Engineering Technology

(Bachelor of Science)

Program Mission

All of the Engineering Technology programs include a strong liberal arts base along with a number of hands-on experiences, including a capstone experience or internship that often will be working with businesses and organizations within the community.

Electrical Engineering Technology

Prepares students for a career as an electrical engineering technologist with the technical and managerial skills necessary to enter careers in the design, application, installation, manufacturing, operation and maintenance of electrical/electronic systems. Students specialize in product improvement, manufacturing, construction and operational engineering functions.

View the Electrical Engineering Technology degree description (http://www.uwgb.edu/engineer-tech/electrical-engineering-technology/degree-description-electrical-engineering)

Environmental Engineering Technology

Responds to northeastern Wisconsin manufacturers and municipalities workforce needs, and addresses the 2010-2020 Bureau of Labor Statistics projections estimating a 14 percent increase in environmental engineering technology positions. Graduates are prepared to work in a number of industries both in and outside of manufacturing, such as in industrial waste treatment, water and wastewater management, agribusiness, environmental consulting, ecological evaluations and biotechnology sectors.

View the Environmental Engineering Technology degree description (http://www.uwgb.edu/engineer-tech/environmental-engineering-technology/degree-description-environmental-engineering)

Mechanical Engineering Technology

Provides students with instruction and hands-on experience to develop competencies in applied mechanical engineering and analytical and critical problem-solving skills. Graduates and industry benefit from a more knowledgeable and flexible workforce that will fill positions in regional industries, manufacturing and engineering service firms.

View the Mechanical Engineering Technology degree description (http://www.uwgb.edu/engineer-tech/mechanical-engineering-technology/degree-description-mechanical-engineering)

- Electrical Engineering Technology (http://catalog.uwgb.edu/archive/2019-2020/undergraduate/programs/engineeringtechnology/electricalmajor)
- Environmental Engineering Technology (http://catalog.uwgb.edu/archive/2019-2020/undergraduate/programs/engineeringtechnology/environmentalmajor)
- Mechanical Engineering Technology (http://catalog.uwgb.edu/archive/2019-2020/undergraduate/programs/engineeringtechnology/mechanicalmajor)

- Electrical Engineering Technology (http://catalog.uwgb.edu/archive/2019-2020/undergraduate/programs/engineeringtechnology/cg/electrical)
- Environmental Engineering Technology (http://catalog.uwgb.edu/archive/2019-2020/undergraduate/programs/engineeringtechnology/cg/environmental)
- Mechanical Engineering Technology (http://catalog.uwgb.edu/archive/2019-2020/undergraduate/programs/engineeringtechnology/cg/mechanical)

John F Katers; Professor; Ph.D., Marquette University*

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Riaz Ahmed; Assistant Professor; Ph.D., University of South Carolina

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Mohammad Mahfuz; Assistant Professor; Ph.D., University of Ottawa

Jagadeep Thota; Assistant Professor; Ph.D., University of Nevada - Las Vegas

Courses

ET 101. Fundamentals of Engineering Technology. 2 Credits.
This course equips students with the tools to be a successful student and practicing engineering technologist. Topics covered include ethics, project management, team work, working with data, creating presentations, engineering design, and an understanding of the engineering technology profession.
P: None
Fall Only.

ET 103. Surveying. 3 Credits.
This course covers fundamental concepts and theory of engineering measurements; adjustment and use of instruments; computations; measurement of distance, difference in elevation, angles, and directions; and route and construction surveys. Applications of probability and statistical analysis of surveying are included.
P: MATH 104 or higher; Major in Environmental Engineering Tech
Fall Only.

ET 105. Fundamentals of Drawing. 3 Credits.
This course equips students with the computer aided design software tools to generate 2D and 3D graphics that meet industry standards.
P: Math 101 with at least a C grade or WPT-MFND score >465 and WPT-AALG score >525 and a declared major in Mechanical, Electrical, or Environmental Engineering Technology
Fall and Spring.

ET 116. Basic Manufacturing Processes. 3 Credits.
This course introduces machining, stamping, casting, forming, and joining of materials. It covers basic machine processes use to form materials to desired specifications and includes manufacturing of materials, heat treatment, foundry work, and shaping processes.
P: ET 101 with a C or higher and declared Mechanical Engineering Technology major OR ENGR 198 with a C or higher and declared Mechanical Engineering major
Fall Only.

