# INDUSTRIAL ENGINEERING (ENGI)

**ENGI 220  Engineering Economy  3 Credit Hour(s)**
**Resident Prerequisite:** MATH 131 or MATH 126
**Online Prerequisite:** MATH 126 or MATH 131
Introduction to the principles of time value of money, analysis of investments, break-even concepts, risk analysis, alternatives analysis, tax implications, certainty and uncertainty.
**Offered:** Resident and Online

**ENGI 230  Production Systems  3 Credit Hour(s)**
**Resident Prerequisite:** ENGR 110
**Online Prerequisite:** ENGR 115
Introduction to manufacturing and production processes. Topics include production process as a human/machine system, planning, organizing, designing, and operating production systems.
**Offered:** Resident and Online

**ENGI 299  Internship  0 Credit Hour(s)**
Placement in a manufacturing plant, hospital, library, police department, or similar location, or related organization for a controlled learning experience within the student's career specialization area. Application procedures processed through the Career Center. Must apply semester prior to internship.
**Registration Restrictions:** Sophomore status, 2.00 GPA, two courses in major, declared major, not more than one CSER behind
**Offered:** Resident

**ENGI 300  Enterprise Forecasting  3 Credit Hour(s)**
**Prerequisite:** (ENGR 110 or ENGR 115) and ENGR 210 and MATH 131 and MATH 132 and PHYS 231
Advanced forecasting and data modeling methods and techniques.
**Offered:** Resident

**ENGI 305  Data Analysis Methods and Modeling  3 Credit Hour(s)**
**Prerequisite:** ENGR 210
Revealing business and economic patterns and information hidden in data by transforming data using algebraic and statistical methods.
**Offered:** Resident

**ENGI 307  Data Analysis and Machine Learning  3 Credit Hour(s)**
**Online Prerequisite:** ENGR 210
Revealing business and economic patterns and information hidden in data by transforming data using algebraic and statistical methods. Enabling computers to learn to predict and categorize events by using data.
**Offered:** Online

**ENGI 310  Operations and Research Logistics  3 Credit Hour(s)**
**Online Prerequisite:** ENGR 210
Introduction to basic principles and application of deterministic analytical methods. Topics include linear programming, dynamic programming, nonlinear optimization, and genetic algorithms.
**Offered:** Online

**ENGI 330  Facilities Design  3 Credit Hour(s)**
**Prerequisite:** ENGI 230
Introduction to the design, analysis and selection of manufacturing facilities and material handling equipment. Topics include integration of computer systems, material flow and storage, and economic implications.
**Offered:** Resident and Online

**ENGI 340  Introduction to Operations Research: Deterministic Models  3 Credit Hour(s)**
**Prerequisite:** MATH 321 (may be taken concurrently) or MATH 221 (may be taken concurrently)
Introduction to basic principles and application of deterministic analytical methods. Topics include linear programming, integer programming, dynamic programming and nonlinear optimization.
**Offered:** Resident

**ENGI 350  Introduction to Operations Research: Probabilistic Models  3 Credit Hour(s)**
**Prerequisite:** ENGI 340 and ENGR 210
Introduction to decision-making modeling and analysis subject to randomness, uncertainty, and risk. Topics include stochastic dynamic programming, Markov chains, and queuing theory.
**Registration Restrictions:** Junior status
**Offered:** Resident

**ENGI 360  Engineering Information Systems  3 Credit Hour(s)**
**Prerequisite:** (ENGR 110 or ENGR 115) and MATH 131 and MATH 132 and PHYS 231
Introduction to information systems used in the analysis, design, and management of complex engineering projects. Topics include identifying potential data anomalies and methods for ameliorating these problems.
**Offered:** Resident

**ENGI 371  Six Sigma, Lean and Kaizen  3 Credit Hour(s)**
**Online Prerequisite:** ENGR 210
Six Sigma is a process improvement methodology that is important for quality management/improvement across a wide range of industries. It a method that provides organizations tools and methods to improve the capability of their business processes by reducing variation while improving performance and profitability. Six Sigma places a strong emphasis on statistics and rigorous data analysis and the implementation process (DMAIC). Lean methods of process improvement are closely related to Six Sigma, and are often combined as "Lean Six Sigma." These methodologies rely on statistics-driven approaches to quality management, lean approaches focus on eliminating waste and non-value added processes, while traditional Six Sigma emphasis on reducing variation and improving control. In practice, these techniques are often interrelated and complement each other, as both work towards the goal of delivering the highest level of quality at the lowest cost.
**Offered:** Online

**ENGI 383  Project Management and Systems Engineering  3 Credit Hour(s)**
**Prerequisite:** Computer Engineering Gate Req with a score of 5 or Electrical Engineerng Gate Req with a score of 5 or Indust Sys Engineer Gate Req with a score of 5 or Mechanical Engineer Gate Req with a score of 5 or Civil Engineering Gate Req with a score of 5
Topics covered include development approaches for project management, information on tailoring the approach and processes, tools and techniques, for project management, discussion of project outcomes in addition to deliverables, systems engineering integration, systems lifecycle concepts, models and processes, lifecycle analyses and methods, tailoring and applications considerations, systems engineering case studies.
**Registration Restrictions:** Chair approval, Junior/Senior Status
**Offered:** Resident

