites: ENGT 401, senior standing.

ENGT 410. Robotics Technology (3).
2 Classroom hours; 3 Lab hours. Cross-listed as IME 410. Examines systems using robotics in technology. Provides the fundamentals of manipulators, sensors, actuator, end-effectors, and product design for automation. Includes kinematics, controls, programming of manipulator, and simulation. Also covers artificial intelligence. Prerequisite: IME 361 or ENGT 361 with a minimum grade of C (2.000) or instructor's consent.

ENGT 411. Microcomputer-Based Mechanical Systems Technologies (3).
2 Classroom hours; 3 Lab hours. Cross-listed as IME 411. Focuses on microcomputer-based real-time control of mechanical systems technologies. Familiarizes students with software methodologies used for real-time control. Includes laboratory sessions involving interfacing microcomputers to mechanical systems. Prerequisites: ENGT 361 and 410; or instructor's approval.

ENGT 440. Engineering Technology Management (3).
Introduces the management and control of technologically based projects as they apply to engineering. Considers both the theoretical and practical aspects of systems models, organizational development, project planning and control, resource allocation, team development and personal skill assessment. Prerequisites: IME 254, 255.

ENGT 441. Analysis of Decision Processes in Technology (3).
Provides decision analysis as it applies to capital equipment selection and replacement, process design, and policy development. Develops and applies explicit consideration of risk, uncertainty and multiple attributes using modern computer-aided analysis techniques. Prerequisite: IME 255.

ENGT 481A. Cooperative Education (1).
Introduces the student to engineering practice by working in industry in an engineering/technology related job. Provides a planned professional experience designed to complement and enhance the student's academic program. Individualized programs must be formulated in consultation with, and approved by, appropriate faculty sponsors and cooperative education coordinators. Intended for students who will be working full time on their co-op assignment and need not be enrolled in any other course. Repeatable for credit. Prerequisites: junior standing and approval by the appropriate faculty sponsor.

ENGT 481B. Human Threats to Cybersecurity (3).
Complements and enhances the student's academic program by providing an opportunity to apply and acquire knowledge in a workplace environment as an intern. Prerequisite: departmental consent.

ENGT 481N. Internship (1).
Complements and enhances the student's academic program by providing an opportunity to apply and acquire knowledge in a workplace environment as an intern. Prerequisite: departmental consent.

ENGT 481P. Cooperative Education (1).
Introduces the student to engineering practice by working in industry in an engineering/technology related job. Provides a planned professional experience designed to complement and enhance the student's academic program. Individualized programs must be formulated in consultation with, and approved by, appropriate faculty sponsors and cooperative education coordinators. Students must enroll concurrently in a minimum of 6 credit hours of coursework including this course in addition to a minimum of 20 hours per week at their co-op assignment. Repeatable for credit. Prerequisites: junior standing and approval by the appropriate faculty sponsor.

ENGT 490. Sustainable Power Generation (3).
Provides the fundamentals of sustainable power generation including solar, geothermal, biomass, wind, hydro, tidal and wave. Covers embedded renewable generation: technical challenges, opportunities and connection in electrical transmission and distribution grids. Prerequisite: ENGT 360. Pre- or corequisite: ME 469.

ENGT 491. Applied Fluid Mechanics (3).
2 Classroom hours; 2 Lab hours. Covers fluid properties, fluid statics, fluid flow concepts, dynamic similarity, fluid resistance, ideal flow, compressible flow, and pneumatic and hydraulic applications. Prerequisite: ENGT 303.

ENGT 492. Energy Management and Sustainability (3).
Provides a study of the global energy situation and the interactions between human activities in the energy field and in the environment. Provides knowledge of available management systems (ISO 14001 and ISO 50001) and tools as well as technical mitigation methods relevant to the energy field that are applicable within the existing legal framework. Prerequisite: ENGT 360 or ENGT 370. Pre- or corequisite: IME 255.
ENGT 497. Electrical Machines and Electronic Circuits (4).
3 Classroom hours; 2 Lab hours. Covers introduction to three phase circuits; ideal, practical, single phase, three phase, and auto transformers; single phase and three phase induction motors; synchronous machines; DC shunt, series, compound machines, their characteristics, and armature reaction; introduction to semiconducting materials, ideal and practical diode and their characteristics, and introduction to transistors. Prerequisite: ENGT 320 or EE 282. Corequisite: ENGT 497L.

