School	
Major	Bachelor of Science in Industrial Engineering

General Education Requirements

Code	Title	Credits	Description
CULT200	Introduction to Arab - Islamic Civilization	3	The purpose of this course is to acquaint students with the history and achievements of the Islamic civilization. Themes will include patterns of the political and spiritual leadership; cultural, artistic, and intellectual accomplishments Prerequisites: ENGL051, ENGL101, ENGL151.
ARAB200	Arabic Language and Literature	3	This course is a comprehensive review of Arabic Grammar, Syntax, major literature and poetry styles, formal and business letters.
ENGL201	Composition and Research Skills	3	This course focuses on the development of writing skills appropriate to specific academic and professional purposes; the analysis and practice of various methods of organization and rhetorical patterns used in formal expository and persuasive writing; the refinement of critical reading strategies and library research techniques; and the completion of an academically acceptable library research paper. Prerequisites: ENGL150, ENGL151.
ENGL251	Communication Skills	3	The objectives of this course are to improve students writing skills for academic purposes by developing effective use of grammatical structures; analytical and critical reading skills; a sensitivity to rhetorical situation, style, and level of diction in academic reading and writing; and competence in using various methods of organization used in formal writing.
ENGG300	Engineering Economics	3	This course covers the fundamentals of Engineering Economics for engineering professionals to match engineering practice today. It recognizes the role of the engineer as a decision maker who has to make and defend sensible decisions. It emphasizes on the analytical consideration of money and its impact on decision making as well as on other factors such as environmental and social factors and tasks. By the end of the course students will be equipped with basic analytical skills for solving problems of an economic nature real-world example.
ENGG450	Engineering Ethics and Professional Practice	3	Engineering Profession and Ethics is a complete study course on the role of ethics in engineering in their historical, philosophical and professional contexts. The course examines the impact of ethical theories and their application to issues encountered in the engineering profession, such as employee rights, whistleblowing, safety, risk and liability, professional responsibility to consumers and employers, conflicts of interest, codes of ethics, legal obligations, environmental and social responsibility. Through the use of real and hypothetical case studies, the course focuses on developing analysis techniques and applying them to ethical problems through independent critical thinking and moral sensitivity.

Core Requirements

Code	Title	Credits	Description
MATH310	Probability & Statistics for Scientists & Engineers	3	The concept of probability and its properties, descriptive statistics, discrete and continuous random variables, expected value, distribution functions, the central limit theorem, random sampling and sampling distributions, Hypothesis testing. Prerequisite: MATH 170
MATH210	Calculus II	3	The course material includes hyperbolic functions and their inverses and their derivatives integration techniques, improper integrals, sequences, infinite series, power series, Taylor and Maclaurin series and application of power series. The mathematical software Maple will be introduced and used in support of the comprehension of the material. Prerequisites: MATH160
CSCI250	Introduction to Programming	3	This course introduces the basic concepts and principles of structured programming in Java. It starts by an introduction to Java showing its syntax and the structure of a program in Java then teaches simple data types, control structures, methods, arrays, and strings.

CSCI250L	Introduction to Programming Lab	1	This course is a co-requisite for the Introduction to Programming course (CSCI250). The students apply in the lab the fundamentals of programming, explained in CSCI250, by solving lab exercises. The objective of the lab is to implement programming problems using basic data types, selection and repetition structures, methods and arrays.
MATH220	Calculus III	3	This text covers basic topics on infinite series, lines and planes in space, cylinders and quadric surfaces, functions of several variables, limits and continuity, Partial derivatives, chain rule, directional derivatives, Gradient vector, tangent planes, double and triple integrals, areas, moments, center of mass, volumes, double integrals in polar forms, triple integrals in cylindrical and spherical coordinates, line integrals, vector fields Green□s theorem, surface integrals, Stokes theorem, and the divergence theorem. Students are required to solve extensive number of problems and computer assignment using the mathematical software package Maple.
MATH225	Linear Algebra with Applications	3	Introduction to the systems of linear equations and matrices, Gaussian eliminations, matrix operations, inverses, types of matrices, determinants and their applications, vector spaces, subspaces, linear independence, basis and dimension, rank and nullity, inner product spaces and orthogonal bases, eigenvalues and eigenvectors, applications from other disciplines such as physics, computer science, and economics.
MATH270	Ordinary Differential Equations	3	First-order equations, linear and non-linear differential, linearization, numerical and qualitative analysis, second-order equations, existence-uniqueness theorem, series solutions, Bessel s and Legendre s functions, Laplace transforms, systems of differential equations, applications and modeling of real phenomena. Prerequisite: MATH 220.
CHEM200	General Chemistry	3	Basic principles of chemistry, electronic structure of the atom, chemical periodicity, molecular structure and bonding, acids and bases and the states of matter, rates of chemical reactions, and chemical equilibrium are covered in this course. Prerequisites: ENGL 150; CHEM, or S grade on the Chemistry Placement Test Prerequisites: CHEM160, ENGL101. Co-requisites: CHEM200L.
MENG225	Engineering Drawing & CAD	3	This course consists in two parts: 2 D and 3D. It can be defined as a tool in order to generate accurate drawings due to scales in 2 D and in 3 D. It focuses on drawings related to engineering. Drawings may be □descriptive□, describing an object__a tool,__they may represent the first step of design (Design of tools and machines).
MENG250	Statics	3	This course treats only rigid-body mechanics and forms a suitable basis for the design and analysis of many types of structural, mechanical,__electrical devices encountered in engineering. As the course name suggests, this course deals with the equilibrium of bodies that are either at rest__move with constant velocity. Therefore, this Statics course provides the students with the principles that treats the Statics of particles and rigid bodies, trusses, frames, machines; centroids, centers of gravity; and friction. Prerequisites: ENGL051. Co-requisites: MATH210.
ENGG200	Introduction to Engineering	3	Introduction to Engineering is a first-year course designed to help first semester students explore the world of engineering by introducing them to what engineers do, the fundamental principles that form the basis of their work, and how they apply that knowledge within a structured design process. The course is designed to be an ideal introduction for anyone interested in exploring the various fields of engineering and learning how engineers work to solve problems. Students will be helped to decide which major within the school suits them better. The course aims to prepare students for success at LIU and beyond by teaching them important skills including: Technical problem solving and engineering design, teamwork, and communicating to diverse audience.