ET 118. Fluids I. 3 Credits.
This course covers basic fluid properties and hydraulic power, including pneumatics, Pascal's law, control systems, hydraulic pumps, effects of fluid friction, hydraulic energy, and design of hydraulic circuits.
P: PHYSICS 103 or PHYSICS 201 with C or higher; Major in Environmental or Mechanical Engineering Tech
Spring.

ET 130. Basic Electrical Circuits I. 3 Credits.
This course uses theory, laboratory investigation, and circuit simulation to introduce basic electrical and circuit analysis principals with emphasis on DC current. Concepts of electric and magnetic fields in the context of capacitors and inductors and transient responses responses in DC circuits is included.
P: MATH 104 or higher; Major in Electrical or Mechanical Engineering Tech
Fall Only.

ET 131. Basic Electrical Circuits II. 3 Credits.
This course uses theory, laboratory investigation, and circuit simulation to introduce basic electrical and circuit analysis principals with emphasis on AC current. Transformers, 3 phase power, frequency response and analysis, and selected DC current topics will be included.
P: ET 130 with C or higher; Major in Electrical Engineering Tech
Spring.

ET 142. Introduction to Programming. 3 Credits.
This is an introductory course in computer programming using the C++ language. Topics covered include problem solving, algorithms, selected statements, repetition, arrays, functions, and sub-programs. Applications to electrical engineering technology are emphasized.
P: ET 101 with a C or higher and MATH 104 or higher and Electrical or Mechanical ET major
Fall Only.

ET 150. Codes, Safety, and Standards. 2 Credits.
This course provides a survey of codes applied to the electrical construction industry, including the National Electric Code, with discussion of safety organizations and their guidelines, including OSHA, IEEE, ISA, ANSI, and UL. Safety procedures and up-to-date electrical codes are emphasized.
P: ET 130 with a C or higher
Fall Only.

ET 201. Introduction to Environmental Engineering. 3 Credits.
This course is designed to educate students in the principal and practice of air quality management and solid and hazardous waste management. This includes sources of air pollution, health and environmental effects of air pollution, and regulations governing air pollution. For solid waste this includes sources of solid waste, disposal of solid waste, regulations, and health and environmental effects.
P: CHEM 211 and CHEM 213 with a C or higher and Major in Environmental Engineering Tech
Fall Only.

ET 203. Introduction to Water and Waste Water. 3 Credits.
This course provides an overview of water resources, drinking water standards, water quality characteristics, water pollutants, and storm water management. Sampling and laboratory instrument procedures are included with statistical analysis of data to complete lab reports.
P: CHEM 211 and CHEM 213 with a C or higher
Fall Only.

ET 206. Chemistry for Engineers. 5 Credits.
This course will provide engineering students with a background in important concepts and principles of chemistry. Emphasis will be on areas mot relevant for an engineering context with practical applications. In addition to the fundamental concepts of atomic structure, solutions, stoichiometry, kinetics, and enthalpy of reactions, the connections between chemistry, physics, and materials science will be investigated.
P: Math 104 or concurrent enrollment or equivalent and either Mechanical Engineering or Mechanical Engineering Technology major
Fall Only.

ET 207. Parametric Modeling. 3 Credits.
This course provides the skills and knowledge to create and manipulate orthographic drawings for part models, cast, molded, and sheet metal parts with weldments. Surface modeling will be emphasized and students will be introduced to software tools with kinematics and finite element stress analysis capabilities.
P: ET 105 with a C or higher or declared major in Mechanical Engineering
Spring.

ET 221. Machine Components. 3 Credits.
This course introduces concepts and techniques used in the design of a machine. The components studied include gears, shafts, cams, bearings, belts, and other hardware. Using reference handbooks and catalog specifications in choosing appropriate components for various applications is stressed.
P: ENGR 220 with a C or higher
Fall Only.

ET 232. Semiconductor Devices. 3 Credits.
This course introduces semiconductor materials and manipulation to create several types of diodes, transistors, and optoelectronic devices. The theory and operation of these devices is explored. Laboratory experiments will be performed to measure device characteristics and verify circuit performance.
P: ET 131 with a C or higher
Spring.

