

Engineering Management Program

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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 his/her courses in a way that satisfies one of the three following areas of concentration:

- Financial and Industrial Engineering
- Projects and the Built Environment
- Management of Technology in Organizations

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 1).

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, in architecture, or in 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 his/her 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 613  Manufacturing Systems and Facilities Planning  3 cr.

ENMG 614  Human Factors Engineering  3 cr.

ENMG 615  Optimal Product Design and Development  3 cr.
The course aims at providing the student with an exposure to a rational integration of traditional design methodologies with concepts and techniques of modern optimization theory and practice. Students learn to create appropriate mathematical optimization models and to use analytical and computational techniques to solve them.

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 approval 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 approval of instructor.

Projects and the Built Environment Sequence

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

ENMG 632 Engineering Project Management 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 634  Design Management for Large Projects  3 cr.
Characteristics of the design phase. Setting project design criteria. Design team selection.
Design service agreement formation and negotiation. Design sub-consultants coordination
issues. Joint ventures for the rendering of design service. Value engineering and management
during design development. Constructability analysis of design solutions. Project contingency
management during design development.

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 636  Dispute Resolution on Projects  3 cr.
Types of claims and counterclaims. Standard forms of construction contract. Contract conditions
governing claims. Claim evolvement and administration: notification and substantiation. The
construction schedule: formulation and consent. Types of delay: excusableness, concurrency,
compensation. Delay claims and time extension determination. Right for the usage of float:
critical versus non-critical activities. Possession of site claims. Unforeseen conditions and
obstructions claims. Variations claims. Specifications compliance claims. Damages, payments,
withholdings, and reductions. Evolvement of claims into disputes. Dispute resolution methods.

ENMG 637  Logistics, Technologies, and Productivity Concepts  3 cr.
Construction methods and systems. Construction technology classification. Construction team
organization, information flow, and complexities. Productivity improvement approaches. On-site
construction as a system. Site layout design and analysis. Preplanning for construction operations.
Assessing productivity of activities. Data gathering for on-site studies. Analysis of construction
Automation of construction operations. Safety and environmental health in construction.

ENMG 638  Advanced Topics in Construction Management  3 cr.
Materials procurement and inventory management systems. Job costing and balancing. Cash flow
analysis and management. Construction organizational structures. Construction procedural and
administrative systems. Labor procurement, retention, and training. Industrial relations.

ENMG 639  Infrastructure and Facility Management  3 cr.
Project life span. Preventive maintenance. Condition assessment. Short-term and long-term
repair and upgrade plans. Capital budgeting for sustaining serviceability. Scheduling of service
and repair crews. Working around the built facility. Energy conservation strategies. Intelligent
building management systems.

ENMG 640  Sustainable Development Management  3 cr.
Introduction to the concept of sustainable development. Pricing the environment, energy,
and the marketplace. Innovation process. Technological cooperation. Renewable resources.
Leadership for sustainable development in developing countries. Case studies.

ENMG 641  Environmental Strategies for Development Projects  3 cr.
Introduction to global environmental problems including air, water, solid, pesticides, and toxic
substances. The impact of such problems on forests, species, coasts, and wetlands. From cradle
to grave as applied to all types of development projects including industrial, construction,
agriculture, and others. Latest techniques and tools available to management such as industrial
ecology, environmental impact assessment, and so on.
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 643 Mediation of Engineering Disputes 3 cr.
This course focuses on the use of mediation for resolving construction related disputes. Topics tackled include: dispute avoidance in construction, alternative dispute resolution techniques, and mechanics of mediation. Prerequisite: ENMG 502/CIVE 580.

Management of Technology in Organizations Sequence

ENMG 652 Custom Project Information System 3 cr.

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 662  Engineering Workforce Management  3 cr.

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 798  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 799  Thesis  6 cr.