

DEPARTMENT OF INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT

Chairperson:	Walid Shatila
Assistant Professors	Rola Sammoura, Fatima Maksoud
Full-time Instructors	Zeidoun Zeidan., Rami Saleh

Mission

The Department of Industrial Engineering and Engineering Management (INME) mission is to provide technically competent graduates; have basic management and inter-personal skills; and contemporary and relevant engineering education to design and improve operations in the industry, business, and government for the global economy of the 21st century; and promote life-long learning.

Program Educational Objectives

The Bachelor of Engineering in Industrial Engineering (IE) is the only undergraduate degree awarded by the Industrial Engineering & Engineering Management Department at BAU. The Industrial Engineering (IE) program educational objectives were set and approved by the IE program's constituencies, i.e. Faculty, Alumni, Advisory Board, and Employers. The program has as its objectives that within a few years our graduates must:

1. be competent to identify and implement effective solutions to real problems by applying contemporary industrial engineering tools and cutting-edge technology in production, quality, safety, supply chain, optimization, economics, manufacturing, service and information systems.
2. be competent in formulating problems accurately, generating alternative solutions, evaluating those alternatives, and presenting the best solutions to clients or decision-makers in a fashion that facilitates decision-making processes.
3. assume leadership roles with strong communication skills and will be able to work competently and ethically alone and as a team member.

Learning Outcomes

The IEEM department has adopted the ABET Students Learning Outcomes (SLOs) "1 to 7" to ensure the quality of the Industrial Engineering Program Educational Objectives. Upon completion of the program graduates must attain:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements

The undergraduate curriculum for the degree of Bachelor of Engineering in Industrial Engineering consists of 150 credit hours of coursework + IC3 + 30 credits transferred from the Lebanese Baccalaureate or its equivalents.

Career Opportunities

Industrial engineering differs from other branches of engineering in essentially two ways. First, it applies to all types of industrial, commercial, and government activities. Second, it is a branch of engineering that is explicitly concerned with people, products, as well as processes and operations. Industrial engineers learn to make decisions concerning the best use of people, materials, and equipment in achieving organizational aims. They are spread across nearly all kinds of manufacturing. Recent data show that employment offerings are especially plentiful in manufacturing and service sectors, management consulting, chemicals, and food processing. Students develop skills in mathematics, the sciences, communications, and humanities. Therefore, an industrial engineering (IE) degree qualifies professionals for a diverse array of jobs, including Engineering Project Manager, Supply Chain and Operations Manager, Quality Engineer, Industrial Scheduling Engineer, Maintenance and Safety Engineer, Production Process Engineer, Service Process Engineer, Construction Management Engineer, and Industrial Management Engineer. A growing trend in the IE profession, especially consulting, is in the services sector of the economy such as banking, transportation, logistics, and government.

Program Overview

The Student's Study Plan is provided to every IE student upon his/her enrollment. The IE curriculum consists of the following components:

I. Common Requirements	Credits
General Education Requirements	16
Basic Sciences and Mathematics	30
General Engineering topics	12
II. IE Program-Specific Requirements	Credits
A. Industrial Engineering core	75
B. Industrial Engineering Technical Electives	12
C. Final Year Project	4
D. Internship	1

I. Common Requirements

The General Education Requirements with their descriptions are as follows:

Course	Title	Credits	Pre-requisites
WRNL200	Work Ready Now	3	
ARAB001	Arabic Language	2	
ENGL001	English Language	2	
ENGL211	Advanced Writing	2	ENGL 001
ENGL300	Speech Communication	2	ENGL 211
BLAW001	Human Rights	1	
ENGR001	Engineering Ethics	1	earned 90 credits
	General Elective	2	
	General Elective	1	
Total		16	

Description of Common Requirements Courses

WRNL 200 WORK READY NOW (3Crs.:3Lec,0Lab): The Work Ready Now course is designed to provide students with the foundational “soft skills” and work-based learning experiences to prepare them for success in the workplace. Work Ready Now is designed to facilitate participatory, hands-on teaching and learning. Students will be actively engaged in the learning process and provided opportunities to practice and enhance new skills and gain the self-confidence necessary to secure and maintain work related to their professional goals. Work-based learning activities are woven into the course and will require students to go to real workplaces in the community outside of class time. Students will be guided to use free online digital tools to demonstrate their learning. Throughout the course, students will create a career portfolio that will help them on their experiential Work Ready Now journey from student to employee.

