Department of Industrial Engineering and Management

Chairperson: Maddah, Bacel
Professors: Salameh, Moueen; Yassine, Ali
Associate Professors: Maddah, Bacel; Nasr, Walid
Assistant Professors: Al-Qaisi, Saif; Jaber, Hadi (visiting); Moacdieh, Nadine; Tarhini, Hussein
Senior Lecturers: Charif, Hassan; Noueihed, Nazim; Saad, Youssef; Trabulsi, Samir
Lecturers: Bdeir, Fadl; Hamade, Tarek; Shalhoub, Kathy
Instructors: Itani, Mona; Kadi, Samir; Sarieddine, Mouna

General Information
The graduate program leading to the degree of Master of Engineering Management (MEM) provides professional training in engineering management, with emphasis on technically based organizations and applications to various engineering and related disciplines. This program addresses the specific area of the management of technical activities and enterprises.

A student may pursue courses so as to satisfy one of the three following areas of concentration:
- Financial and Industrial Engineering (FIE)
- Project and Program Management (PPM)
- Management of Technology and Entrepreneurship (MTE)

The requirements for the Master of Engineering Management degree can be fulfilled by pursuing one of the following two options.

Non-Thesis Option:
Under this option, a student is required to complete a total of 33 credits, subdivided as follows:
- Four core courses (12 credits)
- Four electives from the student’s area of concentration (12 credits)
- Three free electives (9 credits)
- Seminar (0 credit)

Thesis Option:
Under this option, a student is required to complete a total of 30 credits, subdivided as follows:
- Four core courses (12 credits)
- Three electives from the student’s area of concentration (9 credits)
- One free elective (3 credits)
- Thesis (6 credits)
- Seminar (0 credit)

Free electives should be graduate courses (within IEM, SFEA, or any AUB program), which relate to engineering management. All free electives must be approved by the student’s academic advisor. All students pursuing the FIE concentration are required to take ENMG 623 Stochastic Models and Applications. All students pursuing the PPM concentration are required to take ENMG 632 Project Planning Scheduling and Control. The ENMG 797 Special Project course can be used to satisfy the three-credit requirement of any elective depending on the nature of the topic addressed. A flexible combination of courses not in fulfillment of either option stated above leads to no mention of an area of concentration on the student’s transcript.

Requirements for Admission
In order to be eligible for admission to the MEM program, a student must have a bachelor's degree in one of the engineering disciplines, architecture, or another related field. The student must also satisfy the requirements of the University and the Maroun Semaan Faculty of Engineering and Architecture for admission to graduate study, as specified in the relevant sections of this catalogue.

Graduates of universities other than AUB or from majors other than engineering or architecture may be required to take undergraduate prerequisite courses to make up for deficiencies.

A student is not allowed to register in the program for more than four calendar years beyond the date of her/his first registration, except with the approval of the Graduate Studies Committee of the Faculty.

Dual Master Degree – Master of Engineering in Engineering Management and Energy Studies (Thesis option only)
The dual Master degree – Master of Engineering in Engineering Management and Energy Studies – program is primarily intended for individuals with a bachelor degree in engineering who seek to deepen their knowledge in advanced energy studies and engineering management subjects.

Applicants must be accepted in both programs (Master of Engineering Management and Master of Science in Energy Studies) and in accordance with the policies of each program, and with AUB policies regarding dual graduate degrees.

A student wishing to apply for the dual degree may submit a single dual-degree application that will be sent to each program simultaneously when first applying for graduate admissions. If the student is already registered in one degree s/he may apply for the second degree no later than the end of a student’s second semester at AUB.

