

2015-2016 Engineering Course Descriptions

ECE 310 Engineering Surveying. This course presents the theory and practice of land surveying including observing distances, elevations, and angles; analysis of errors in surveying measurements; computations of irregular areas; circular and parabolic curves; and Earth-work estimates. It also includes computer applications, photogrammetry, geographic information systems (GIS) and global positioning systems (GPS) technologies. This course has a laboratory component. Prerequisites: EGE 120 and MTH 142. 2 Semester Hours.

ECE 320 Transportation Engineering and Traffic Analysis. This course presents an introduction to highway engineering and traffic analysis including road vehicle performance involving tractive effort, resistances, and principles of braking; geometric design of highways considering horizontal and vertical alignments; pavement analysis and design of rigid and flexible pavements; fundamentals of traffic flow and queuing theory; and highway capacity and level-of-service analysis. Prerequisites: EGE 210 and ECE 310. 2 Semester Hours.

ECE 330 Environmental Engineering. This course provides an introduction to environmental engineering. The emphasis will be on introducing students to the fundamental science and principles of environmental engineering. These principles are applied to solve environmental engineering problems, including the design of unit processes in engineered systems and modeling of pollutants in natural systems. This course has a laboratory component. Prerequisites: CHE 120N and EGE 220. 4 Semester Hours.

ECE 340 Structural Analysis. This course presents an introduction to structural analysis of statically determinate and indeterminate structures including shear and moment diagrams, influence lines, and deflection calculations using force-displacement methods. Students will determine structural loads, and the use of commercially available software to analyze trusses and frames. Prerequisite: EGE 240. 4 semester hours.

ECE 350 Geotechnical Engineering. This course provides students with theoretical background in soil mechanics as applied to civil engineering design. Students will learn how the soil history affects engineering properties such as bearing capacity. They will learn how to classify soil and determine internal stresses. The laboratory component provides students with the opportunity to apply their theoretical knowledge to standard soil testing techniques. There is a design project associated with this course. This course consists of three lecture hours and one three-hour lab session per week. Prerequisites: EGE 240. 4 semester hours.

ECE 360 Water Resource Engineering. This course provides students with theoretical background in closed-conduit hydraulics, open channel hydraulics, and hydrology applied to civil engineering design. This course introduces students to a) the quantification of water flows in the hydrologic cycle, b) the design of simple water distribution networks, and c) the principles of uniform and gradually varied open channel flow. There is a design project and a two hour lab associated with this course. Prerequisite: EGE 220. 4 semester hours.

ECE 420 Structural Design. This course provides students with the principles to design structures, using applicable design codes. Students will learn to determine structural loads, design steel members (tension, compression, beams, and frames), as well as simple steel connections. Students will also understand the properties of concrete and how to design reinforced concrete beams, columns, one-way slabs, and retaining walls. Students will mold and strength test concrete specimens. Structural engineering software will be used to reinforce the analysis and design principles. Prerequisites ECE 340 and MTH 333. 4 semester hours.

ECE 440 Hydraulic Engineering Design. This course will apply knowledge gained in water resources engineering to hydraulic engineering design. Students will design a hydraulic structure that conforms to client requirements and local codes. There will be a final design report and presentation. In addition material associated with the design project, students will be exposed to contemporary issues in hydraulic engineering. Prerequisite: ECE 360. 2 semester hours.

ECE 450 Separation Processes. This course provides students with the theory and applications of separation processes to the design of systems for solids, liquids, and gas separation. Topics include but not limited to: absorption, adsorption, membrane processes, ion exchange, stripping, and distillation. Prerequisite: ECE 330. 2 Semester Hours

ECE 460 Geotechnical Engineering Design. In this course students will apply knowledge of geotechnical engineering theory to the design of foundations and retaining walls. Use knowledge of shear strength, bearing capacity, and lateral earth pressures in their designs. Design topics discussed will include both shallow and deep foundation design along with wall and geotextile design. Prerequisite: ECE 350. 2 Semester Hours.

ECE 480 Civil Engineering Capstone I. This course involves the study and investigation of an open-ended problem in the field of Civil Engineering. The emphasis of this course is on independent learning, literature search and identification of viable solutions for the defined problem. This course is the first component of the Senior Culminating Experience requirement. Prerequisites: ECE 330, ECE 340, ECE 350 and ECE 360. 2 Semester Hours.

ECE 490 Civil Engineering Capstone II. This course is a continuation of ECE 480 with an emphasis on the execution of the design identified for solving the problem introduced in ECE 480. The emphasis of this course is on data collection, analysis, and justification of the most viable solution for the defined problem. This includes providing detailed design calculations and engineering drawings in addition to incorporating engineering standards and realistic constraints that include economic, environmental, sustainability, manufacturability, ethical, health, social, and political considerations. This course is the second and final component of the Senior Culminating Experience requirement for Civil Engineering students. Prerequisite: ECE 480 with a grade of C or better. 4 Semester Hours.

