

Annex 2 Prospectus

Department of Industrial Engineering and Management

Chairperson:	Maddah, Bacel
Professors:	Abdul Malak, Mohamed-Asem; Maddah, Bacel; Salameh, Moueen; Yassine, Ali
Associate Professors:	Nasr, Walid; Khoury, Hiam
Assistant Professors:	Moacdieh, Nadine; Nouiehed, Maher; Tahini, Hussein
Lecturers:	Kalach, Maysaa; Khraibani, Rayan
Instructors:	Jaafar, Maysaa; Mattar, Maurice; Olleik, Majd; Sfeir, Rana

The Department of Industrial Engineering and Management offers an undergraduate degree program leading to a Bachelor of Science in Industrial Engineering and a graduate degree program leading the Master of Engineering Management degree.

Bachelor of Science (BS)

Major: Industrial Engineering (IE)

The Industrial Engineering Program extends over a four-year period and is offered exclusively on a daytime, on-campus basis. The program is offered in nine terms whereby eight terms are 12/13-week Fall/Spring terms given over four years, and one eight-week summer term taken during the third year of the program in which students are required to participate in a practical training program with a local, regional or international organization.

IE Program Educational Objectives

Graduates of the IE program will be able to:

- assume key roles in a range of industries that use industrial engineering, including manufacturing and service.
- effectively participate in, coordinate and manage diverse teams of engineers and analysts, especially in large-scale systems.
- pursue advanced degrees in industrial engineering and other related fields at reputable regional and international universities.
- appreciate the importance of professional ethics and actively use their knowledge and experience to the benefit of the community.

IE Program Learning Outcomes

Upon graduation, IE students will be able to demonstrate:

- an ability to apply knowledge of mathematics, science and engineering to model, optimize and evaluate integrated systems of people, technology and information.
- an ability to design and conduct experiments, as well as to analyze and interpret data.
- an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
- an ability to function on multidisciplinary engineering teams.
- an ability to identify, formulate and solve engineering problems and to develop integrated solutions to large-scale, sociotechnical problems through quantitative models.
- an understanding of professional and ethical responsibility.
- an ability to communicate effectively in oral and written form.
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.
- recognition of the need for, and ability to engage in, lifelong learning.
- knowledge of contemporary issues.
- an ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

IE Program Requirements

The BE curriculum in Industrial Engineering is a four-year program (with one summers) consisting of 244 ECTS of coursework, split into 190 ECTS compulsory courses and 54 ECTS electives.

The IE curriculum is supported by four pillars:

- a) basic science courses, b) general education courses, c) basic business courses and d) general engineering fundamental courses.

The specific course requirements are as follows:

- Basic Science Courses: MATH 202, MATH 218/219, MATH 251, STAT 230, PHYS 210, CHEM 201/202
- General Education Requirements: 12 ECTS in English, ENGL 203 and ENGL 206; 6 credits in Arabic; 3 credits on quantitative reasoning, MATH 201; 12 ECTS in natural science including BIOL 210; 24 ECTS in the humanities including a course on Greek Studies; 12 ECTS in social sciences, ECON 211 and MNGT 215; 6 credits on ethics and community engagement including INDE 410.

- Basic Business Courses: ACCT 210
- Engineering Fundamentals: CIVE 210, EECE 230, MECH 421

The IE courses are distributed in three core areas:

- a) Operations Research, b) Engineering Management and c) Production Systems.

IE Plan of Study

	Course Code	Course Title	ECT S
Term 1 (Fall)			
1	EECE 230	Introduction to Programming	6
2	CHEM 201/2	Chemistry Course	6
3	MATH 201	Calculus and Analytic Geometry III	6
4	CIVE 2101	Statics/Dynamics	6
5	ENGL 203	Academic English	6
Term II (Spring)			
1.	MATH 202	Differential Equations	6
2.	MATH 218/9	Linear Algebra	6
3.	PHYS 210	Introductory Physics II	6
4.		Science Elective I	6
5.	INDE 301	Engineering Economy	6
Term III (Fall)			
1	INDE 302	Operations Research I	6
2	STAT 230	Introduction to Probability and Random Variables	6
3	ECON 211	Microeconomic Theory	6
4	ENGL 206	Technical English	6
5	BIOL 210	Human Biology	6
Term IV (Spring)			
1.	INDE 303	Operations Research II	6
2	INDE 320	Work Measurement and Methods Engineering	6
3	MATH 251	Numerical Computing	6
4	MNGT 215	Fundamentals of Management & Organizational Behavior	6
5		Arabic Elective I	6
Term V (Fall)			
1.	INDE 412	Engineering Entrepreneurship	4
2.	INDE 421	Human Factors Engineering	6
3.	INDE 504	Discrete Event Simulation	6
4.	INDE 513	Information Systems	6
5.		Humanities Elective I	6
6.		Arabic Elective II	6
Term VI (Spring)			

