Engineering Management Program

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General Information

The graduate program leading to the degree of Master of Engineering Management (MEM) caters to the specific needs of management of technical activities and enterprises by providing a professional education in engineering management, with emphasis on technically based organizations and applications to various engineering and related disciplines.

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:

1. 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 credits)

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.
2. 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 credits)

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

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 in other related fields, and must 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 the university catalogue (refer to the Graduate Studies section).

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 any 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.

Minor in Engineering Management

The Engineering Management Program offers a minor in engineering management that can be pursued by undergraduate engineering and architecture students, as well as by students from related majors, starting as early as the fall semester of their third year of enrollment. To satisfy the requirements of this minor, a student must earn 18 credits of course work from the engineering management course offerings as follows:

- At least nine of the total requirement of 18 credits must be fulfilled from the six undergraduate courses offered by the program, which must include ENMG 400: Engineering Economy.
- The other nine credits can be satisfied by taking courses either from the list of undergraduate courses, or from the elective graduate courses that are unrestricted to undergraduate student registration.

A minimum grade of 70 is required for a course to be counted toward the fulfillment of a minor in engineering management.
Undergraduate Courses

ENMG 400  Engineering Economy  3 cr.
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.  Prerequisite: ASST 310 or equivalent. Every semester.

ENMG 500  Engineering Management I  3 cr.
A course on operations research modeling concepts with emphasis on linear programming; topics include: linear programming, network programming, and project management. Annually.

ENMG 501  Engineering Management II  3 cr.
A course outlining basic management models used to optimize operation systems; discrete- and continuous-time Markov chains and their application in modeling queues, inventories, and production process behavior. Prerequisite: STAT 230 or equivalent. Annually.

ENMG 502  Construction Management  3 cr.
A course on organizing for construction projects; pre-construction activities; bidding and contracts; fundamentals of construction planning, monitoring, and control; application of construction control tools: CPM, materials management, operations analysis, and quality control. Annually.

ENMG 503  Specifications and Cost Estimation  3 cr.
A course on the structure of construction documents and their interrelationships; bidding requirements; general and particular contract conditions; administrative and procedural requirements for construction; technical specifications; construction cost estimation process; and unit rates determination. Prerequisite: ENMG 502 or CIVE 580. Annually.

ENMG 504  Engineering Ethics  3 cr.
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. Annually.

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.

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 multiechelon 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.

ENMG 614  Human Factors Engineering  3 cr.
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 machine, parallel machines, flow shops, job shops, open shops.  Scheduling in practice: general purpose procedures, modeling scheduling problems, implementation of scheduling systems.

ENMG 616  Network Optimization: Algorithms and Applications  3 cr.

ENMG 617  Engineering Management Statistics  3 cr.

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. **Prerequisite: ENMG 632.**

**ENMG 634 Design Management for Large Projects 3 cr.**

**ENMG 635 Project Deliverance and Contracts 3 cr.**

**ENMG 636 Disputes 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.
Creation, assessment, development, and operation of new and emerging ventures. Entrepreneurship defined. Initiating and operating concerns. Growth and development of entrepreneurial ventures.
ENMG 655  Management of Technology  3 cr.
Management of technology at both the national and organizational level and its contribution to the national wealth generation. 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 3 cr.
Advanced topics in engineering management. May be repeated for credit when topics vary.

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

ENMG 799 Thesis 3 cr.
A thesis whose goal is to demonstrate the candidate’s independent ability to apply analytic concepts and accepted methods of research to engineering management problems. Empirical surveys or case studies are acceptable provided that collected data can be manipulated in a fashion that enables the candidate to draw an original conclusion of generalized nature.

ENMG 700 Seminar 0 cr.