**ENGI 420  Advanced Data Analysis and Machine Learning  3 Credit Hour(s)**
**Prerequisite:** (ENGR 210 or MATH 211) and (MATH 221 or MATH 321) and (ENGR 133 or MATH 133)
Machine learning introduces the methods that are used to provide computers the ability to perform various levels of artificial intelligence (AI) with the ability to learn without being explicitly programmed. Machine learning focuses on the development of computer programs and algorithms as well as the underlying data requirements that can enable computers to teach themselves, self-organize objects, and to grow or change when exposed to new data or sensory information.
**Offered:** Resident

**ENGI 428  CNC and Programming Logic Chips  3 Credit Hour(s)**
**Online Prerequisite:** ENGE 205 or ENGE 211
This course introduces the fundamentals of Computer Numerical Control (CNC) for machining and Programmable Logic Chips (PLC) for factory control. Specifically, the course teaches the basic elements and tools of PLC necessary to create a complete program using ladder logic common to most platforms. The CNC aspects of the course focus on setup and programming of CNC machining and turning centers to include programming these tools on a variety of brands and machines.
**Offered:** Online

**ENGI 430  Decision Analysis  3 Credit Hour(s)**
**Prerequisite:** ENGI 220 and ENGI 350 (may be taken concurrently)
A first course in decision analysis that extends the domain of decision-making problems from those considered in traditional statistical hypothesis testing scenarios: modeling decisions, where the emphasis is on structuring decision problems using techniques such as influence diagrams and decision trees, modeling uncertainty, which covers subjective probability assessment, use of classical probability models, Bayesian analysis, and value of information, and modeling preferences, which introduces concepts of risk preference, expected utility, and multi-attribute value and utility models.
**Offered:** Resident

**ENGI 450  Human Factors and Ergonomics  3 Credit Hour(s)**
**Resident Prerequisite:** (ENGR 110 or ENGR 115) and ENGR 210 and MATH 131 and MATH 132 and PHYS 231
**Online Prerequisite:** ENGR 210 and First Year Engineering Gate with a score of 5
Human biological and psychological capabilities and limitations in the industrial setting. Topics include techniques and methods for applying the principles of human factors engineering and ergonomics to systems design.
**Offered:** Resident and Online

**ENGI 455  Industrial Ergonomics  3 Credit Hour(s)**
**Prerequisite:** ENGI 450
This course will teach students the principles of industrial ergonomics. It focuses on physical ergonomics and ergonomic assessment tools. At the end of the course students will have used the most common ergonomic assessment tools and will be able to assess the risk of musculoskeletal injuries.
**Offered:** Resident

**ENGI 460  Digital Simulation  3 Credit Hour(s)**
**Prerequisite:** MATH 334
Introduction to the structure, logic and methodologies of systems simulation. Topics include the generation of random numbers, simulation languages, and simulation models and analysis.
**Offered:** Resident

**ENGI 461  Engineering Technology Capstone I  3 Credit Hour(s)**
Capstone (part 1) emphasizes the planning and project management process, from inception to completion. In addition to technical design, factors such as safety, economics and ethical and societal implications are considered.
**Registration Restrictions:** ENGI 461 and ENGI 462 must be taken sequentially in the student's last year of enrollment.
**Offered:** Online

**ENGI 462  Engineering Technology Capstone II  3 Credit Hour(s)**
**Online Prerequisite:** ENGI 461
Capstone (part 2) emphasizes the execution and implementation of the project process for an approved project. Students put into motion an approved project plan.
**Offered:** Online

**ENGI 481  Industrial & Systems Engineering Design I  3 Credit Hour(s)**
**Prerequisite:** CSCN 111 and ENGI 220 and ENGI 230 and ENGI 330 and ENGI 340 and ENGI 350 and ENGI 360 and ENGR 210 and ENGR 270 and MATH 131 and MATH 132 and MATH 231 and PHYS 231 and PHYS 232
This is the first senior design course where students are exposed to engineering design and product/process development. Students work in teams on engineering design projects from inception to completion to satisfy the needs and requirements of the clients. In addition to technical design, factors such as safety, economics, and ethical and societal implications are considered.
**Note:** ENGI 481 and ENGI 482 represent two parts of the same project; therefore, they must be taken in consecutive terms.
**Offered:** Resident

**ENGI 482  Industrial & Systems Engineering Design II  3 Credit Hour(s)**
**Prerequisite:** ENGI 481
This is the second senior design course where students are exposed to engineering design and product/process development. Students work in teams on engineering design projects from inception to completion to satisfy the needs and requirements of the clients. In addition to technical design, factors such as safety, economics, and ethical and societal implications are considered.
**Note:** ENGI 481 and ENGI 482 represent two parts of the same project; therefore, they must be taken in consecutive terms.
**Offered:** Resident

**ENGI 497  Special Topics in Industrial and Systems Engineering  1-4 Credit Hour(s)**
Selected topics in various areas of Industrial and Systems Engineering. May be repeated for credit when topic varies.
**Offered:** Resident

**ENGI 499  ISE Internship  1-6 Credit Hour(s)**
Placement in a manufacturing plant, hospital, library, police department, or similar location or related organization for a controlled learning experience within the student's career specialization area. Applications are processed through the department Faculty Intern Advisor. Applicants must apply the semester prior to starting the internship.
**Registration Restrictions:** Junior or Senior status
**Offered:** Resident