

- IENG 231      Engineering Materials      (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): CHEM 211**  
This course describes the material science and why should an engineer know about it. It covers: Classification of engineering materials, bonding forces and atomic structure and structure of crystalline materials, imperfections and defects, diffusions in solids. Phase diagrams and phase transformation diagrams and heat treatment also covered. Properties of materials such as mechanical, thermal, corrosive and electrical properties of materials included. Moreover, the mechanical failure of engineering materials and the application and processing of metal alloys will be discussed.
- IENG 232      Engineering Materials Lab      (0:3:0)**  
**3 Semester Credit Hours -Co-requisite(s): IENG 231**  
This laboratory course provides an introduction to material science that covers the main material experimentations. General introduction and safety procedures are introduced. Physical and mechanical properties will be inspected. This include microstructure, hardness, creep, impact, tensile, compression and torsion test. Further the microstructure/processing properties relationships are also investigated. Steel heat treatments is also included.
- IENG 241      Engineering Statistics      (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): MATH 114**  
This course covers the role of statistics in engineering, probability, discrete random variables and probability distributions, continuous random variables and probability distributions, joint probability distributions, random sampling and data description, point estimation of parameters, statistical intervals for a single sample, and tests of hypotheses for a single sample.
- IENG 311      Manufacturing Processes      (2:0:0)**  
**2 Semester Credit Hours -Pre-requisite(s): IENG 231**  
This course introduces the principles and importance of manufacturing processes with some practical applications. It describes and differentiate between manufacturing processes groups. That's is forming and shaping processes of metals including casting, forging, rolling and drawing and for polymers including injection molding and extrusion. Machining processes such as turning, milling and drilling and their associated machining processes also identified as well as introducing the advanced machining processes. Joining processes including fusion welding processes, solid-state processes as well as brazing, soldering, adhesive-bonding, and mechanical-fastening processes also explained. Surface modifications and surface treatments and coatings processes also included. The product design and process selection and considerations in a competitive environment is highlighted and identified.
- IENG 313      Manufacturing Processes Lab.      (0:3:0)**  
**1 Semester Credit Hour -Pre-requisite(s): IENG 311**  
This laboratory course provides an introduction to manufacturing processes experimentation. Experiments include Oxy, Arc, Spot welding as well as mechanical fastening by riveting, screwing and assembling, metal fabrication and sheet metal, machining processes of milling, turning and CNC. Advance manufacturing technologies of LASER and FDM are introduced. **(Writing Intensive Course)**
- IENG 321      Engineering Economy      (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): MATH 113**  
Principles of economic analysis and methods in engineering including: time value of money, discounted cash flow techniques equivalence, economic measures of worth, single and multiple alternatives evaluation and selection, replacement decisions, cost estimation, equipment depreciation, the use of Minimum Attractive Rate of Return MARR and Benefit/cost analysis.
- IENG 322      Quality Control      (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 241**  
Fundamentals of quality control and management, quality principles, quality control techniques, quality control tools (Check Sheets, Histograms, Pareto Diagram, Cause and Effect Diagram, Scatter Diagram, Flow Process Charts and Control Charts), Fundamentals of Statistics, Statistical Process Control, Control Charts for Variables and Control Charts for Attributes), SPC techniques for variables, acceptance sampling system, quantitative techniques, process capability and reliability, examples and case studies from a wide variety of Engineering discipline.
- IENG 323      Human Factors      (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 241**  
This course is structured to provide students with the basic knowledge of principles and concepts of human factors and its effect on the design of products, system and workstations. The course will consider the effect of human-machines and environment interaction and interface, human capabilities and limitations, work environment on human performance, safety, and productivity.

