

## ENGR: Courses in Engineering

### Department of Mathematics, Engineering, and Computer Science

#### ENGR 104 Engineering Graphics & CAD Applications 3 Cr

An introduction to modern computer drafting and engineering design using a CAD (computer aided design) software system. Fundamental concepts of technical drawing in two and three dimensions including orthographic projections, isometric projections, three-dimensional and solids modeling, and rendering. Spring Semester.

#### ENGR 201 Engineering Design Process 1 Cr

An introduction to civil engineering and the engineering process. A project-oriented course including proposal-writing, preparing and giving presentations, problem formulation, project scheduling, contract documents, and bid procedures. Fall semester.

#### ENGR 202 Water Distribution Systems 1 Cr

An introduction to water distribution theory and design practice. A project-oriented course that includes water supply, storage, distribution, and computer analysis of water distribution networks. Spring semester.

#### ENGR 302 Engineering Mechanics I: Statics 3 Cr

Equilibrium of bodies under the action of forces. Force systems and resultants; equilibrium of mechanical systems; trusses, frames, and machines; centroids and centers of mass; shear and moments in beams; hydrostatics; friction; and virtual work. Introduction to mechanics of solids and computer analysis of structures, as time permits. Emphasis on solving practical engineering problems in complete, documented style. Prerequisite: Grade of "C" or better in PHYS 205. Spring semester.

#### ENGR 303 Engineering Mechanics II: Solids 3.5 Cr

An introduction to the mechanics of deformable solids. Topics covered include stress, strain, rotation-of-axes transformations, constitutive relations, equilibrium, compatibility requirements, stability, and deformation of structural elements. Uni-axial, torsion, bending, and shear loads on and deformations of prismatic bars are also studied together with Euler buckling of slender columns. Three credits of lecture and one-half credit of laboratory. Prerequisites: Grades of "C" or better in ENGR 302 and MA 334. Fall semester.

#### ENGR 304 Engineering Mechanics III: Dynamics 3 Cr

Continuation of ENGR 301. Motions of bodies under the action of forces; kinematics and kinetics of particles, systems of particles, and rigid bodies; work-energy and impulse-momentum; area and mass moments of inertia. Emphasis on solving practical engineering problems in complete, documented style. Prerequisites: Grades of "C" or better in ENGR 301 and MA 334. Spring semester.

#### ENGR/PHYS 305 Electronics and Circuit Analysis I 4 Cr

An introductory survey of the behavior of electrical circuits. Review of current, voltage, and passive circuit elements (resistors, capacitors, and inductors). Kirchhoff's Laws, network theorems, and basic network analysis. General characteristics of amplifiers and electronic instrumentation. Introduction to operational amplifiers and active elements (transistors). Laplace transform analysis of transient (switching) response, and complex phasor analysis of sinusoidal steady-state response. Three (3) hours lecture and one two-hour laboratory per week, in which students build and test circuits and learn how to use typical circuit simulation software (PSPICE). Prerequisites: Grades of "C" or better in PHYS 202 or PHYS 206, and MA 122 or MA 233. Fall semester.

#### ENGR /PHYS 306 Electronics and Circuit Analysis II 4 cr

A continuation of PHYS/ENGR 305. Systematic node-voltage and mesh-current methods of circuit analysis. Network transfer functions and frequency spectra. Mutual inductance and transformers. Diode circuits and the behavior of single-transistor amplifiers using field-effect or bipolar-junction transistors. Analysis and design of digital logic circuits. Principles of operation and interfacing of typical laboratory instruments. Three (3) hours lecture and one two-hour laboratory per week. Prerequisite: Grade of "C" or better in PHYS/ENGR 305. Offered spring semesters if warranted by sufficient demand.

#### ENGR 307 Fluid Mechanics 3 Cr

A first course in fluid mechanics for engineering majors. Topics covered include fluid properties, fluid statics, fluid motion, pressure variations in fluid flows, momentum principles, energy principles, dimensional analysis and similitude, surface resistance, flow in conduits, flow measurements, drag, and lift. Two and one-half credits of lecture and one-half credit of laboratory. Prerequisites: Grades of "C" or better in MA 334 and ENGR 302. Fall semester.

#### ENGR/PHYS 308 Thermodynamics 3 Cr

A practical introduction to thermodynamics for engineering students. Fundamental state variables are defined (e.g., temperature, pressure, energy, enthalpy, entropy, etc.), and the three laws of thermodynamics are extensively discussed and illustrated. Applications include power systems, gas turbines, and refrigerators. Three (3) hours lecture per week. Prerequisites: Grades of "C" or better in PHYS 205-206 and MA 334. Spring semester.

#### ENGR 309 Geotechnical Engineering 3.5 Cr

An introduction to geotechnical engineering. Topics covered include an introduction to geology and the classifications of soils, and rocks, and geologic structures. Soil exploration, testing, and classifications are introduced, and soil characteristics and mechanical properties such as compressibility and compaction, permeability and seepage, and stresses in soil structures are also studied. Three credits of lecture and one-half credit of laboratory. Prerequisites: Grades of "C" or better in ENGR 303 and ENGR 307. Spring semester.

#### ENGR 310 Structures I 3 Cr

This is the first in a series of three courses in structural analysis and design. The primary objective of this course is to introduce the principles and methods of analysis for trusses, beams, and frames so that students develop the understanding and the skills necessary to analyze and design statically determinate as well as statically indeterminate structures. While emphasis is on modern computer methods of analysis, elementary methods are also studied so students gain an understanding and "feel" for the behavior of structures. Prerequisites: Grade of "C" or better in ENGR 303. Spring Semester.

#### ENGR 313 Hydrology 3 Cr

This course focuses primarily on the basic principles of the hydrologic cycle such as precipitation, hydrologic abstractions, catchment properties, groundwater flow, and the relationships between precipitation, abstractions, and runoff. A brief portion of the course deals with the measurement of various components of the hydrologic cycle. The engineering applications of basic hydrologic principles are studied. The purpose of this course is to introduce the fundamentals of hydrologic science, which are used to solve typical engineering problems. Prerequisites: Grades of "C" or better in MA 334 and PH 205. Fall semester.