EGE 110 Introduction to the Engineering Profession. A highly interactive seminar style course that explores all aspects of the engineering profession, including engineering disciplines, challenges, education, and employment; creativity and design; and the professional responsibilities of engineers. Student teams make presentations that discuss the relevance of course topics to current events. 2 Semester Hours.

EGE 120 Introduction to Engineering Analysis and Problem Solving. A hands-on introduction to the practice of engineering and the use of engineering tools to solve problems and design products. Students will complete individual and team assignments using hardware and software platforms. Prerequisites: EGE 110 and MTH 141. (MTH 141 may be taken concurrently.) 4 Semester Hours.

EGE 210 Statics and Dynamics. The study of force systems in two and three dimensions to explore the principles of equilibrium applied to various bodies and simple structures, and the kinematics and kinetics of plane motion of particles. The principles of work and energy and impulse and momentum are also introduced. Course makes extensive use of vector methods. This course has a laboratory component. Prerequisites: EGE 120, MTH 141 with a grade of C- or better, PHY 101, and MTH 142. (MTH 142 may be taken concurrently). 4 semester hours.

EGE 220 Thermodynamics and Fluid Mechanics I. This course is an equal balance between Thermodynamics and Fluid Mechanics. Thermodynamics concepts covered are basic concepts, ideal gas, internal energy, enthalpy, evaluating properties and the first law applied to control mass and control volume systems. Fluid Mechanics concepts covered are fluid measurement, hydrostatics, integral relations-conservation of mass, momentum and energy, Bernoulli equation and viscous flow in pipes. 200 minutes of lecture and one 110 minute lab per week. Prerequisites MTH 142, CHE 120N and EGE 210. 4 Semester Hours.

EGE 230 Material Science. Introduction to the structure, processing, properties, and performance of engineering materials, including metals, glasses, ceramics, and composites. Prerequisite: CHE 120N. 2 Semester Hours.

EGE 240 Mechanics of Materials. Introduction to the behavior of materials, including stress-strain diagram, Hooke's law, principal stresses and strains, Mohr's circle, strain gauges, determination of stresses and deformations in statically determinate and indeterminate members subjected to axial loading, torsion, and bending. Stress analysis of components under general loading are also presented in this course. This course has a laboratory component. Prerequisite: EGE 210. 4 Semester Hours.

EGE 310 Product Design and Development. This course presents interdisciplinary content from business and engineering with an emphasis on the process of product development. The steps in the product development process are presented to give shape to a design idea to make a commercially viable product. Student teams will design a product, construct an Alpha prototype and present the prototype with a business case in support of the product. Prerequisites: EGE 230, EGE 240 and MGT 495. 4 Semester Hours.

EGE 320 International Engineering Field Experience. This course will provide the student with an interdisciplinary, multidisciplinary, and international exposure to engineering projects, specifically projects in the developing world. The course will expose students to the grand challenges of engineering and the need for various stakeholders (engineers, scientists, policy-makers, etc.) to collaborate and to develop, test, and implement innovative, appropriate, cost-effective, and sustainable solutions. Prerequisites: EGE 220, EGE 230, EGE 240 and Foreign Language Proficiency. 2 Semester Hours.

EGE 440 Introduction to Finite Element Analysis. This course introduces the methodology of finite element modeling and analysis. Topics include selection of elements, use of symmetry, plane stress, plane strain, and isoparametric formulation. This course will make extensive use of ANSYS for finite element analysis. Prerequisites: EGE 230 and EGE 240. 2 Semester Hours.

EGE 450 Fatigue and Fracture Mechanics. This course involves the study of low cycle fatigue, high cycle fatigue and fracture mechanics. The emphasis of the course content will be on the incorporation of fatigue and fracture considerations in engineering design to ensure structural integrity. Topics of study include crack initiation, crack growth, notch effects, stress-based fatigue and strain-based fatigue. Prerequisites: EGE 230 and EGE 240. 2 Semester Hours

EME 310 Kinematics and Dynamics of Machinery. This course involves the study of the synthesis and analysis required for the design of mechanical systems. The core content is based on the kinematic and kinetic analysis of rigid bodies and the application of this analysis to commonly used devices and products. This course introduces computer aided engineering (CAE) for the analysis of mechanisms. Prerequisite: EGE 210. 4 Semester Hours.