ARAB 001 ARABIC LANGUAGE (2Crs.:2Lec,0Lab):

تقديم إطار عام للغة العربية لغير المتخصصين، وتتناول الموضوعات التالية: العربية بين لغات العالم، النظام الصوتي، النظام الصرفي، النظام النحوي والنظام الكتابي، كما تتناول العربية والتعريب، والعربية والحاسوب، ثم كيف تكتب مقالاً علمياً

ENGL 001 ENGLISH LANGUAGE (2Crs.:2Lec,0Lab): A general course that enhances the language skills and provides coverage of basic grammar, vocabulary, reading, and writing for foundation students. It deals with basic competence in reading, through exercises on getting main ideas, guessing meaning from context, understanding details, predicting and inferencing. Writing development from paragraph to composition, proceeding through writing is the focus of the course. Writing and reading build vocabulary through exercises and dictionary use and clause exercises. The latter develop grammar where the use of nouns, verbs, adjectives, and adverbs, transition signals, the reconstructing of sentences and main and subordinating clauses is practiced.

ENGL 211 ADVANCED WRITING (2Crs.:2Lec,0Lab): Students write essays on different topics related to argumentation or presentation of concepts and ideas in an organized manner. This is in addition to descriptive, narrative, reflective, and creative writing. Topics chosen are related to the students’ culture diagram as well as current affairs. The ability of students to write academically and classify and organize ideas is stressed. **Pre-req.: ENGL 001.**

ENGL 300 SPEECH COMMUNICATION (2Crs.:2Lec,0Lab): Basic oral communication principles and theories; body, intonation, and stress language considerations; speaker-listener relationship; speech topic, context and audience; planning, preparing and delivering of platform speeches; showcase and spotlight ideas; group interactions; projects and formal presentations. **Pre-req.: ENGL 211.**

BLAW 001 HUMAN RIGHTS (1Crs.:1Lec,0Lab): This course aims at introducing students to the principles of human rights and its foundations. The importance of human rights in our societies, not only from a theoretical point of view but rather more from a practical one, is highlighted. Special attention is given to certain global themes on human rights, which touch on critical topics related to our society. It also covers the following topics: Human rights, key values of human rights & other values, characteristics of human rights, history of human rights, some problematic cases, the evolution of human rights, the implementation of human rights and NGOs, human rights in Lebanon, children, citizenship, democracy, discrimination and xenophobia, education, and gender equality. Lectures are in English.

ENGR 001 ENGINEERING ETHICS (1Crs.:1Lec,0Lab): Ethical issues in the practice of engineering, corporate responsibility; personal rights; honesty, ethical aspects of safety, risk and liability and conflicts of interest; environmental issues and sustainability; codes of ethics;

emphasis on developing the capacity for independent ethical analysis of real cases. **Pre-req.: earned 90 crs.**

The courses required as Basic Sciences and Mathematics topics for INME program with their descriptions are as follows:

Course	Title	Credits	Pre-requisites
MATH 281	Linear Algebra	3	
MATH 282	Calculus	3	
MATH 283	Differential Equations	3	MATH 281 and MATH 282
MATH 284	Numerical Analysis and Techniques	3	MATH 283
MATH 381	Probability and Statistics	3	MATH 282
PHYS 280	Classical Physics	3	
PHYS 281	Electricity and Magnetism	3	
CHEM 241	Principles of Chemistry	3	
CHEM 241L	Principles of Chemistry Lab	1	Pre or Co: CHEM 241
CHME 342	Green Chemistry	3	CHEM 241
CHEM 405	Solid State Chemistry	2	CHEM 241
Total		30	

Description of Basic Sciences and Mathematics Courses :

MATH 281 LINEAR ALGEBRA (3Crs.:3Lec,0Lab): Partial fractions; binomial theorem; roots of polynomial equations; convergence of series; Matrices: Determinants, rank, eigen values, eigenvectors, block decomposition, axes transformation solution of linear system of equations; introduction to complex analysis; conic sections; engineering applications.

MATH 282 CALCULUS (3Crs.:3Lec,0Lab): Hyperbolic functions; implicit and logarithmic differentiation; derivatives of higher order functions; Leibniz theorem; mean value theorem; partial differentiation and applications; Taylor expansion; methods of integration; improper integrals; multiple Integrals; engineering applications.