Code	Title	Credits	Description
EENG250	Electric Circuits I	3	Introduce techniques of DC circuit analysis (Node, Mesh, Superposition, & Source Transformation) containing ideal and dependent sources. Covers real power calculations, perform equivalent resistive circuits. Introduce concept of Thevinin and Norton equivalent circuits, basic concept of mutual inductance, and determine the transient responses of RL, RC, parallel and series RLC. Prerequisites: ENGL051. Co-requisites: MATH210
PHYS220	Physics for Engineers	3	Electricity, Electric Field and Electric Potential, Magnetism, Biot-Savarat Law, Ampere□s Law, Faraday□s Law, Fluid Mechanics, Wave Motion, Sound Waves, Superposition and Standing Waves, Temperature, Heat, Laws of Thermodynamics.

Major Requirements			
Code	Title	Credits	Description
IENG370	Industrial Systems Simulation	3	This is an introductory course to modeling techniques and simulation. It introduces solutions to industrial and service systems problems and challenges using process simulation to enhance organizational performance in an increasingly complex, turbulent, and uncertain industrial environment. This course uses discrete-event simulation, random number generation and testing, and the design of simulation experiments as tools to model the behavior of industrial systems for process analysis and process improvement. It is coupled with a hands-on lab that will introduce modeling concepts of a modern simulation language. Prerequisites: CSCI250, MATH310.
MENG310	Engineering Material Science	3	This course presents an introduction to materials science for engineers. It tackles three keywords: science, 11 of 12 materials and engineering. The word science deals with the fundamentals of structure and classification. □Materials□ deals with the four types of structural materials which are metals, ceramics and glasses, polymers and composites and with the electronic materials (semi-conductors). Finally, the word engineering puts the materials to work with discussions of key aspects of the degradation and selection of materials. Prerequisites: MENG250. Co-requisites: CHEM200.
IENG310L	Industrial Engineering Field Visit	1	Students will conduct a field visit to an industrial facility. A report will need to be produced with focus on industrial engineering implications and observations. The course is concluded by a student presentation. Prerequisites: ENGL201.
IENG320	Introduction to Environmental Engineering	3	This course provides the basis of environmental engineering. It introduces various tools for identifying and solving sustainability oriented environmental problems. It covers the major areas of environmental engineering with particular emphasis in the areas of water and air quality, noise pollution, waste water treatment, and solid and hazardous waste management.
IENG350	Introduction to System Engineering	3	This course presents ideas and techniques for the process of designing, developing, testing, debugging, and modifying engineering systems. Topics include: Function-oriented and modular design techniques, designing for re-use and maintainability, specification, documentation, verification, validation, and quality assurance. Students will work in teams on a system related to their field of study. Prerequisites: CSCI250.
IENG360	Operations Analysis Methods	3	This course is an introduction to the fundamental methods for analyzing and designing procedures to perform operations in the workplace. Includes time and motion study, methods improvement, and workplace design. Ergonomic and safety issues associated with efficient design are presented. Prerequisites: MATH310.

