ENGINEERING (ENGR)

ENGR 1010. Engineering Introduction, Design and Ethics. (3 Credits)
This introductory course covers professional focus areas in engineering, basic computations, units and conversions, computer aided design, geometric constructions and dimensioning, engineering ethics and impact of other factors.

ENGR 1020. Engineering Applications and Programming. (3 Credits)
This course addresses algorithm development and structured programming techniques, scientific problem solving, numerical and graphical applications related to engineering.

ENGR 2110. Material Balances. (3 Credits)
This course covers conservation of mass for single and multi- process units as well as for reactive and non-reactive systems.
Prerequisites: (CHEM 141 or 1414).

ENGR 2320. Thermodynamics. (4 Credits)
This course covers application of the first and second laws of Thermodynamics to the analysis of singe and multi-phase processes for both control mass and control volume systems. Power and refrigeration cycles are included.
Prerequisites: ENGR 2110 and (MATH 202 or 2020).

ENGR 2410. Engineering Economics. (3 Credits)
This course covers principles and techniques for monetary quantification of engineering and business decisions over time. It includes time value of money, depreciation, cost estimation, return of investment, risk and selecting alternatives.
Prerequisites: (MATH 201 or 2010).

ENGR 2420. Materials- Science & Strength. (4 Credits)
In this course, students will learn about materials and their structures and properties. Students will use a hands-on approach to discover the relationship between structures, properties, and performance of materials, such as the stressors produced by axial loading, torsion, bending, deflections, and buckling.
Prerequisites: (CHEM 141 or 1414) and (MATH 202 or 2020).

ENGR 3110. Separation Processes. (3 Credits)
This course addresses thermodynamic models of mixtures and phase equilibrium, and analysis and design of staged separation processes such as distillation, absorption, stripping, and extraction.
Prerequisite: ENGR 2320.

ENGR 3120. Mass Transfer. (3 Credits)
This course covers diffusion and convective mass transfer; application to chemical processes and systems.
Prerequisite: ENGR 3310.

ENGR 3140. Kinetics & Reactor Design. (4 Credits)
This course examines reaction mechanisms, rate expressions; reaction kinetics with application to the design of chemical reactors.
Prerequisites: (CHEM 241 or 2414) and ENGR 3310.

ENGR 3310. Heat Transfer. (4 Credits)
This course deals with one-d and two-d steady state conduction, unsteady conduction, convective heat transfer and heat exchangers, radiation. It includes computational/experimental studies.
Prerequisites: ENGR 2320 and (MATH 325 or 3250).

ENGR 3330. Fluid Mechanics. (4 Credits)
This course presents mass and momentum balance principles for incompressible and compressible fluids, Navier-Stokes equations, viscous flow, pumps and piping. It includes computational/experimental studies.
Prerequisites: (MATH 325 or 3250) and (PHYS 171 or 1714).

ENGR 3410. Quality/Design of Experiments. (3 Credits)
This course covers tools to solve manufacturing quality problems and implement effective quality systems. Customer analysis, the Six Sigma problem solving methodology, process capability, measurement, design of experiments, statistical process control, failure mode and effects analysis, quality function deployment and reliability are addressed.
Prerequisites: (MATH 305 or 3050).

ENGR 3420. Facilities Design. (3 Credits)
This course covers the essentials of the layout of a facility, planning methods, and the relationship between the physical layout, process flows, and materials handling. Students will use CAD software to create layouts to evaluate and generate solutions to facilities issues. Students will also learn the key factors in selecting a facility location.
Prerequisite: ENGR 3470.

ENGR 3430. Manufacturing Systems & Processes. (4 Credits)
In this course, students explore ways to integrate systems to increase flexibility and response time. Students will learn how to design and analyze manufacturing systems, including how to improve systems using LEAN and quick response manufacturing. Students will practice techniques to learn how changes affect overall effectiveness for work processes.
Prerequisites: (MATH 202 or 2020) and (MATH 305 or 3050).

ENGR 3440. Production & Operation Analysis. (4 Credits)
This course covers the analysis and design of production control procedures. Inventory, planning, and scheduling will be included. Students will learn techniques for operations management, including forecasting and planning using computer applications.
Prerequisites: (MATH 305 or 3050).