- IENG 324 Human Factors Lab. (0:3:0)**  
**1 Semester Credit Hour -Pre-requisite(s): IENG 323**  
This laboratory course provides an introduction to human factors engineering in terms of muscular work, nervous control, work efficiency, body size and anthropometrics. Work station design, heavy work, handling loads and man-machine systems. Mental activity fatigue, stress and boredom. Vision and lighting as well as voice and vibration.
- IENG 341 Operations Research I (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): MATH 114**  
Fundamentals of deterministic linear programming mathematical models. Graphical solution for two variables problem. Simple, M-Method and Two-Phase versions of the simplex method. Primal-Dual relationships. Sensitivity and post-optimal analysis. Transportation problem and network models. Software applications in linear programming.
- IENG 421 Production Planning and Control (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 241**  
Application of industrial engineering theory and practice to the area of operations management and production planning/control. Analysis and understanding of forecasting, aggregate planning, operations strategy, capacity planning, supply-chain management, just-in-time systems, lean manufacturing, agile manufacturing, materials requirement planning, inventory management, short-term scheduling and sequencing, line balancing and other pertinent topics.
- IENG 422 Facilities Planning (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 421**  
This course is intended to provide students with basic concepts in planning and design of production facilities. Topics include plant location and layout, material flow, material handling systems, automation, warehouse operations, computer-aided layout design, and other related issues will be emphasized in this course.
- IENG 423 Total Quality Management (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 322**  
Total Quality Management (TQM) is a scientific approach for management and employees to be involved in the continuous improvement of processes underlying the production of goods and services. This approach is fundamental in business, industry, evidence-based medicine and many other disciplines.
- IENG 424 Time and Motion Study (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 323**  
This course concentrates on evaluation of work methods through studying time and motions needed to accomplish work. The course introduces different techniques of motion and time study as process chart, flow diagram, operation charts, flow process charts, operations analysis chart, workstation design, flow patterns, predetermined time standards system, stopwatch time study, standard data and its uses in balancing work, and work sampling. The course also discusses job evaluation, productivity measures, wage and incentive, and motion and time study for lean manufacturing environment.
- IENG 425 Project Management (3:0:0)**  
**3 Semester Credit Hours**  
This course addresses the basic nature of managing all types of projects as well as the specific techniques and insights required for selecting, initiating, executing, and evaluating those projects. Students will be guided through all facets of the steps needed to successfully manage a project.
- IENG 426 Safety Engineering (3:0:0)**  
**3 Semester Credit Hours**  
The student learns methods to predict, eliminate or reduce unsafe conditions at the design and construction stage utilizing engineering controls. Topics includes hazards in workplace, analytical tools of hazards and accidents, probabilistic concepts, safety and health systems, national regulations and requirements, hazard control, safety and health management.
- IENG 427 Simulation (3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 241 and IENG 341**  
This course focuses on simulation modeling and analysis techniques to model real-world facilities and processes with application in industrial engineering such as production, services, and other systems. Emphasis on building computer-based model using a simulation software for design, analysis and results interpretation in order to evaluate and improve of such systems. Introduction to simulation concepts, random number generation, ways of studying systems, differences and similarities between static and dynamic systems, discrete and continuous models, and deterministic and stochastic models are analyzed. Linear and nonlinear models are emphasized. Students are required to do a term project.

- IENG 428      Operation Research II** **(3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 341**  
Integer linear programming (Branch-and-Bound & Cutting Plane Algorithms), Deterministic Dynamic Programming, Stochastic Dynamic Programming, Nonlinear Programming. Case studies and software applications in operations research.
- IENG 429      Advanced Manufacturing Technologies** **(3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 311**  
This course describes various advanced manufacturing technologies available in this nowadays, it covers Advanced CAD/CAM and Computer-Integrated Manufacturing (CIM), Rapid prototype and 3D printing, Robotics in Manufacturing, Advanced and smart materials and composites, advanced machining processes, Additives manufacturing and tooling, computer modeling, analysis, visualization and inspection systems, Nano-technologies and fabrications and surface and coating technologies.
- IENG 430      Supply Chain Management** **(3:0:0)**  
**3 Semester Credit Hours**  
This course focuses on management and improvement of supply chain processes and performance. This course focuses on important supply chain metrics, primary tradeoffs in making supply chain decisions, and basic tools for effective and efficient supply chain management, production planning, order fulfillment and supply chain coordination.
- IENG 441      Design of Experiment** **(3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): IENG 241**  
This is an applied course that introduces statistical methods associated with models used in the design of experiments, in addition to issues related to: blocking, randomization, replication, and interaction, complete and incomplete block designs, factorial experiments, crossed and nested effects, repeated measures, and confounding effects.
- IENG 491      Senior Design Project I** **(0:6:0)**  
**2 Semester Credit Hours -Pre-requisite(s): Senior Standing**  
Preparation and starting of an engineering project in one of the industrial engineering fields such as planning, design, construction and/or management. Writing a technical report. Preparation of technical engineering drawings.
- IENG 492 Senior Design Project II** **(0:12:0)**  
**4 Semester Credit Hours -Pre-requisite(s): IENG 491**  
Continuation of phase (1) including; writing a technical report and drawing the project drawings in detail.
- IENG 493      Special Topics in Industrial Engineering** **(3:0:0)**  
**3 Semester Credit Hours -Pre-requisite(s): (Dept. Approval)**  
Special up-to-date topic in one of the industrial engineering streams, manufacturing, or engineering management.