The program permits full-time or part-time enrollments. To fulfill the basic requirements for the dual degree, a student must complete a minimum of 18 credit hours of graduate course work in each degree program. The remaining credits include additional course work and a thesis that are credited to the dual degree. The program requires a minimum of 42 credit hours of graduate course work and 6 credits of thesis work. The course work is distributed as follows:
- 9 credits of core Engineering Studies (ENST) courses
- 6 credits of core Engineering Management (ENMG) courses
• 6 credits of common courses: Required core ENMG (ENST List A Electives)
• 12 credits of ENMG elective courses
• 6 credits of elective course from ENST List B on energy science and technology
• 3 credits elective course as approved by thesis advisor/s (ENST)

The courses that are counted toward both degrees are:

ENMG 603 Probability and Decision Analysis 3 cr.
ENMG 604 Deterministic Optimization Model 3 cr.
Comprehensive Exam 0 cr.
Thesis 6 cr.

Sample Schedule

Term: Fall 1
Course Number & Title Credits Prerequisite(s)
ECON 333 Energy Economics and Policy 3
PSPA 352 Foundations of Public Policy 3
ENST 300 The Science and Technology of Energy 3 PHYS 210 or equivalent
Term credit total: 9

Term: Spring 1
Course Number & Title Credits Prerequisite(s)
ENMG 603 Probability and Decision Analysis 3
ENMG 604 Deterministic Optimization Models 3
ENST List B Elective 1 3
Term credit total: 9

Term: Fall 2
Course Number & Title Credits Prerequisite(s)
ENMG 601 Management Theory 3
ENMG 602 Introduction to Financial Engineering 3
ENMG Elective 1 3
Term credit total: 9

Term: Spring 2
Course Number & Title Credits Prerequisite(s)
ENMG Elective 2 3
ENMG Elective 3 3
ENST List B Elective 2 3
Term credit total: 9

Term: Fall 3
Course Number & Title Credits Prerequisite(s)
ENMG Elective 4 3
ENST Elective Graduate Course 3
Comprehensive Exam 0

Course Descriptions

Core Courses

ENMG 601 Management Theory 3 cr.

ENMG 602 Introduction to Financial Engineering 3 cr.

ENMG 603 Probability and Decision Analysis 3 cr.

ENMG 604 Deterministic Optimization Models 3 cr.
Elective Courses

Financial and Industrial Engineering Sequence

ENMG 611 Supply Chain Design and Management 3 cr.
Introduction to supply chain management and its key issues. Logistics, network configuration. Inventory management. Distribution strategies and strategic alliances. The value of information in supply chains. Information technology and decision support systems for supply chain management.

ENMG 612 Advanced Supply Chain Design and Management 3 cr.
This course concentrates on the advanced quantitative and qualitative techniques used in supply chain management to achieve competitive advantage. The focus is on planning models for production, inventory, and distribution in general multi-echelon multi-item systems. This course also deals with models for planning, information sharing, transportation, distribution, and site selection. The interactions with other functional areas, such as information systems, marketing, and finance, are also illustrated.

ENMG 616 Advanced Optimization Techniques 3 cr.
The course is divided into four parts covering integer programming, nonlinear programming, stochastic programming, and heuristic methods. Students will develop skills in modeling complex systems using mathematical programming, in analyzing the structure of mathematical programs, and in developing and applying the correct solution techniques. The students will also have a hands-on experience in using software packages for solving optimization problems.

ENMG 617 Engineering Management Statistics 3 cr.

ENMG 622 Simulation Modeling and Analysis 3 cr.

ENMG 623 Stochastic Models and Applications 3 cr.
Poisson process, renewal theory, queuing models, reliability theory, Markov chains, Brownian motion, random walks and Martingale, stochastic order relations.

ENMG 624 Financial Engineering I: Portfolios and Risk Management 3 cr.
Basic theory of interest. Fixed-income securities yield, duration convexity, and immunization. Term structure of interest rates. Expectation, liquidity, and market segmentation explanations of the term structure. Applied interest rate analysis: capital budgeting, optimal portfolios, dynamic cash flow processes, optimal management, the Harmony Theorem, valuation of a firm. Mean-variance portfolio theory. Introduction to expected utility theory. Introduction to general pricing theory. Prerequisite: ENMG 602 or INDE 301, or consent of instructor.