¹ New course developed jointly by ME and ECE

1.	INDE 402	Facilities Planning and Material Handling	6
2.	INDE 430	Statistical Quality Control	6
3.	INDE 431	Production Planning and Inventory Control	6
4.	ACCT 210	Financial Accounting	6
5.		Humanities Elective II	6
Term VII (Summer)			
	INDE 500	Approved Experience	0
Term VIII (Fall)			
1.	INDE 501	Final Year Project I	6
2.	INDE 410	Engineering Ethics	6
3.	INDE 411	Introduction to Project Management	6
4.		Science Elective II	6
5.		Humanities Elective III	6
Term IX (Spring)			
1.	INDE 502	Final Year Project II	6
2.	INDE 535	Data Analytics for Industrial Engineering	6
3.	MECH 421	Manufacturing Processes I	6
4.		Understanding our Engagement ²	6
5.		Humanities Elective IV	6

IE Course Description

INDE 301 Engineering Economy

A course that covers principles, basic concepts and methodology for making rational decisions in the design and implementation of real engineering projects; time value of money, depreciation, comparing alternatives, effect of taxes, inflation, capital financing and allocation, and decision under uncertainty. *Every term.*

INDE 302 Operations Research I

A course on operation research modeling concepts with an emphasis on linear programming; topics include: linear programming, network programming and project management. *Prerequisite: MATH 218 or Math 219, or equivalent. Annually.*

INDE 303 Operations Research II

Another course on operation research modeling concepts with an emphasis on probability models and stochastic processes; topics include conditional probability, discrete- and continuous-time Markov chains and their application in modeling queues, inventories and production process behavior. *Prerequisite: STAT 230 or equivalent. Annually.*

INDE 320 Work Measurement and Methods Engineering

² New course on community engagement, part of the new GE requirement. TBA

A course on system and work design concepts; time studies; performance rating and allowances; standard and pre-determined times; work methods improvement; design of manual work, equipment, tools and work environments; line balancing; manpower determinations, job analysis and incentives; systems analysis, lean and value analysis. *Prerequisite: STAT 230 or equivalent. Annually.*

INDE 402 Facility Planning and Material Handling

Inter-relationships between facilities, process design, systematic layout procedures, computer aided layout, location analysis models, material handling analysis and concepts, warehousing storage and retrieval systems. *Prerequisites: INDE 302 and INDE 303. Annually.*

INDE 410 Engineering Ethics

A course on engineering ethics covering responsibility in engineering; framing the moral problem; organizing principles of ethical theories; computers, individual morality and social policy; honesty, integrity and reliability; safety, risk and liability in engineering; engineers as employees; engineers and the environment; international engineering professionalism; and future challenges. *Every term.*

INDE 411 Introduction to Project Management

Introduction to project management for engineers. Conception, planning, scheduling, budgeting, leadership, management, tracking and completion of projects. Project management software is introduced and used. *Prerequisites: INDE 302 and INDE 303. Annually.*

INDE 412 Engineering Entrepreneurship

This course provides students with the tools necessary to create and grow a successful, innovative technology enterprise. Topics include evaluating market opportunities, designing profitable business models, producing a solid business plan, raising capital, addressing legal considerations and developing a winning team. *Prerequisite: INDE 301 or equivalent.*

INDE 421 Human Factors Engineering

Designing for human performance effectiveness and productivity. Introducing human factors and ergonomics. Design and evaluation methods. Perception: vision and hearing. Cognition. Displays and controls. Work-space design. Biomechanics of work. Stress and workload. Safety and human error. Human-computer interaction. *Prerequisite: INDE 320. Annually.*

INDE 430 Statistical Quality Control

Design of quality control systems; quality methods for establishing product specifications; process control; variables and attributes charts; acceptance sampling; operating characteristics curves; process capabilities; QC software. *Prerequisite: STAT 230. Annually.*

INDE 431 Production Planning and Inventory Control

Methods of production and inventory planning. Single-product replenishment systems. Inventory management for special classes of items and products. Multiple item and multiple location inventories. Production planning and scheduling: aggregate production planning, MRP, JIT, OPT and short-range production scheduling. *Prerequisites: INDE 302 and 303. Annually.*

INDE 500 Approved Experience

Practical training program with a local, regional or international organization. *Summer.*

INDE 501 Final Year Project I

This is a capstone course where IE students utilize knowledge they acquired from different courses to design and develop an IE-related product or service. This is the first part of the course that spans through the final year of the student's study. *Prerequisite: Completion of third year in IE requirements. Fall.*

INDE 502 Final Year Project II

This is the second part of the IE capstone course. *Prerequisite: INDE 501. Spring.*

INDE 504 Discrete Event Simulation

System definition; model formulation, Monte-Carlo method; random number generation; discrete events; system entities and its attributes. Emphasis on analysis of systems and models of real-life problems. Lab experience with a modern discrete-event simulation package (e.g., ARENA). *Prerequisite: INDE 303. Annually.*

INDE 513 Information System

This is a course that answers the questions: What is information? How can it best be stored? What to call it? The course also covers the following topics: abstraction, interfaces, barriers, specification, documentation, relational calculus and architectural abstractions, data structures for fast data storage and retrieval, encryption, putting things on the Web, data warehousing and data mining. *Annually.*

INDE 535 Data Analytics for Operations Research and Financial Engineering

Students will learn to identify, evaluate and capture analytic opportunities that create value for an organization. Basic descriptive analytics methods are reviewed utilizing specialized software (e.g. R) in analyzing large data sets. Predictive analytics techniques including clustering, classification and regression are covered in detail. Prescriptive analytics applications on utilization simulation and optimization over large data to improve business decisions are presented. *Annually.*