MATH 283 DIFFERENTIAL EQUATIONS (3Crs.:3Lec,0Lab): First- and second-order differential equations with constant and variable coefficients; simultaneous system of differential equations; series solution; Introduction to partial differential equations; Fourier series; Laplace transforms; shifting theorems; convolution theorem; engineering applications.
Pre-req.: MATH 281, MATH 282

MATH 284 NUMERICAL ANALYSIS AND TECHNIQUES (3Crs.:3Lec,0Lab): Curve fitting; function approximation; iterative method for finding roots; solution of systems of linear equations; numerical differentiation and integrations; numerical solution for ordinary differential equations (first order, simultaneous system, second order; special functions; numerical analysis software; engineering applications. **Pre-req.: MATH 283.**

MATH 381 PROBABILITY AND STATISTICS (3Crs.:3Lec,0Lab): Probability space, conditional probability and independence, and probability theorems; Random variables, and density functions, joint probability; expectation, variance and covariance, Discrete and continuous distributions; statistical measures: mean, mode, variance, standard deviation; statistical distribution: t- distribution, chi- distribution; sampling theory; Theory of estimation, confidence intervals; Hypothesis testing. **Pre-req.: MATH 282.**

PHYS 280 CLASSICAL PHYSICS (3Crs.:3Lec,0Lab): The course is an introductory to fluid mechanics, thermodynamics, and solid mechanics. The course content includes units, dimensions, definitions of fluids and their properties, such as density and viscosity, pressure measurements, mass flow rate calculations, basic calculations of energy and its forms, temperature measurements, phases of matter, definitions of specific heat and latent heat, ideal gas law, definitions of heat transfer modes, basic calculations of force types, moment, and

torsion, vectors and scalar quantities, types of motion, solid body normal and shear stresses, strain, bulk modulus of elasticity, strength of materials.

PHYS 281 ELECTRICITY AND MAGNETISM (3Cr.:3Lec,0Lab): Electric charges and Coulomb's Law; Electric field and potential of various charge distributions; electric dipoles; Gauss's Law in electricity; Capacitance and Dielectrics; Electric conduction current; Resistance and Temperature; Magnetic field of a solenoid; Gauss's Law in Magnetism; Electromotive force; Electromagnetic induction; Faraday's law; Self-induction and inductance.

CHEM 241 PRINCIPLES OF CHEMISTRY (3Cr.:3Le,0Lab): A study of the fundamental concepts of chemistry including matter and measurement, atoms, molecules, ions, moles, nomenclature, atomic and molecular weights. Stoichiometry. Chemical reactions, quantitative calculations. Periodic table, atomic structure, periodic properties of the elements, chemical bonding, molecular structure. The gaseous, liquid, and solid states of matter. Properties of solutions, aqueous reactions and solution stoichiometry. Thermochemistry, chemical thermodynamics, chemical kinetics, chemical equilibrium, acids, bases, ionic equilibria, and nuclear chemistry.

CHEM 241L PRINCIPLES OF CHEMISTRY Lab (1Cr.:0Le,3Lab): Selected experiments illustrate the topics discussed in CHEM 241. *Pre or Co-req.: CHEM 241.*

CHME 342 GREEN CHEMISTRY (3Cr.:3Lec,0Lab): This course provides a comprehensive introduction to the chemistry of the environment. Students will investigate the fundamental chemical principles underlying environmental processes, including the sources, reactions, transport, and fate of chemical species in air, water, and soil. Topics covered may include atmospheric chemistry, water chemistry, soil chemistry and environmental remediation. The course emphasizes the impact of human activities on natural systems and explores strategies for addressing environmental challenges. *Pre-req.: CHEM 241.*

CHEM 405 SOLID STATE CHEMISTRY (2Cr.:2Lec,0Lab): Bonding in solids, crystal structures, X-ray diffraction, electron models, band theory, crystal defects. Electrical, thermal, optical and magnetic properties of solid-state materials from a chemical perspective. Fabrication techniques and modern applications. *Pre-req.: CHEM 241.*

The courses required as General Engineering topics for the INME program and their descriptions are as follows.

Course	Title	Credits
INME221	Engineering Economy	3
CVLE 210	Statics	3
MCHE 201	Engineering Drawing and Graphics	3
COMP 208	Programming I	3
Total		12

Description of General Engineering Courses

INME 221 ENGINEERING ECONOMY (3Cr.:3Lec,0Lab): Basics principles and techniques of economic analysis of engineering project, time value of money, cost allocation and estimation, evaluation of engineering projects and investments, depreciation, inflation, loan financing, after-tax cash flow analysis, selection among mutually exclusive alternatives using present worth, annual worth, internal rate of return, benefit to cost ratio.

