Engineering Technology (ENGT)

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

ENGT 281. Internship  1 credit hour
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 281L. Non-Credit Internship  0 credit hours
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 credit hours
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 credit hours
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. Corequisite: MATH 243 or MATH 252.

ENGT 313. Applied Dynamics  1 credit hour
Introductory concepts of applied dynamics including particle kinematics, force and acceleration methods for particles, and energy methods for particles. Prerequisites: (ENGT 312 or AE 223) and PHYS 213. Corequisite: MATH 243 or MATH 252.

ENGT 320. Circuits Technology with Lab  4 credit hours
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.

ENGT 323. Introduction to Fluids  3 credit hours
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. Prerequisites: (ENGT 312 or AE 223) and PHYS 213. Corequisite: MATH 243 or 252.

ENGT 330. Material Applications in Engineering  4 credit hours
3 Classroom hours; 2 Lab hours. Presents an overview of structures, properties and applications of metals, polymers, ceramics and composites commonly used in industry. Develops problem-solving skills in the areas of materials selection, evaluation, measurement and testing. Experimentally studies material applications used in aircraft structures, including experiments with metals, polymers, ceramics and composites. Prerequisites: CHEM 211, MATH 252.

ENGT 332. Aviation Safety and Security  2 credit hours
Covers safety in aviation design, operation and maintenance, hazardous materials, airport environment issues, and security regulations for aviation. Explores the physiological and psychological factors relating to flight safety, emphasizing cause and effect of airplane accidents and related problem-solving processes. Includes a systems approach to safety program development and management. Prerequisite: junior standing.

ENGT 334. Introduction to Strength and Mechanics of Materials  3 credit hours
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. Prerequisites: (ENGT 312 or AE 223) and (MATH 243 or MATH 252) or equivalent.

ENGT 348. Machine Elements  3 credit hours
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 credit hours
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. Prerequisite: MATH 243 or 252.

ENGT 361. Industrial Controls and Instrumentation  4 credit hours
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.

ENGT 370. Environmental Engineering Technology  3 credit hours
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 401. Senior Project I  3 credit hours
Comprehensively covers the student's concentration in engineering technology and its applications. Students work with faculty to determine their senior project. Prerequisites: ENGT 301, engineering technology senior standing, and departmental approval.

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

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

ENGT 411. Microcomputer-Based Mechanical Systems Technologies  3 credit hours
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. Prerequisite: both ENGT 361 and 410; or instructor's approval.

ENGT 431. Aerodynamics and Performance 2 credit hours
Covers theory of flight, aircraft structure and control, wind tunnel lab demonstrations, propulsion, performance and weight and balance. Prerequisite: ENGT 302.

ENGT 440. Engineering Technology Management 3 credit hours
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 credit hours
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 credit hour
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. Graded Cr/NCr unless preapproved by engineering technology program for technical elective credit hours. Repeatable for credit. Prerequisites: junior standing and approval by the appropriate faculty sponsor.

ENGT 481I. Noncredit Internship 0 credit hours
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 credit hour
Complements and enhances the student's academic program by providing an opportunity to apply and acquire knowledge in a workplace environment as an intern. Graded Cr/NCr. Prerequisite: departmental consent.

ENGT 481P. Cooperative Education 1 credit hour
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. Graded Cr/NCr unless preapproved by engineering technology program for technical elective credit hours. Repeatable for credit. Prerequisites: junior standing and approval by the appropriate faculty sponsor.

ENGT 490. Sustainable Power Generation 3 credit hours
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. Corequisite: ME 469.

ENGT 491. Applied Fluid Mechanics 3 credit hours
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 credit hours
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. Prerequisites: ENGT 360. Corequisite: IME 255.

ENGT 493. Energy, the Environment and Sustainability 3 credit hours
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 and tools as well as technical mitigation methods relevant to the energy field that are applicable within the existing legal framework. Prerequisites: ENGT 360, IME 255.

ENGT 497. Electrical Machines and Electronic Circuits 4 credit hours
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.

ENGT 501. Cyber Operations 4 credit hours
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 credit hours
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 credit hours
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 credit hours
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 credit hours
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.

**ENGT 602. Cyber Physical Systems  4 credit hours**
Focusses 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 credit hours**
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 credit hours**
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 credit hours**
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 credit hours**
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 credit hours**
Cross-listed as IME 664. 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.