Covers concepts related to cyber attack, penetration testing, cyber intelligence, reverse engineering, and cryptanalysis. Students learn how security infrastructure integrates with the rest of the business and IT infrastructure through the use of hands-on projects. Prerequisite: MIS 310 with a C- or better grade, or instructor's consent.

ENGT 510. Solar and Wind Engineering (3).
2 Classroom hours; 2 Lab hours. Covers types of solar generation, solar radiation, sun path charts, shading effect, sizing of solar panels, inverters, batteries, V-1 curves for solar panels, grid connected and off-grid solar system, types of batteries, NEC codes for solar systems, economic analysis of PV system, carbon footprint, wind power generation, advantages and disadvantages of wind power, comparison between the wind energy and solar energy, wind energy system economics and environmental aspects and impacts. Prerequisite: ENGT 320 or EE 282.

ENGT 590. Independent Study in Engineering Technology (1-3).
Arranged individual independent study in specialized areas of engineering technology under the supervision of a faculty member. Repeatable for credit. Prerequisite: consent of the supervising faculty member.

ENGT 600. Water and Wastewater Treatment (3).
Studies water quality constituents and introduces the design and operation of water and wastewater treatment processes. Prerequisites: ENGT 323, ENGT 370; or departmental consent.

ENGT 601. Digital Forensics (3).
Covers concepts related to hardware and software forensics, incident response, cyber crime, and cyber law enforcement. Students learn different aspects of computer and cyber crime and ways in which to uncover, protect, exploit, and document digital evidence. Students are exposed to different types of tools (both software and hardware), techniques and procedure, and are able to use them to perform rudimentary forensic investigations. Focuses on the entire lifecycle of incident response, including preparation, data collection, data analysis, and remediation. Case studies reveal the methods behind and remediation strategies for today's most insidious attacks. Prerequisite: ENGT 501 with a C- or better grade, or instructor's consent.

Focuses on the methodology to conduct cyber security risk assessments for critical cyber and cyber-physical systems. Students learn risk assessment methodology techniques to: identify, classify, and analyze cyber threats and vulnerabilities in cyber and cyber-physical systems, conduct criticality and impact analysis, and create risk mitigation plans. Also, students learn how to design cyber-infrastructures to securely capture, process and manage cyber security data obtained from embedded systems deployed in industrial infrastructures, SCADA networks and control systems. Prerequisite: ENGT 501 with a C- or better grade, or instructor's consent.

ENGT 610. Hydraulics and Hydrology (3).
Studies water resources engineering topics and methods. Hydraulic and hydrological concepts are explored through the application of fundamental conservation laws and ecologically-based design theory.

Students apply the concept of fluid mechanics to pipe networks, hydraulic machinery, and open channel flow, flow control devices, flood routing, groundwater flow and management, and develop quantitative approaches for answering questions in engineering hydrology. Prerequisite: ENGT 323 or departmental consent.

ENGT 611. Cyber Risk Management (3).
Covers concepts related to cyber resilience, mission assurance, disaster recovery, business continuity, security evaluation, and cyber economics. Prerequisites: ENGT 601 with a C- or better grade, or instructor's consent.

ENGT 612. Secure Web Development (3).
Covers concepts related to the development of secure web-based systems, security mitigation strategies and secure coding, penetration testing, and security in systems using advanced web technologies. Prerequisite: ENGT 601 with a C- or better grade, or instructor's consent.

ENGT 620. Structural Analysis and Design (3).
Studies the functions of structure, design loads, reactions and force systems; analysis of statically determinate structures including beams, trusses and arches; energy methods of determining deflections of structures; influence lines and criteria for moving loads; analysis of statically indeterminate structures including continuous beams and frames. Prerequisite: ENGT 334 or departmental consent.

ENGT 664. Engineering Project Management (3).
Introduction to the design and control of technologically-based projects. Considers both the theoretical and practical aspects of systems models, organizational development, project planning and control, resource allocation, team development and personal skill assessment. Prerequisites: IME 255, (IME 254 or ENGT 354), all with a C or better.