CVLE 210 STATICS (3Cr.:3Lec,0Lab): Force vectors (analytical and graphical methods), free-body diagrams; equilibrium of particles and rigid bodies in two and three dimensions; structural elements and supports; plane and space trusses; axial, shear, and moment diagrams of beams; Cable-supported structures. Friction; center of gravity and centroid; moment of inertia. Applications.

MCHE 201 ENGINEERING DRAWING AND GRAPHICS (3Crs.:2Lec,2Lab): Constructional Geometry-constructing tangents. Plane curves and polygons. Orthographic drawing and theory of sketching shapes and surface identification. Orthographic projection of views. Sectional views and conventions. Pictorial drawing. Applications of Auto-CAD software for 2D drawings.

COMP 208 PROGRAMMING I (3Crs.:2Lec,2Lab): Computer fundamentals. Computer system components: hardware and software. Problem solving and flowcharts/pseudocode. High level programming: data types, structured programming constructs, input and output, expressions and assignments, selection, repetition, arrays.

II. IE Program-Specific Requirements

A. *Industrial Engineering Core Courses*

The Industrial Engineering core courses are listed in the table below.

Course	Title	Crs	Pre-requisites
INME204	Introduction to Industrial Engineering	2	
INME206	Production Engineering	3	
INME211	Engineering Materials and Technology	3	PHYS 280
INME212	Metal Shaping	3	INME206 and INME211
INME214	Manufacturing Processes	3	INME211
INME222	Operations Research	3	MATH281
INME312	Computer Aided Design and Manufacturing	3	MCHE201
INME321	Management Information Systems	3	INME204
INME321L	Management Information Systems Lab	1	Pre or Co: INME321
INME322	Organization Design	3	INME204
INME324	Production and Operation Management	3	INME222
INME325	Stochastic Operations Research	3	MATH381
INME332	Industrial Measurements and Inspection	3	MATH284
INME333	Facility Planning and Design	3	INME204
INME335	Quantitative Methods for Decision Making	2	MATH381 and INME222
INME341	Engineering Safety	2	INME212 and INME214
INME422	Engineering Logistics and Supply Chain	3	INME325 and INME221
INME423	Project Planning and Management	3	INME324
INME431	System Modeling and Simulation	3	COMP208
INME431L	System Modeling and Simulation Lab	1	Pre or Co: INME431
INME433	Maintenance Planning and Technology	3	INME332
INME434	Statistical Quality and Process Control	3	MATH381
INME442	Ergonomics	2	CVLE210
INME500	Research Methodology	2	ENGL211
INME521	Total Quality Management & Six Sigma	3	INME434
INME522	Management of Global Operations	3	INME422
INME531	Production Systems and Automation	3	INME333
INME535	Advanced Engineering Statistics	3	INME335
	Total	75	

Description of Core Courses

INME 204-INTRODUCTION TO INDUSTRIAL ENGINEERING (2Crs.:2Lec,0Lab):

The course is designed to familiarize first-year students with the concept and the various aspects of Industrial Engineering. Introduction to selected topics in Industrial Engineering, including facilities design, project management, production and operation management.

INME206 PRODUCTION ENGINEERING (3Cr.:3Lec,0Lab): Introduction to production and manufacturing engineering, Production of iron and steel, metrology, bench work, hand forging, and production cost analysis.

INME 211 ENGINEERING MATERIALS TECHNOLOGY (3Cr.:2Lec,2Lab): Introduction to material & material Properties. Structure of metals, principles of material properties and theory of elasticity, metal alloys, strengthening by heat treatment, material selection for different engineering applications, Phase diagram & diffusion of materials. **Pre-req.: PHYS280.**

INME 212 METAL SHAPING (3Cr.:2Lec,2Lab): Fundamentals of casting and metal casting processes. Metal forming: bulk and sheet metalworking. Material removal processes. **Pre-req.: INME206 and INME211.**

INME 214 MANUFACTURING PROCESSES (3Cr.:3Lec,0Lab): Assembly processes such as welding, brazing, soldering, and fastening, applications of nontraditional machining processes and thermal cutting processes, economics and process design considerations in machining, manufacturing processes of polymers & composites, and powder metallurgy. **Pre-req.: INME211.**