ENMG 625 Financial Engineering II: Derivatives 3 cr.
Derivative securities: forwards, futures, and swaps; models of asset dynamics; options theory; interest rate derivatives. General cash flow streams: optimal portfolio growth, general investment evaluation. Prerequisite: ENMG 602 or INDE 301, or consent of instructor.

Project and Program Management Sequence

ENMG 631 Pre-Project Planning and Feasibility Analysis 3 cr.

ENMG 632 Project Planning Scheduling and Control 3 cr.

ENMG 633 Advanced Topics in Project Management 3 cr.
Planning and scheduling under constraints. Trade-off analysis in a project environment. Project cost control from a client's perspective. Project risk management. Managing the international project. Determinants of project success. Lessons learned in project management. Strategic planning in project management. Modern developments in project management.

ENMG 635 Project Deliverance and Contracts 3 cr.

ENMG 641 Lean Engineering Concepts 3 cr.
This course focuses on the emerging concept of lean performance in the construction industry. Topics covered include the origin of lean concepts, application to the design process, implementation in construction, contracting for lean performance, and value improving practices (e.g., benchmarking, constructability, and value management).

ENMG 644 Agile Software Project Management 3 cr.
The main objectives of this course are to enable the student to understand the fundamental principles underlying software management and economics. The course provides a quick overview of traditional software development and management strategies such as Waterfall, PMI/PMBOK, and RUP. This will be contrasted with iterative and incremental development techniques covering the full spectrum of agile methods, including Scrum, extreme programming, lean, and feature-driven development.
ENMG 645  Program and Portfolio Management  3 cr.
This course presents a view of managing projects from an organizational perspective. The main areas of discussion will be strategic alignment, the role of effectively managing organizational assets through an enterprise project management office, portfolio management, and program management. Using specific examples and a case study approach, students will explore the importance of using organizational strategies to align projects and apply practices to create portfolios of programs and projects to efficiently leverage organizational assets.

Management of Technology and Entrepreneurship Sequence

ENMG 654  Technology-Based Entrepreneurship  3 cr.
An introduction to general theories, principles, concepts and practices of entrepreneurship and intrapreneurship. The entrepreneurial perspective, development the entrepreneurial plan, initiating entrepreneurial ventures, growth and development of entrepreneurial ventures, and contemporary challenges in entrepreneurship are discussed. The course includes case study analysis and group projects.

ENMG 655  Management of Technology  3 cr.
Management of technology at both the national and organizational level and its contribution to the generation of national wealth. Engineering, science, and management principles contributing to the development of a successful framework for managing technology within an organization, nationally or internationally. Introduction to technological innovations. Planning and forecasting. Socio-economic changes.

ENMG 656  Management of Technological Innovations  3 cr.

ENMG 659  Introduction to System Dynamics  3 cr.
An introduction to the field of system dynamics as a discipline and a set of tools for understanding and dealing with complexity in systems. Students will learn how to collaboratively translate knowledge about a system or problem into a conceptual model, and to simulate the model in order to test hypotheses about system behavior.

ENMG 661  Strategic Management of Technology  3 cr.
The organization as a whole and its interaction with its environment. The corporation as it undergoes the process of a global transformation. Mergers, acquisitions, outsourcing, downsizing, and privatization. Framework of analysis for the identification of central issues and problems usually faced in strategic management. Understanding the effect of present and future environments on the corporation’s welfare.

ENMG 663  Product Design and Development  3 cr.
This class provides students with a holistic perspective that includes the design, analysis, and management of complex engineered systems/products. Topics covered include marketing research, integrated system/subsystem/component design, production planning, manufacturing strategy, supply chain management, innovation, and entrepreneurship.

ENMG 698  Special Topics in Engineering Management  3 cr.
ENMG 700  Seminar  0 cr.
All students are required to register for the seminar during each fall semester.

ENMG 797  Special Project in Engineering Management  3 cr.
A supervised study that may involve special research work in the student’s area of concentration.

ENMG 800  Comprehensive Exam  0 cr.
A capstone exam covering core engineering management concepts as well as major concepts in the student’s area of concentration.

ENMG 798  Thesis  6 cr.