

Engineering (ENGR)

Courses

ENGR 198. First Year Seminar. 3 Credits.

This course will introduce students to the field of mechanical engineering, and the relationships between science, mathematics, and communication for the analysis, design, and manufacture of mechanical products and systems. It will also include ethics and professionalism in engineering.
Spring.

ENGR 202. An Introduction to Smart Cities. 3 Credits.

It is anticipated that in the near future a significant portion of world population will live in cities. Cities of the future need to be smart, sustainable, and efficient. This course introduces students to the concept of Smart Cities and explains the technologies, infrastructure, transportation, healthcare systems, and security that must be considered in economic and sustainable development policies. Case studies of a diverse selection of present day smart cities are included to demonstrate the aspects of smart cities in the present and future.
Spring.

ENGR 204. Programming for Engineers. 2 Credits.

This course introduces students to the fundamental principles of programming for solving engineering problems and familiarizes students with the process of computational thinking and translation of real life engineering to computational problems. Programming languages covered include MATLAB, Python and C.

P: ENGR 198 with at least a C, MATH 202 with at least a C, and declared Mechanical Engineering major

Fall Only.

ENGR 208. Fundamentals of Electric Circuits. 4 Credits.

This course provides an introduction to DC and AC electrical circuit analysis, electronic devices and circuits, transducers, electric machines, and power transmission. It includes both lecture and lab.

P: MATH 203, PHYSICS 201, or concurrent enrollment and ENGR 198 all with a C or higher and declared major in Mechanical Engineering

Fall and Spring.

ENGR 213. Mechanics I. 3 Credits.

Elementary vector operations, resultant of two- and three-dimensional force systems, centroid, hydrostatic forces, equilibrium of trusses and frames, laws of friction and impending motion, moments of inertia, virtual work, stability.

P: MATH 202 with a C or higher and declared major in either Mechanical Engineering or Mechanical Engineering Technology

Fall Only.

ENGR 214. Mechanics II. 3 Credits.

Displacement, velocity and acceleration components, kinematics of particles using rectilinear and curvilinear coordinates, relative motion, solution and plane motion of rigid bodies, work and potential energy of particles and rigid bodies, linear and angular impulse and momentum, central force motion.

P: ENGR 213

Spring.

ENGR 220. Mechanics of Materials. 3 Credits.

This course covers the distribution of forces in materials, trusses, and other rigid structures. Topics include stress and strain, torsion, shear and bending moments, thermal expansion and stress, Mohr's circle, and column theory.

P: ENGR 214 or concurrent enrollment and ET 101 with a C or higher; Major in Mechanical Engineering Tech

Spring.

ENGR 221. Mechanics of Materials Lab. 1 Credit.

This lab teaches students an applied analysis of the distribution of forces in static structures; analysis of axial, torsional, and bending stresses; and loading analysis of systems.

P: ENGR 220 or concurrent enrollment

Spring.

ENGR 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 311

Spring.

ENGR 301. Engineering Materials. 2 Credits.

This course covers the basic behavior and processing of engineering materials, including metals, ceramics, plastics, and alloys. Phase behavior of alloys, response to applied loads, crystalline and noncrystalline behavior are included.

P: ET 206 with a C or higher OR CHEM 212 with a C or higher

Fall Only.

ENGR 312. Engineering Measurements. 2 Credits.

This course teaches students instrumentation and techniques for measurement of mechanical phenomena. It includes generalized measurement systems, characteristics of dynamic signals, calibration, recording systems, error and statistical analysis.

P: ENGR 208 and PHYSICS 202, both with at least a C and MATH 260 with at least a C

Fall Only.

ENGR 322. Engineering Measurements Lab. 1 Credit.

This course introduces students to the laboratory analysis of Engineering Measurements including instrumentation and measurement systems, calibration, error and statistical methods applied to engineering processes.

P: ENGR 312 with at least a C or concurrent enrollment

Fall Only.

ENGR 324. Engineering Thermodynamics. 3 Credits.