INME 222 OPERATIONS RESEARCH (3Cr.:3Lec,0Lab): Introduction to deterministic operations research models, linear programming, simplex method and sensitivity analysis, network models, transportation, and assignment. **Pre-req.: MATH281.**

INME 312 COMPUTER AIDED DESIGN AND MANUFACTURING (3Cr.:1Lec,4Lab): Geometric/solid modelling, design optimization, graphical and computational features of CAD, engineering analysis and design execution and implementation, manual code programming G code, finite element analysis (FEA). **Pre-req.: MECH201.**

INME 321 MANAGEMENT INFORMATION SYSTEMS (3Cr.:3Lec,0Lab): This course covers an introduction to Management Information Systems (MIS) & examines the role of Information Systems (IS) in supporting a wide range of organizational functions. Use of IS in supporting administrative operations, decision-making & overall strategic initiatives and corporate philosophies. Introduction to e-commerce and knowledge management and a preview of supply chain management and customer relationship management systems. **Pre-req.: INME204.**

INME 321L MANAGEMENT INFORMATION SYSTEMS LAB (1Cr.: 0Lec,2Lab): The content of this lab is directly related to the course INME321. Students will implement the concepts of managing information by building simple, real-life systems with database management software such as ACCESS and ORACLE. **Pre or Co-req.: INME321.**

INME 322 ORGANIZATION DESIGN (3Cr.:3Lec,0Lab): Introduction to organizations and organizational effectiveness, the roles of stakeholders and managers, organization ethics, organization design, organization culture, and types of organizations. **Pre-req.: INME204.**

INME 324 PRODUCTION AND OPERATIONS MANAGEMENT (3Cr.:3Lec,0Lab) Fundamentals of forecasting time series and linear regression, capacity of production systems, aggregate planning, material requirement planning MRP, enterprise resource-planning ERP. **Pre-req.: INME222.**

INME 325 STOCHASTIC OPERATION RESEARCH (3Cr.:3Lec,0Lab): Introduction to stochastic processes, Markov chains, first passage times, ergodic and absorbing chains, birth-death processes, Poisson processes, integer linear programming, optimization theory. **Pre-req.: MATH381.**

INME 332 INDUSTRIAL MEASUREMENTS AND INSPECTION (3Cr.:3Lec,0Lab): Theory of measurements with emphasis on standardization, dimensional and geometrical tolerance on part components, different monitoring systems, vibration monitoring analysis of signals, application of Matlab software to analyze vibration signal. *Pre-req.: MATH284.*

INME 333 FACILITY PLANNING AND DESIGN (3Cr.:3Lec,0Lab): Fundamentals of developing efficient layouts of various production/service systems, travel chart, layout procedures, time study, facility location, single- facility and multi-facility location problems, material handling system design for production facilities. *Pre-req.: INME 204.*

INME 335 QUANTITATIVE METHODS FOR DECISION MAKING (2Cr.:2Lec,0Lab): Topics include decision theory, decision-making techniques under certainty, uncertainty, and risk, sensitivity analysis, utility functions, and game theory. *Pre-req.: MATH381 and INME222*

INME 341 ENGINEERING SAFETY (2Cr.:2Lec,0Lab): Engineering principles to control hazards, maintaining optimally safe systems, types of Hazards, Personal Protective Equipment, construction and manufacturing safety. *Pre- req.: INME212 and INME214.*

INME 422 ENGINEERING LOGISTICS AND SUPPLY CHAIN (3Cr.:3Lec,0Lab): Introduction to supply chain management and logistics, managing inventory in the supply chain and risk pooling, network planning, supply chain contracts, supply chain integration, information sharing, and strategic partnering. *Pre-req.: INME325 and INME221.*

INME 423 PROJECT PLANNING AND MANAGEMENT (3Cr.:3Lec,0Lab): Principles of project planning, network construction (activity on arrows, activity on nodes), CPM and PERT applications, cost estimation, earned value analysis, crashing of schedules, resource allocation and leveling, computer-based project management. *Pre- req.: INME324*

INME 431 SYSTEM MODELING AND SIMULATION (3Cr.:3Lec,0Lab): Principles of simulation, Systems concepts, design and analysis of network flows for material and information, modelling of discrete and continuous systems, advanced system modelling, case studies with verification and validation. *Pre-req.: COMP208*