ET 233. Linear Circuits. 3 Credits.
This course focuses on the operation, analysis, and application of linear active circuits utilizing transistors, operational amplifiers, comparators, mixers, and other components as well as integrated circuit functions such as converters and phase locked loops.
P: ET 232 with a C or higher
Fall Only.

ET 240. Micro-controllers and Programmable Logic Controllers. 3 Credits.
This course introduces embedded computer systems and mid-range micro-controller peripherals, including electric motor control components, using assembly and C programming. PLC topics such as troubleshooting, timers, counters, sequencers, data move, math, and analog input and output are covered.
P: ET 142 and ET 233 both with a C or higher
Spring.

ET 250. Signals and Systems. 3 Credits.
This course provides an introduction to analysis techniques for continuous time and discrete time signals and typical model systems. Topics include systems definitions and properties. Signal representations and applications to circuit analysis will be made using software packages such as MATLAB.
P: MATH 203 with a C or higher
Spring.

ET 305. Environmental Systems. 4 Credits.
Physical and chemical aspects of natural environmental processes. The movement, transformation, and fate of materials and contaminants.
P: Chem 212 with at least a C grade and Geosci 202 with at least a C grade and Math 104 with at least a C grade and Biology 201/202 with at least a C grade.
Fall and Spring.

ET 308. Finite Element Analysis. 3 Credits.
This course introduces the finite element analysis (FEA) method and applications to stress analysis and structural mechanics. Topics include FEA in 1, 2, and 3 D systems, optimization using FEA, incorporation of failure criteria and other constraints, and interpretation of FEA results.
P: ET 207, ENGR 220, and Math 203 all with a C or higher
Fall Only.

ET 311. Digital Electronics. 3 Credits.
This course introduces digital electronics, the operation of logic gates, and the theory of combination logic circuits. Programmable logic devices, Karnaugh mapping, encoders, decoders, multiplexers, binary adders, party circuits, multi-vibrators, and glitch-free clocks are introduced.
P: ET 233 with a C or higher
Fall Only.

ET 318. Fluids II. 2 Credits.
This course covers the theory of fluids including hydrostatics, hydrostatic forces, buoyancy and stability, Bernoulli's equation, pipe flow, open channel flow, drag and lift.
P: ET 118 and Math 203 both with a C or higher
Fall Only.

ET 320. The Soil Environment. 4 Credits.
The physical, chemical and biological properties and principals of soils; formation, classification and distribution of major soil orders; function and management of soils in natural, agricultural and urban environments. Includes field and laboratory experiences.
P: Chem 108 with at least a C grade or 212 with at least a C grade; REC: Geosci 202.
Fall Only.

ET 322. Design Problems. 3 Credits.
In this course students apply design principles and methods to create a product or a machine. Students work with a team to prepare concept sketches, assembly drawings, detail drawings, and perform cost analysis.
P: ET 116, ET 207, and ET 221 all with a C or higher
Spring.

ET 323. Pollution Prevention. 3 Credits.
Emphasizes principles of pollution prevention and environmentally conscious products, processes and manufacturing systems. Also addresses post-use product disposal, life cycle analysis, and pollution prevention economics.
P: Env Sci 318 with at least a C grade, OR instructor consent
Spring Odd.

ET 324. Motors and Drives. 3 Credits.
This course analyzes selection, set-up, and circuitry associated with AC and DC drives and motors. Topics include DC motor characteristics. AC induction, specialty machine performance and characteristics, stepper motors, servomotors, and three phase power systems are also included.
P: ET 130 with a C or higher and either PHYSICS 103, PHYSICS 201 with a C or higher, or equivalent
Spring.

ET 330. Hydrology. 3 Credits.
Study of the principal elements of the water cycle, including precipitation, runoff, infiltration, evapotranspiration and ground water; applications to water resource projects such as low flow augmentation, flow reregulation, irrigation, public and industrial water supply and flood control.
P: MATH 104 with at least a C or higher math course
Fall Only.

ET 331. Water and Waste Water Treatment. 3 Credits.
Water and waste water treatment systems, including both sewage and potable water treatment plants and their associated collection and distribution systems. Study of the unit operations, physical, chemical and biological, used in both systems.
P: Geosci 202 with at least a C grade or Chem 211 with at least a C grade or Biology 201/202 with at least a C grade.
Spring Even.

