ENGINEERING (ENGR)

ENGR 1201. Introduction to Engineering. 2 Hours.
This course provides an introduction to the engineering profession. Information on the different disciplines of engineering will be presented. Professional and ethical aspects of engineering are covered. An introduction to problem solving and the engineering design process with the utilization of various computer applications are covered. Various forms of technical communication are emphasized.

ENGR 1204. Engineering Graphics I. 2 Hours.
This course is an introduction to computer-aided drafting. Emphasis is placed on drawing setup, creating and modifying geometry, adding text and dimensions, using levels, coordinate systems, and plot/print scale. Technical drawing skills including freehand sketching, text, orthographic projection, dimensioning, sectional views, and other viewing conventions will be developed.

ENGR 1304. Engineering Graphics I. 3 Hours.
This course is an introduction to computer-aided drafting. Emphasis is placed on drawing setup, creating and modifying geometry, adding text and dimensions, using levels, coordinate systems, and plot/print scale. Technical drawing skills including freehand sketching, text, orthographic projection, dimensioning, sectional views, and other viewing conventions will be developed.

ENGR 2105. Electric Circuits Laboratory. 1 Hour.
This course provides hands on experience with mainstream circuit technology. This shall be accomplished with a set of laboratory experiments that introduce increasingly more complex circuits and techniques. Successful completion of each lab assignment shall 1) require a written report detailing the design solution(s), 2) require the construction of one or more circuits, and 3) require a demonstration that the constructed circuits work properly. Pre-requisite or co-requisite: ENGR 2305 or EE 2305.

ENGR 2301. Engineering Mechanics - Statics. 3 Hours.
Basic theory of engineering mechanics, using calculus, involving the description of forces, moments, and couples acting on stationary engineering structures; equilibrium in two and three dimensions; free-body diagrams; friction; centroids; centers of gravity; and moments of inertia. Prerequisite: PHYS 2325.

ENGR 2302. Engineering Mechanics - Dynamics. 3 Hours.
Basic theory of engineering mechanics, using calculus, involving the motion of particles, rigid bodies, and systems of particles; Newton’s Laws; work and energy relationships; principles of impulse and momentum; application of kinetics and kinematics to the solution of engineering problems. Prerequisite: ENGR 2301.

ENGR 2304. Programming for Engineers. 3 Hours.
Programming principles and techniques for matrix and array operations, equation solving, and numeric simulations applied to engineering problems and visualization of engineering information: platforms include spreadsheets, symbolic algebra packages, engineering analysis software, and laboratory control software. Prerequisite: Concurrent enrollment or previous completion of MATH 2413 or instructor's approval.

ENGR 2305. Electric Circuits I. 3 Hours.
This course focuses on the fundamental concepts of engineering with special emphasis on electrical engineering. It includes the concepts of current, voltage, power and energy, Kirchhoff's current and voltage laws, resistance, capacitance, inductance, series, and parallel combinations of circuit elements. Basic techniques such as superposition and node voltage analysis are introduced. Prerequisite: PHYS 2326.

ENGR 2308. Engineering Economics. 3 Hours.
Methods used for determining the comparative financial desirability of engineeing alternatives. Provides the student with the basic tools required to analyze engineering alternatives in terms of their worth and cost, an essential element of engineering practice. The student is introduced to the concept of the time value of money and the methodology of basic engineering economy techniques. The course will address some aspects of sustainability and will provide the student with the background to enable them to pass the Engineering Economy portion of the Fundamentals of Engineering exam.

ENGR 289. Independent Study. 1-3 Hours.
This course provides individual instruction. Students may repeat the course when topics vary.

ENGR 304. Engineering Graphics I. 3 Hours.
This course is an introduction to computer-aided drafting. Emphasis is placed on drawing setup, creating and modifying geometry, adding text and dimensions, using levels, coordinate systems, and plot/print scale. Technical drawing skills including freehand sketching, text, orthographic projection, dimensioning, sectional views, and other viewing conventions will be developed.

ENGR 305. Fundamentals of Power Systems. 3 Hours.

ENGR 306. Electric Power and Machinery Lab. 1 Hour.
This lab addresses the basics of electric power components and operation. Topics cover the principles of DC machines, single and three phrase circuits, synchronous generators, power transformers, power factor correction, and electric power analysis. Prerequisite: EE 305 or ENGR 305 or concurrent enrollment.

ENGR 307. Probability and Statistics for Engineers.. 3 Hours.
This course introduces students to the basic concepts of probability and statistics with relevant engineering applications, discrete and continuous random variables, Bayes Theorem, functions of random variables, joint and multiple probability distributions, random processes, statistical inference, parameter estimation, hypothesis testing, and linear regression. Credit cannot be granted for both ENGR 307 and MATH 357. Prerequisite: MATH 2414.

ENGR 312. Engineering and Business Ethics. 3 Hours.
This course will make science and engineering students aware of ethical issues they will face in the work environment. It will help them understand the responsibilities of scientists and engineers and prepare them to articulate and respond to ethical conflicts. Class will involve case studies, discussions, writing response papers and tests.

ENGR 315. Engineering Computations. 3 Hours.
This course covers numerical methods and their use for solving computational problems in engineering. The course is devoted to mathematical essentials and software utilization of the following numerical methods: solving nonlinear equations, solving systems of linear algebraic equations, interpolation, curve fitting, numerical differentiation, numerical integration, and optimization. Engineering applications of the numerical techniques are also considered. Prerequisite: MATH 2413 and COSC 1315 or ENGR 1201.

