Department of Industrial Engineering and Management

Chairperson: Yassine, Ali
Professors: Salameh, Moueen; Yassine, Ali
Associate Professor: Maddah, Bacel
Assistant Professors: Al-Qaisi, Saif; Nasr, Walid; Tarhini, Hussein; Moacadieh, Nadine
Senior Lecturers: Charif, Hassan; Ghazal, Nader; Noueihed, Nazim; Saad, Youssef; Trabulsi, Samir
Instructor: Itani, Mona

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 select her/his 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)
• Three electives from the student’s area of concentration (9 credits)
• Two area-related electives (6 credits)
• Two free electives (6 credits)
• Seminar (0 credit)

A student may opt to complete all seven elective courses in one area of concentration provided the courses are offered during the four-year period of permitted enrollment.

Note 1: All students pursuing the Financial and Industrial Engineering concentration are required to take ENMG 623 (Stochastic Models and Applications) and ENMG 624 (Financial Engineering I).

Note 2: The ENMG 797 Special Project course can be used to satisfy the 3-credit requirement of any elective depending on the nature of the topic addressed.
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)

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 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.

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 ENMG 400, 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 ENMG 400, or consent of instructor.

Project and Program Management Sequence

ENMG 631  Pre-Project Planning and Feasibility Analysis  3 cr.
Assimilation of client needs. Market assessment studies. Impact of laws and regulations on
the facility program. Surveys of project area infrastructure conditions. Investigation of site
conditions. Project scope validation. Project cost and revenue estimation. Project life-cycle

ENMG 632  Introduction to Project Management  3 cr.
Extended overview of project management. Basic planning and scheduling concepts. Project
participants and roles. Project management applications and growth. Project team formation.
Dealing with time. Project planning and costing. Advanced scheduling techniques. Integrated
project cost-time control.

ENMG 633  Planning, Scheduling and Control  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.
Overview of project organizations. The design-build project delivery approach. The build-
operate-transfer project delivery approach. Innovative delivery approaches, financial schemes,
Components of the proposal package. Evaluation of the commercial, financial, and technical
components. Contract formation and agreement closure.

ENMG 642  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). Prerequisite: ENMG
502/CIVE 580.
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. These methods promote teamwork through rich and concise communication, and allows for the frequent delivery of running and tested systems that satisfy the highest-priority customer features and requests. Examples of agile adoption in industry are discussed. Additional subthemes in the course will include software cost/schedule tradeoff analysis via software cost estimation tools and microeconomic techniques, team dynamics, collaboration, and software quality.

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, how to use an enterprise project management office as a governance entity, and apply practices to create portfolios of programs and projects to efficiently leverage organizational assets. Key topics include establishing a governance process, project selection techniques, project portfolio management methodology, and application of project practices to program management.

Management of Technology and Entrepreneurship Sequence

ENMG 654  Technology-Based Entrepreneurship  3 cr.
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 658  Organizational Analysis and Design  3 cr.
Organization aspects such as form, centralization, formalization, differentiation, and culture. The Contingent Organization Design concept: different organizational forms for different situations (e.g., uncertainty, competition, size, strategy). Critiques from contemporary and classical organization science literature. Understanding how an organization can work or fail, from the purely descriptive process view to the purely reductionist view of the organization as an information processing mechanism.

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.