INME 431L SYSTEM MODELING AND SIMULATION Lab (1Cr.: 0Lec,2Lab): The content of this lab is directly related to the courses INME431. *Pre or Co-req.: INME431.*

INME 433 MAINTENANCE PLANNING AND TECHNOLOGY (3Cr.:3Lec,0Lab): Maintenance strategy, maintenance organization, maintenance systems, condition-based maintenance, maintenance awareness in design, cost of the maintenance team, effectiveness, and case studies. *Pre-req.: INME332.*

INME 434 STATISTICAL QUALITY AND PROCESS CONTROL (3Cr.: 3Lec,0Lab): The course covers the foundations of modern quality control and improvement methods that may be applied to manufacturing industries. It aims to introduce students to the tools and techniques of quality control used in industrial applications. The course emphasizes the philosophy and fundamentals of quality control, the statistics foundations of quality control, statistical process control, and acceptance sampling *Pre-req.: MATH381.*

INME 442 ERGONOMICS (2Cr.:2Lec,0Lab): Introduction to ergonomics, applied anthropometry, anatomical and physiological factors underlying the design of equipment and workplaces, measurement and specification of heat, light, and sound with respect to the design of the work environment, and biomechanical factors governing physical workload and motor performance. *Pre-req.: CVLE210.*

INME 500 RESEARCH METHODOLOGY (2Cr.:2Lec,0Lab): Steps for conducting successful research: formulating a research problem, literature review, constructing an

instrument for data collection, writing a research proposal, collecting data, processing & displaying data, writing a research report. **Pre-req.: ENGL211.**

INME 521 TOTAL QUALITY MANAGEMENT AND SIX SIGMA (3Cr.:3Lec,0Lab)

Total quality systems in manufacturing and services, strategic quality management, quality culture, customer satisfaction and retention, employee empowerment, teamwork, the six-sigma paradigm, benchmarking, Pareto analysis, cause-effect, Flow chart, Swim and lane diagrams, and quality function deployment. **Pre-req.: INME434.**

INME 522 MANAGEMENT OF GLOBAL OPERATIONS (3Cr.:3Lec,0Lab):

Introduction to international operations and multi-national enterprises, the study of factors affecting operations in a global environment with a focus on international economic issues. **Pre-req.: INME422.**

INME 531 PRODUCTION SYSTEMS AUTOMATION (3Cr.:3Lec,0Lab):

Types of automation, production systems, time Study, system efficiency, mathematical models, automation strategies, cost analysis of automated production line, assembly systems, manual assembly lines, material handling. **Pre-req.: INME333.**

INME 535 ADVANCED ENGINEERING STATISTICS (3Cr.:3Lec,0Lab):

Topics cover advanced statistical tools for engineers. Those include the design of experiments and analysis of variance, Simple Regression, Multiple Regression, model building and diagnosis, and categorical data analysis. **Pre-req.: INME335.**

B. Industrial Engineering Technical Elective Courses

The IE curriculum includes three 3-credit hour courses as technical electives. The courses are chosen from the courses listed in the table below with their descriptions given thereafter.

Course	Title	Credits	Pre-requisites
INME331	Engineering Design	3	INME212 and INME214
INME414	Industrial Scheduling	3	INME333
INME416	Industrial Packaging	3	INME214
INME418	Plastic Engineering	3	INME214
INME421	Reliability	3	MATH381
COMP424	Artificial Intelligence and Robotics for Engineers	3	COMP208
INME432	Failure Analysis	3	INME211
INME516	Advanced Manufacturing Processes	3	INME214
INME518	Strategic Manufacturing Planning	3	INME214 and INME333
INME539	Reverse Engineering and Prototyping	3	INME312

Description of Technical Elective Courses

INME 331 ENGINEERING DESIGN (3Cr.:3Lec,0Lab): General principle of machine design, the basic design principle of machine elements, fasteners and fittings, shaft, gears, and bearings selection. **Pre-req.: INME 212 and INME 214.**

INME 414 INDUSTRIAL SCHEDULING (3Cr.:3Lec,0Lab): Basic scheduling models for single machines, parallel machines, flow shops and flexible flow shops, applications in production and services and algorithms will be explained from theoretical and applied perspectives. **Pre-req.: INME333**