This course teaches student engineering applications of thermodynamics including the first and second laws, behavior of condensable and non-condensable substances, analysis of open and closed systems, equations of state, and power and refrigeration cycles.

P: MATH 203 with at least a C, ET 206 or CHEM 211, 212, 213, and 214 with at least a C; declared major in Mechanical Engineering or Mechanical Engineering Technology

Spring.

ENGR 326. Numerical Methods. 4 Credits.

This course teaches students applied numerical analysis for linear and non-linear engineering problems; systems of linear equations, non-linear equations, eigen value problems, and optimization techniques; approximate numerical integration and differentiation; developing numerical methods; and solving for initial and boundary value problems. The course includes both a lecture and a lab.

P: MATH 305 with a C or higher or concurrent enrollment and ENGR 204 with a C or higher

Fall Only.

ENGR 336. Fluids. 3 Credits.

This course provides an introduction to fluid properties, fluid statics, and fluid dynamics; potential flow; dimensional analysis; closed conduits and external flow; boundary-layer theory; compressible flows; and turbomachinery.

P: ENGR 214, MATH 305, and PHYSICS 202 all with a C or higher

Fall Only.

ENGR 337. Fluids Lab. 1 Credit.

This laboratory course introduces students to the experimental analysis of Fluid Dynamics concepts including measurement of fluid properties, applications of Bernoulli's equation, and fluid power systems.

P: ENGR 336 with a C or higher or concurrent enrollment

Fall Only.

ENGR 340. Analysis of Dynamic Systems. 3 Credits.

This course introduces students to mathematical modeling and analysis of dynamic systems with mechanical, thermal, and fluid elements. Topics include time and frequency domain solutions, linearization techniques, state space modeling and solutions.

P: ENGR 214 with a C or higher and MATH 305 with a C or higher

Spring.

ENGR 342. Supervisory Control and Data Acquisition. 3 Credits.

This course uses knowledge acquired from previous courses as it applies to techniques for precision measurements, interpreting measurement data and using it in control systems. Hands on laboratory experiments are provided to demonstrate and verify the concepts in precision measurement theory.

P: ET 240

Fall Only.

ENGR 402. Smart Cities: Engineering the Future. 3 Credits.

Cities are now a major hub of human populations and in the near future a majority of the world's population will live in cities. To meet growth needs, future cities must be engineering to be smart, sustainable, and efficient. This course characterizes features of smart cities, particularly the role of engineering and technology in the design of infrastructure, transportation, health care, and the security and privacy required in smart systems. Case studies will be used to assess and analyze the economics, policy making, and sustainability of smart city design.

P: MATH 104 or higher with at least a C or graduate standing. REC: ENV SCI 102 or ENV SCI 260 or ET 101 or ENGR 198

Fall and Spring.

ENGR 430. Heat Transfer. 3 Credits.

This course teaches students fundamental concepts of steady-state and transient conduction, convection, and radiation. It also includes an introduction to heat exchanger principles and applications.

P: ENGR 324 and MATH 305, both with a C or higher

Fall Only.

ENGR 431. Thermal Lab. 1 Credit.

This laboratory course includes experimental analysis of Fluid Dynamics concepts including measurement of fluid properties, applications of Bernoulli's equation, and fluid power systems.

P: ENGR 430 with a C or higher or concurrent enrollment

Fall Only.

ENGR 432. Automatic Controls. 4 Credits.

This combined lecture and lab course gives students an introduction to feedback control system concepts; mathematical modeling of mechanical, hydraulic, electro-mechanical, and servo systems; feedback system characteristics and performance; stability; design; and compensation of control systems.

P: ENGR 208 and ENGR 340, both with a C or higher

Spring Even.

ENGR 460. Senior Design. 3 Credits.

Senior design is the mechanical engineering synthesis course in which students complete a senior design process that includes project proposal, design definition, design analysis, design completion, oral presentation, and a written report.

P: ET 360, ENGR 336, and ENGR 430 all with a C or higher

Spring.

ENGR 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.

Fall and Spring.