EME 320 Thermodynamics and Fluid Mechanics II. This course is a continuation of Thermodynamics and Fluid Mechanics I. Thermodynamics concepts covered are second law, entropy, exergy, power cycles – rankine, otto, diesel, brayton, refrigeration, psychrometry and reaction thermodynamics. Fluid Mechanics concepts covered are flow past immersed bodies, similarity analysis, differential analysis – total acceleration, continuity, navier-stokes and turbomachines. 200 minutes of lecture and one 110 minutes of lab per week. Lab includes experiments and computer simulations to compliment the lectures. Prerequisites: MTH 333 and EGE 220. 4 Semester Hours.

EME 330 Design of Machine Elements. This course provides students with the theoretical background required for designing components and systems that need to withstand static as well as cyclic loading. The principles of design are applied to multiple elements that are commonly used in Mechanical Engineering. This course introduces students to the application of finite element analysis and the principles of probabilistic design for designing machine elements, parts and systems. Prerequisites: EGE 230 and EGE 240. 4 Semester Hours.

EME 410 Control of Dynamic Systems. This course involves the study of analysis and design of control systems for mechanical, electrical and electro-mechanical systems. The core content of this course involves mathematical modeling of dynamic systems and subsequent analysis in time domain and frequency domain. This course introduces concepts of state space design and digital control. Extensive usage of computing tools for simulation of control systems is also integrated into the course content. Required laboratory in dynamic systems provides hands-on experience with dynamic system equipment, instrumentation, control and analysis. Prerequisites: EME 310 and MTH 333. 4 semester hours.

EME 420 Mechanical Vibrations. This course involves the study of mathematical modeling for the analysis of dynamic systems. Systems with one degree-of-freedom and multiple degrees-of-freedom are covered with specific focus on mechanical vibrations. Topics of study include vibration isolation and control, damping, harmonic excitation, periodic and non-periodic excitation and modal analysis. An introduction to laboratory equipment and measurement for modal analysis of vibrations. Prerequisites EME 310 and MTH 333. 4 semester hours.

EME 430 Heat Transfer. This course covers the basic modes of heat transfer, steady heat conduction, extended surface heat transfer, transient heat conduction, computational methods, forced and free convection, boiling and condensation, heat exchangers, thermal radiation and a thermal systems design project. 200 minutes of lecture and one 110 minute lab per week. Lab includes experiments and computer simulations to compliment the lectures. Prerequisite EME 320. 4 semester hours.

EME 440 Power Plant Engineering. Analysis of thermodynamic cycles, environmental, and economic considerations that affect the design and performance of modern fossil fuel based power plants; overview of power generation system and its components, including boilers, turbines, circulating water systems, and condensate-feedwater systems; fuels and combustion; gas turbine and combined cycles. Exposure to nuclear power plants and alternative energy systems based on geothermal, solar, wind, and ocean energy. Prerequisite: EME 430 or Instructor's permission. 2 Semester Hours.

EME 450 Manufacturing Science. This course involves the study of topics in manufacturing science for the understanding of manufacturing systems and processes. Topics of study will include manufacturing methods for metal processing and cutting, additive manufacturing, and tribology applied to manufacturing systems; and exposure to polymers, ceramics, and microelectronic manufacturing. An emphasis will be made on additive manufacturing laboratory systems and composites manufacturing laboratory experience. This course has a laboratory component. Prerequisite EME 310. 2 Semester Hours.

EME 460 Introduction to Robotics. This course involves the study of kinematics, dynamics and control of robotic manipulators. Topics of study include path and trajectory planning, independent joint control and current topics in the application and research of robot modeling and control. This course will also introduce students to Programmable Logic Controller (PLC) programming that is commonly used in the industry. Prerequisite: EME 310. 2 Semester Hours.

EME 470 Probabilistic Design and Reliability. This course involves the study of probabilistic techniques in product and system design. The focus of this course will be on the design of Mechanical Engineering components, but the principles of probabilistic design can be applied to other systems as well. This course also introduces concepts in statistical quality control, robust design, design of experiments and product reliability. Prerequisite: EME 330. 2 Semester Hours.

EME 480 Mechanical Engineering Capstone I. This course involves the study and investigation of an open-ended problem in the field of Mechanical Engineering. The emphasis of this course is on independent learning, literature search and identification of viable solutions for the defined problem. This course is the first component of the Senior Culminating Experience requirement. Prerequisites: EME 320 and EME 330. 2 Semester Hours.

EME 490 Mechanical Engineering Capstone II. This course is a continuation of EME 480 with an emphasis on the execution of the design identified for solving the problem introduced in EME 480. Analysis as well as experimentation and data collection will be required to support the identified design. This course is the second and final component of the Senior Culminating Experience requirement for Mechanical Engineering students. Prerequisites: EME 480 with a grade of C or better. 4 Semester Hours.