INME 416 INDUSTRIAL PACKAGING (3Cr.:3Lec,0Lab): This course provides an overview of packaging materials selection. It introduces a systematic process for Manufacturing

food packaging. It focuses on packaging machinery, packaging line, and filling systems. By participating in interactive problem-solving activities, discussions, and projects, you'll gain important insights into the process of packaging materials and containers. **Pre-req.: INME214.**

INME 418 PLASTICS ENGINEERING (3Cr.:3Lec,0Lab): Plastic materials and their processing, review of the pertinent organic chemistry of polymer materials, classification, properties, characteristics and applications of plastics; applications, process parameters, quality, economics and tooling considerations. **Pre-req.: INME214.**

INME 421 RELIABILITY (3Cr.:3Lec,0Lab): Life distribution and their applications in reliability, system reliability models, design by reliability and probabilistic design, reliability analysis through FMECA and FTA, reliability estimation and measurement by testing for binomial, exponential and Weibull distribution. **Pre-req.: MATH 381.**

COMP 424 Artificial Intelligence and Robotics for Engineers (3Cr.: 3Lec, 0Lab): Introduction to artificial intelligence and machine learning. Introduction to robotics. Programming in Python: data type, expressions, functions, loops and control. Data plotting and analysis. Smart agent models. Supervised and unsupervised learning. Knowledge representation and reasoning. **Pre-req: COMP 208.**

INME 432 FAILURE ANALYSIS (3Cr.:3Lec,0Lab): Brittle fracture, ductile fracture, stress residual, Griffith's theory and Irwin's theory, crack initiation, crack propagation and spreading, fracture toughness, reasons for failures, procedures of failure analysis, metallurgical failure analysis, fatigue, creep, case studies. **Pre-req.: INME211.**

INME 516 ADVANCED MANUFACTURING PROCESSES (3Cr.: 3Lec,0Lab): Advanced topics in manufacturing materials and processes, including integrated manufacturing systems, microfabrication technologies, nanofabrication technologies, rapid prototyping and additive manufacturing. **Pre-req.: INME214.**

INME 518 STRATEGIC MANUFACTURING PLANNING (3Cr.:3Lec,0Lab): Formulate a framework for developing and implementing a manufacturing strategy, develop a framework for the strategic management of manufacturing, technical tools and frameworks that directly apply to operational decisions that can be useful in adding value to manufacturing firms. **Pre-req.: INME214 and INME333.**

INME 539 REVERSE ENGINEERING AND PROTOTYPING (3Cr.:3Lec,0Lab): Concept, techniques, analysis and applications of engineering design, fundamentals of design and design principles, conceptual design, importance of sketching, reverse engineering principles. **Pre-req.: INME312.**

C. FINAL YEAR PROJECT

INME 501 FINAL YEAR PROJECT I (1Cr) After completing 120 credits of coursework, the student becomes eligible to sign up for the Final Year Project (FYP) that extends over two semesters. The FYP experience requires students to work in teams to complete a specific project,

submit a technical report, and give a presentation on a significant, relevant, and comprehensive engineering problem. The FYP is intended to stimulate student creativity and critical thinking, and build skills in formulating, designing, developing, building, communicating, and managing engineering projects. The project aims to provide students with a transitional experience from the academic world to the professional world. **Pre-req.: INME500, INME221 and ENGL300.**

Refer to the Final Year Project Policy for more details

INME 502 FINAL YEAR PROJECT II (3Crs) After completing 120 credits of coursework, the student becomes eligible to sign up for the Final Year Project (FYP) that extends over two semesters. The FYP experience requires students to work in teams to complete a specific project, submit a technical report, and give a presentation on a significant, relevant, and comprehensive engineering problem. The FYP is intended to stimulate student creativity and critical thinking, and build skills in formulating, designing, developing, building, communicating, and managing engineering projects. The project aims to provide students with a transitional experience from the academic world to the professional world. **Pre-req.: INME501**

Refer to the Final Year Project Policy for more details

D. INTERNSHIP

INME 499 INTERNSHIP (1Cr) This is professional training which should not be less than four weeks. The training is followed by a presentation session where the students are supposed to present what they have learned.

Refer to the department policy for further details.