ET 334. Solid Waste Management. 3 Credits.
This course will focus on technical concepts of solid waste management related to the design and operation of landfills, waste-to-energy systems, composting facilities, recycling facilities, and other emerging waste management technologies.
P: ET 202.

ET 336. Environmental Statistics. 2 Credits.
This course emphasizes the principles of data analysis using advanced statistical software (such as R, SAS, etc.). It employs primarily environmental examples to illustrate procedures for elementary statistical analysis, regression, analysis of variance and nonparametric statistics.
P: MATH 260
Fall and Spring.

ET 340. Advanced Programmable Logic Controllers. 3 Credits.
This course covers interfacing programmable logic controllers to communicate with each other in a complete system. Actuators used in typical industrial related processes are explored. Operation and application of electronic instrumentation and control systems are also covered.
P: ET 233 and ET 240 both with a C or higher
Fall Only.

ET 342. Supervisory Control and Data Acquisition. 3 Credits.
This course uses knowledge acquired from previous courses including embedded controllers and electrical circuit design as it applies to techniques for precision measurements, interpreting measurement data, and using it to control systems. Hands on laboratory experiments are provided to demonstrate and verify the concepts in precision measurement theory as it relates to process measurements and the accuracy of electrical measurements in industry.
P: ET 240 with a C or higher
Fall Only.

ET 344. Industrial Electronics and Control. 3 Credits.
This course covers the fundamental concepts of power electronics, characteristics of static power semiconductor devices (BJT, MOSFET, IGBT, Thyristors), AC/DC power converters: uncontrolled and controlled rectifiers (single phase and three phase), dual converter, AC/AC power converters: phase controlled converters (single phase and three phase), AC switch, cycloconverter. DC/DC converters: choppers (step down and step up), switching regulators (buck, boost, buck-boost), DC/AC converters: single phase and three phase inverters, and various power control applications.
P: ET 311 with a C or higher
Spring.

ET 346. Electrical Power Systems. 3 Credits.
This course covers characteristics of three phase power configurations and utility systems interconnection from generation through distribution, including powerhouse, renewable, nuclear, transmission, utility grid, device coordination, metering, protective relays, fuses, breakers, and fault circuit interrupting.
P: ET 240 with a C or higher
Spring.

ET 348. Electromagnetic Fields and Applications. 3 Credits.
This course includes electromagnetic vector quantities and vector operations in different coordinate systems. Static and dynamic systems are explored in the context of applications such as circuits, dielectric and permeable materials, transmission lines, antennas and waveguides.
P: MATH 203 with a C or higher and either PHYSICS 104 or PHYSICS 202 or equivalent with a C or higher
Fall Only.

ET 350. Data Communication and Protocols. 3 Credits.
Concepts needed to understand data, communications, and networking are presented in this course. The principles associated with data communication, transmission media, interfaces, error control, flow control, synchronization, circuit switching, and packet switching are investigated.
P: ET 250 with a grade of C or higher
Spring.

ET 360. Project Management. 3 Credits.
This course presents an overview of project management with an emphasis on engineering projects. Topics include pre-construction planning, project scheduling systems, critical path management, risk and effects analysis, and failure models.
P: Junior standing and either Electrical, Environmental, or Mechanical Engineering Technology major or junior standing and Mechanical Engineering major
Spring.

ET 377. Industrial Safety and Hygiene. 3 Credits.
This course analyzes hazards that can affect safety/health, including assessment of safety/health risks, associated with equipment, materials, processes, and activities. Also covered will be occupational health and safety management principles to initiate and/or improve safety management systems.
P: ET 101, ET 201, ET 203, and CHEM 212; REC: BIOLOGY 201/202.

ET 390. Mechatronics. 4 Credits.
This course is the study of mechanical, electrical, and electronic systems. Students from both the mechanical engineering and mechanical engineering technology programs will form teams and will design and build a project using an electro-mechanical control system.
P: declared major in Mechanical Engineering Technology and both ET 130 and ET 322 with a C or higher or declared major in Mechanical Engineering and ENGR 208, ENGR 220, and ET 221 all with a C or higher
Spring.

