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 four following areas of concentration:

- Financial Engineering
- Industrial Management
- Projects and the Built Environment
- Information and Organizational Management

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)

Note: 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 any 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.

Graduate Courses

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.
Mathematical modeling and the operation research approach. Formulation and classification of
optimization models. Improving search. Formulation of linear programs (LPs). Simplex algorithms
for solving LPs. Duality and sensitivity in linear programming. Multi-objective optimization and
goal programming. Introduction to network flow models. Formulation of integer programs. Solution
methods for integer programs. Unconstrained nonlinear programming. Introduction to constrained
nonlinear programming and quadratic programming.

Elective Courses

Operations and Financial 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  Production-Inventory Planning and Control  3 cr.
Replenishment systems for individual items. Inventory management for special classes of items.
Multiple item and multiple location inventories. Introduction to supply chain management and
multi-echelon inventories. Production planning and scheduling: aggregate production planning,
MRP, JIT, OPT, and short-range production scheduling.

ENMG 613  Manufacturing Systems and Facilities Planning  3 cr.
Material handling systems. Warehousing storage and retrieval systems. Introduction to general-
purpose queuing and simulation models.

ENMG 614  Human Factors Engineering  3 cr.
Designing for human performance effectiveness and productivity. Introducing human factors and
and controls. Work-space design. Biomechanics of work. Stress and workload. Safety and human
error. Human-computer interaction.

ENMG 615  Industrial Scheduling  3 cr.
Deterministic models for single machine, parallel machines, flow shops and flexible flow shops, job
shops, open shops. Stochastic models for single machines, parallel machines, flow shops, job shops,
and open shops. Scheduling in practice: general purpose procedures, modeling scheduling problems,
implementation of scheduling systems.

ENMG 616  Network Optimization: Algorithms and Applications  3 cr.
Network flow problems, their practical applications and their solution algorithms. Categories of

ENMG 617  Engineering Management Statistics  3 cr.
Review of probability and probability distributions. Data description. Random samples and sampling
experiments: the analysis of variance. Design of experiments with several factors. Simple linear
regression and correlation. Multiple regression. Nonparametric statistics. Introduction to statistical
quality control and reliability engineering. Introduction to analyzing and forecasting time-series
data. Introduction to queuing theory. Introduction to statistical decision analysis. Introduction to
simulation.
ENMG 621  Forecasting Methods and Applications  3 cr.

ENMG 622  Simulation  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  3 cr.

ENMG 625  Financial Engineering II  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 624.

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.

ENMG 635  Project Deliverance and Contracts  3 cr.

ENMG 636  Dispute Resolution on Projects  3 cr.

ENMG 637  Logistics, Technologies, and Productivity Concepts  3 cr.

ENMG 638  Advanced Topics in Construction Management  3 cr.

ENMG 639  Infrastructure and Facility Management  3 cr.

ENMG 640  Sustainable Development Management  3 cr.

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, etc.
Information and Organizational Management Sequence

**ENMG 651 Decision Support Systems** 3 cr.

**ENMG 652 Custom Project Information System** 3 cr.

**ENMG 653 Knowledge Management** 3 cr.
Knowledge management as a new management paradigm. Knowledge creation and capture. Knowledge codification and system implementation. Knowledge management system tools and portals. Ethical, legal, and managerial issues.

**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 657 Contemporary Issues in Technological Development** 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 Total Quality Management 3 cr.
Principles of total quality management. Leadership, customer satisfaction, employee involvement, continuous process improvement, supplier management, and performance measures. Tools and techniques including quality management systems (ISO), statistical quality control, quality function deployment, benchmarking, etc.

ENMG 660 Business Process Re-engineering 3 cr.

ENMG 661 Strategic Management 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 Human Resources Management 3 cr.
Functional areas associated with effective human resources management. Human resource planning, recruitment, and selection. Human resources development. Compensation and benefits. Safety and health. Employee and labor relations. Human resource research. Emphasis on, and case studies applied to, technical industries including manufacturing, engineering consulting, telecommunication, construction, etc.

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 799 Thesis 6 cr.