Study Plan

Bachelor of Engineering in Industrial Engineering (150 Credits)

First Semester (16 Credits)		Crs.	Pre-requisites
MCHE 201	Engineering Drawing and Graphics	3	
MATH 281	Linear Algebra	3	
PHYS 280	Classical Physics	3	
CHEM241	Principles of Chemistry	3	
CHEM241L	Principles of Chemistry Lab	1	Pre or Co: CHEM241
COMP 208	Programming I	3	
Second Semester (17 Credits)		Crs.	Pre-requisites

MATH 282	Calculus	3	
INME 206	Production Engineering	3	
PHYS 281	Electricity and Magnetism	3	
INME 204	Introduction to Industrial Engineering	2	
INME 221	Engineering Economy	3	
CVLE 210	Statics	3	
Summer Semester (5 Credits)		Crs.	Pre-requisites
ARAB001	Arabic Language	2	
ENGL001	English Language	2	
	Elective (General)	1	
Third Semester (18 Credits)		Crs.	Pre-requisites
MATH 381	Probability and Statistics	3	MATH 282
MATH 283	Differential Equations	3	MATH 281 and MATH 282
INME 211	Engineering Materials and Technology	3	PHYS 280
INME 321	Management Information Systems	3	INME 204
INME 321L	Management Information Systems Lab	1	Pre or Co: INME 321
INME 322	Organization Design	3	INME 204
ENGL 211	Advanced Writing	2	ENGL001
Fourth Semester (17 Credits)		Crs.	Pre-requisites
INME 312	Computer Aided Design and Manufacturing	3	MECH 201
MATH 284	Numerical Analysis	3	MATH 283
INME 222	Operations Research	3	MATH 281
INME 212	Metal Shaping	3	INME 206 and INME 211
INME 214	Manufacturing Processes	3	INME 211
CHEM405	Solid State Chemistry	2	CHEM241

Summer II Semester (5 Credits)		Crs.	Pre-requisites
ENGL 300	Speech Communications	2	ENGL 211
BLAW 001	Human Rights	1	
	Elective (General)	2	
Fifth Semester (18 Credits)		Crs.	Pre-requisites
INME 325	Stochastic Operations Research	3	MATH 381
INME 335	Quantitative Methods for Decision Making	2	MATH 381 and INME 222
INME 324	Production and Operation Management	3	INME 222
INME 341	Engineering Safety	2	INME 212 and INME 214
INME 333	Facility Planning and Design	3	INME 204
	Technical Elective	3	
INME 500	Research Methodology	2	ENGL 211
Sixth Semester (17 Credits)		Crs.	Pre-requisites
INME 422	Engineering Logistics and Supply Chain	3	INME 221 and INME 325
INME 434	Statistical Quality and Process Control	3	MATH 381
INME 332	Industrial Measurements and Inspection	3	MATH 284
INME 423	Project Planning and Management	3	INME 324
INME 442	Ergonomics	2	CVLE 210
CHME 342	Green Chemistry	3	CHEM 241
Summer III Semester (4 Credit)		Crs.	Pre-requisites
INME 499	Internship	1	
WRNL200	Work Ready Now	3	
Seventh Semester (17 Credits)		Crs.	Pre-requisites

INME 535	Advanced Engineering Statistics	3	INME335
	Technical Elective	3	
INME 433	Maintenance Planning and Technology	3	INME 332
INME 531	Production Systems and Automation	3	INME 333
INME 431	System Modeling and Simulation	3	COMP 208
INME 431L	System Modeling and Simulation Lab	1	Pre or Co: INME 431
INME 501	FYP 1	1	INME 221, INME 500 and ENGL300

Eighth Semester (16 Credits)		Crs.	Pre-requisites
INME 522	Management of Global Operations	3	INME 422
INME 521	Total Quality Management and Six Sigma	3	INME 434
ENGR 001	Engineering Ethics	1	
	Technical Elective	3	
	Technical Elective	3	
INME 502	FYP 2	3	INME 501

Courses offered for other majors.

The Department of Industrial Engineering and Engineering Management offers one course for other engineering majors. These courses are described below.

INME 482 ENGINEERING PROJECT MANAGEMENT (3Crs.: 3Lec, 0Lab) The course covers the characteristics, techniques and challenges associated with initiating, planning, executing, controlling and closure projects. Project management skills are discussed as they apply to projects, with a special focus on leadership, teaming, and coordinating individual and group efforts. MS Project is introduced to provide hands-on practical skills in building a project plan, scheduling tasks, assigning resources, managing dependencies, monitoring progress and costs, keeping projects on track, and communicating project data through Gantt charts. ***Pre: ENGL 300***