ET 391. GIS. 3 Credits.
This course provides an introduction to Geographic Information Systems and the utilization of spatial data for solving geographic problems. Both theoretical concepts of GIS technology and practical applications of GIS will be studied.
P: ET 101 and ET 105 both with a grade of C or higher
Fall Only.

ET 400. Co-op/Internship in Engineering Technology. 3 Credits.
Co-ops/internships are offered on an individual basis and consist of a program of learning activities planned in consultation with a faculty member and an industry sponsor. A student may also conduct research with sponsorship of an individual faculty member. Course is not repeatable for credit.
P: junior or senior standing; Major in Electrical, Environmental or Mechanical Engineering Tech
Fall and Spring.

ET 410. Capstone Project. 3 Credits.
In this class students form teams and define a technological problem with specifications. After developing project proposals, teams work toward solutions while applying principles of technical design from the curriculum. Each team will deliver a formal presentation and each student will provide a written report upon completion.
P: ET 360 and senior standing; Major in Electrical, Environmental or Mechanical Engineering Tech
Spring.

ET 415. Solar and Alternate Energy Systems. 3 Credits.
Study of alternate energy systems which may be the important energy sources in the future, such as solar, wind, biomass, fusion, ocean thermal, fuel cells and magneto hydrodynamics.
P: Physics 104 with at least a C grade or 202 with at least a C grade.
Spring Even.

ET 420. Lean Processes. 3 Credits.
This course focuses on the time value of money as well as operating a business using lean manufacturing with the Sic Sigma and other operational models. Topics covered include decisions under risk, best alternative using economic models, present worth analysis, rate of return, and cost benefit analysis.
P: ET 101, ET 360 or concurrent enrollment; Major in Environmental Engineering Tech.

ET 424. Hazardous and Toxic Materials. 3 Credits.
The handling, processing, and disposal of materials which have physical, chemical, and biological properties that present hazards to human, animal, and plant life; procedures for worker safety and for compliance with regulations. The metals and nonmetals, carcinogens, radioactive materials, and pathogenic human, animal, and plant wastes.
P: CHEM 212
Spring Odd.

ET 432. Hydrogeology. 3 Credits.
Introduction to the geological and physical principles governing ground water flow. Description of aquifer properties, chemical processes, equation of flow, well hydraulics, and environmental concerns.
P: Geosci 202 with at least a C grade; REC: Env Sci 330 with at least a C grade; Math 202.
Spring.

ET 433. Ground Water: Resources and Regulations. 3 Credits.
An overview of the geology, properties, flow, and pollution of ground water systems. Techniques of aquifer characterization and water quality monitoring are introduced and evaluated. Regulatory and policy approaches to moderate use and ensure adequate high quality supplies of this valuable resource in the future are also reviewed.
P: GEOSCI 202
Fall Even.

ET 444. Geochemistry of Natural Waters. 3 Credits.
This class will explore the theory and application of aqueous geochemistry principles to the study of surface and groundwater systems at low to moderate temperatures. The class will focus on inorganic processes including the hydrologic cycle, chemical weathering, chemical activities in natural waters, thermodynamics, kinetics, acid/base equilibria, carbonate chemistry, acid water systems, heavy metals, redox reactions, saline waters, and ancient fluids preserved in fluid inclusions.
P: GEOSCI 202, CHEM 211 & CHEM 212
Fall Even.

ET 464. Atmospheric Pollution and Abatement. 3 Credits.
This course will provide students an understanding of atmospheric processes and weather patterns and how they affect pollutant transport. Sources, sinks, environmental effects, and abatement technologies for air pollutants will be addressed. Atmospheric reactions that create pollution or deplete stratospheric ozone will be included.
P: CHEM 212 and CHEM 214 and ET 201
Fall Odd.

ET 498. Independent Study. 1-4 Credits.
Independent study is offered on an individual basis at the student's request and consists of a program of learning activities planned in consultation with a faculty member. A student wishing to study or conduct research in an area not represented in available scheduled courses should develop a preliminary proposal and seek the sponsorship of a faculty member. The student's advisor can direct him or her to instructors with appropriate interests. A written report or equivalent is required for evaluation, and a short title describing the program must be sent early in the semester to the registrar for entry on the student's transcript. Course is repeatable for credit.
P: fr or so st with cum gpa > or = 2.50; or jr or sr st with cum gpa > or = 2.00.