ENGR 340. Fluid Mechanics. 3 Hours.
Application of laws of statics, buoyancy, stability, energy and momentum to behavior of ideal and real fluids; dimensional analysis and similitude and their application to flow through ducts and piping; lift and drag related problems. Prerequisite: ENGR 2301. Corequisite: ENGR 341.

ENGR 341. Fluid Mechanics Laboratory. 1 Hour.
Introduction to basic fluid mechanics instrumentation; experimental verification and reinforcement of the analytical concepts introduced in the Fluid Mechanics lecture. Corequisite: ENGR 340.

ENGR 343. Mechanics of Materials. 3 Hours.
Concepts in the strength of materials, stress, strain; deformation under load, direct, shear, and combined stresses; stress concentrations, bending stresses, torsional shear stresses; deflection in beams and shafts; columns; and energy methods. Prerequisite: ENGR 2301.

ENGR 365. Statistical Quality Control. 3 Hours.
Statistical control of the quality of processes; statistical methods for quality improvement; control charts for variables; attribute control charts; process capability analysis; statistical methods; analysis and design of sampling. Prerequisite: Junior standing, or instructor consent.

ENGR 389. Independent Study. 1-3 Hours.
This course provides individual instruction. Students may repeat the course when topics vary.

ENGR 404. Project Management and Engineering Operations. 3 Hours.
Basic project management for engineering; project development and economic justification; estimating; scheduling; network methods; critical path analysis; earned value management; project organizational structures; project risk assessment; resource allocation; ethics; characteristics of project managers. Prerequisite: Junior or Senior Standing or Instructor permission.

ENGR 410. Engineering Economics. 3 Hours.
Economic justification of projects; estimating; scheduling; network methods; critical path analysis; earned value management; project organizational structures; project risk assessment; resource allocation; ethics; characteristics of project managers.

ENGR 425. Principles of Process Design. 3 Hours.
The forest products industry partners of the university are used as experiential opportunities for mechanical engineering students to study all elements of optimization. This includes determining data requirements, collecting the data related to process design, analyzing that data, and determining the optimization requirements to drive process requirements. This process design provides students with the knowledge of process improvement and optimization that is generalized across all mechanical processes and manufacturing environments. Prerequisite: MATH 2415.

ENGR 431. Engineering Internship I. 3 Hours.
The course provides experience in an engineering service, industrial, or research setting. The program provides engineering experience during the last two years of an undergraduate academic career. During this period, students can complete at least one semester of work consisting of a 20 hour work week. Prerequisite: Junior standing and approval of CBET Dean.

ENGR 432. Engineering Internship II. 3 Hours.
This course provides the second phase of the experience in engineering service, industrial, or research setting. The program provides engineering experience during the last two years of an undergraduate academic career. During this period students can complete at least one semester of work consisting of a 20 hour work week. Prerequisite: ENGR 431 and Junior standing and approval of CBET Dean.

ENGR 440. Computer Aided Design of Mechanical Components. 3 Hours.
Effective and efficient use of modern computer hardware and software in modeling, design, and manufacturing; simulation of a broad spectrum of mechanical engineering problems.

ENGR 465. Reliability Engineering. 3 Hours.
Uncertainty in Engineering and Importance of Reliability. Fundamentals of probability theory. Reliability in Design and Probabilistic models of design variables. Monte Carlo simulation. Hazard functions and reliability models for failures. System reliability for series, parallel, and n out of k and series parallel systems. Formulation and Solution of Optimization Problems based on Reliability considerations. Quality, the six sigma approach and its relationship to reliability and maintenance strategies. Use of Excel and MATLAB in reliability analysis and predictions. Prerequisite: Senior standing, or instructor consent.

ENGR 470. Introduction to Forest Products Industry. 3 Hours.
This course is to give students an overview of the forest products industry and its technological base. The raw materials used in pulping and paper making are examined and their availability and use worldwide are discussed. This course also analyzes the principles and main features of the unit processes of pulping and paper making. The main end products and their manufacture in a global perspective are discussed. The structure and specific features of the pulp and paper industry are reviewed and compared between the main producing areas. At least two mill tours are included.

ENGR 471. Pulping Technology. 3 Hours.
The purpose of this course is to teach the students the fundamentals of pulping technology and to give them basic knowledge of the sub-processes involved. The main topics include various fiber raw materials, wood chemistry and morphology, wood handling, chemical pulping and bleaching, secondary fibers/recycling, mechanical pulping and brightening of high-yield pulps. The course includes group presentations and site visit.

ENGR 472. Paper Technology. 3 Hours.
This course introduces the students to the basics in wood fibers and paper physics. The important paper making properties of fibers and the structural characteristics of the paper and board are analyzed. The course continues with an overview of the unit processes of paper making, product quality, various paper and paperboard processes. Wet end chemistry and surface treatment of the paper and paperboard are covered in the course. The transformative technologies for mitigating carbon emissions and practical industrial strategic energy management in paper industry are also discussed. The course includes group presentations and site visit.

ENGR 489. Independent Study. 1-3 Hours.
This course provides individual instruction. Students may repeat the course when topics vary.

ENGR 499. Independent Research. 1-6 Hours.
Independent research in Engineering conducted by a student under the guidance of a faculty member of his or her choice. The student is required to maintain a research journal and submit a project report by the end of the semester and potentially make an oral presentation on the project. SCH and hours are by arrangement and, with a change in content, this course may be repeated for credit. Prerequisite: Consent of instructor.

ENGR 599. Independent Research. 1-6 Hours.
Independent research in Engineering conducted by a student under the guidance of a faculty member of his or her choice. Credits and hours are by arrangement and, with a change in content, this course may be repeated for credit. Prerequisite: Consent of instructor.