IENG400	Design and Analysis of Engineering Experiments	3	This is a basic course in designing experiments and analyzing the resulting data. The course deals with the types of experiments that are frequently conducted in industrial settings. The prerequisite background is a basic working knowledge of statistical methods. All experiments conducted by engineers and scientists are designed experiments; some of them are poorly designed, and others are well-designed. Well-designed experiments allow you to obtain reliable, valid results faster, easier, and with fewer resources than with poorly-designed experiments. A well-designed experiment can lead to reduced development lead time for new processes and products, improved manufacturing process performance, and products that have superior function and reliability. Students are required to complete a term project that involves designing, conducting, and presenting the results of a statistically designed experiment. They do this in teams because this is the way that much industrial experimentation is conducted. They must present the results of this project, both orally and in written form.
IENG410	Human Factors Engineering	3	This is an introductory course to the field of human factors engineering. It is designed to introduce the principles of workplace and environmental design conformity to the physical and mental abilities and limitations of people. The students are expected to acquire proficiency and fundamental understanding of human factors that must be considered in the design and engineering of complex systems.
IENG420	Industrial Engineering Information Systems	3	The objective of this course is to provide knowledge and skills in industrial software systems management, i.e., the planning, procurement, development and integration of software systems in an industrial engineering context. The course also considers the underlying industrial processes. It prepares the student both for technology-intensive professions, e.g. system development (ERD software drawing will be used), and project management (Software like PMIS) within organizations supplying_acquiring industrial information and control systems.
IENG430	Inventory Control	3	This course introduces the modern inventory control methods and techniques. It covers the following topics: An introduction to the subject, detailed forecasting techniques focusing on exponential smoothing and moving average methods, inventory problems for single installation and independently handled items, dealing with deterministic lot sizing, safety stocks and reorder points, continuous_periodic monitoring of inventory levels, coordinated replenishments, and multi-echelon inventory systems, structures and reordering policies. Additional topics related to lot sizing and practical problems connected to the implementation of inventory control systems.
IENG440	Quality Control and Reliability	3	This course defines quality and reliability and provides key concepts of probability and statistics, sampling concepts, and data presentation tools. It covers various control charts for variables and attributes and discusses process capability, measurement system analysis, error propagation, and tolerance intervals. Acceptance sampling and major concepts of experimental design are also covered. It introduces the reliability concepts, the evaluation of system reliability of series and parallel systems, K-of-N systems, and standby systems. Parameter estimation aspects for Weibull and Lognormal distributions and sampling procedures for reliability life testing are discussed.
IENG450	Industrial Engineering CAD/CAM Tools	3	This course consists of two parts: CAD (computer-aided design), 3D modeling, drawings with CATIA and CAM (computer-aided manufacturing), NC manufacturing with Surfcam. The course covers the fundamentals of computer assisted part programming of numerical controlled milling and lathe machine tools using Surfcam CAD/CAM software. Surfcam is used to create G code programs for advanced milling applications and basic turning center (lathes) operations.

IENG460	Production Planning and Control	3	The course is an introduction to production planning and control techniques and their application to designing integrated production systems. The main emphasis would be on the development and use of mathematical models and algorithms used to analyze and improve the use of material, labor, and information in production environments.
IENG470	Facilities Planning	3	This course introduces fundamental concepts in several main areas of industrial engineering such as facility planning, material handling systems, work analysis and design. Topics such as analysis and design of work space and flow, facility location and layout, material handling systems, motion and time studies and work sampling are covered.
IENG480	Manufacturing Processes	3	This course emphasizes the description, classification and analysis of manufacturing processes. Fundamentals include the casting processes and form casting processes, mold castings, powder metallurgy, metal and nonmetal fabrication processes are included. Metal forming and sheet metalworking are also covered. Manufacturing Engineering, production planning and quality control and inspection are also integrated throughout the course.
IENG495	Senior Project	3	This course integrates the knowledge acquired in the various courses of the undergraduate curriculum to an open-ended design effort and applies the knowledge gained to the solution of a contemporary engineering problem. Students improve oral and written communication skills, gain familiarity with available technical literature, and experience the life cycle of a design project within a group environment. Many projects include practice in the use of computers and relevant support software while solving a design problem. Students work together as a team to accomplish common goals and be able to participate in regional and national competitions.
EENG370	Industrial Electronics	3	This course introduces students to the following topics: Steady-State Sinusoidal Analysis, Electronic Systems, Sensors & Actuators, Amplification, Control & Feedback, Operational Amplifiers, Diodes, Fieldeffect Transistors, Bipolar Junction transistors, Digital Systems, Sequential Logic, and Digital Devices. Prerequisites: EENG250. Co-requisites: EENG370L.
EENG370L	Industrial Electronics Lab	1	This lab introduces experiments related to the design, implementation, and test of: DC and AC electric circuits using R, L, and C, and analog and digital electronic systems using OpAmp, MOSFETs and BJT. Mixed signal project using sensors and_or actuators, analog and digital components. Co-requisites: EENG370.