ENGR 3450. Work Design & Human Interaction. (3 Credits)
This course covers theories on physical and cognitive ergonomics and engineering anthropometry. Using a hands-on approach, students will learn about the capacities of humans, the environmental effects, and safety standards in the design of an industrial system. Students will apply human-performance modeling techniques to industrial workplace environments.
Prerequisites: (MATH 305 or 3050).

ENGR 3460. Project Management. (3 Credits)
This course covers core concepts of project management based on processes of initiating, planning, executing, controlling, and closing projects. Topics include project proposals, project selection, scope definition, CPM and PERT scheduling, budgeting, control techniques, procurement and integration, and project manager skills. Students will be encouraged to seek PMP certification.
Prerequisites: (MATH 305 or 3050).

ENGR 3470. Modeling & Optimization. (4 Credits)
In this course, students will learn the basic techniques for modeling and optimizing deterministic systems with emphasis on linear programming. The course includes computer solution of optimization problems and applications to production, logistics, and service systems.
Prerequisites: (MATH 202 or 2020).

ENGR 3480. Stochastic Processing. (3 Credits)
This course examines stochastic systems using both analytic methods and computer simulation. Topics include empirical and theoretical models of arrival and service processes, state spaces and state transition probabilities, simulation of queuing and manufacturing systems, continuous time Markov analysis of manufacturing systems, simulation project management, testing and emerging trends.
Prerequisites: ENGR 3470 and (MATH 305 or 3050).

ENGR 4110. Process Safety. (3 Credits)
This course covers chemical process safety fundamentals. It includes toxicity, industrial hygiene, source models, fires, explosions, relife systems, hazard identification and risk assessment.

ENGR 4210. Process Dynamics & Control. (4 Credits)
This course addresses dynamic behavior of process components and feedback control principles. Control system design, tuning, performance assessment and stability analysis are included.
Prerequisites: ENGR 3110 and 3310.

ENGR 4480. Simulation. (4 Credits)
This course addresses simulation of complex discrete-event systems with applications in industrial and service organizations. Computer exercises include generation and analysis of random variables, input distribution modeling, spreadsheet models of queuing systems, and statistical analysis of simulation output data. A course project will involve use of a software package.
Prerequisites: ENGR 3480 and (MATH 325 or 3250).

ENGR 4910. Engineering Capstone Project I. (3 Credits)
This course serves as the first of two in the cumulative design experience. It serves to integrate junior- and senior-level coursework, promote an understanding of team dynamics and the development of project management skills. The content related to process and product design varies depending on the interests of students, project team, and project sponsors. Iterative design process, patent and literature searches, application of engineering standards, consideration of multiple constraints and design options, selection of an optimal design, consideration of various contexts are addressed and documented in the final report.
Prerequisites: ENGR 3310 and (ENGR 3140 or 3330) or ENGR 3420 and (ENGR 3440 or 3480).

ENGR 4920. Engineering Capstone Project II. (3 Credits)
This course serves as the second of two in the cumulative design experience. In continuation of the prerequisite Capstone Design Project I course, further analysis of the design performance may be conducted through any applicable considerations such as computational analysis, construction and testing or prototype, and manufacturability study. A discussion on modifications accounting for public safety, environmental, social, global, and economic factors is required in the written report.
Prerequisite: ENGR 4910.

ENGR 4980. Special Topics in Engineering. (3 Credits)
This course addresses topics in engineering that are not covered in other classes. Structure depends on the mutual interest of faculty and students.

ENGR 4990. Undergraduate Research. (1-3 Credits)
This course allows undergraduate students to actively participate in research. The student pursues a research experience in the faculty member's area of expertise under their supervision. Approval of the research topic, scope, and deliverables is required. A final report and oral presentation is required.

ENGR 4991. Internship Experience. (1-3 Credits)
This course allows undergraduates to actively pursue internship experiences. It serves as practical training in the discipline. Approval of the Department Chair is required for registration. A final report is required with endorsement from the industrial advisor.