

Technology Innovation Management

- M.A.Sc. Technology Innovation Management
- M.Eng. Technology Innovation Management

M.A.Sc., M.Eng. Technology Innovation Management

About the Program

The objective of this program is to train engineers and computer scientists to become competent and efficient managers of the engineering processes that deliver innovative telecommunications systems, products, and services. The emphasis is on design, development, manufacture, and technical support, areas for which engineers are normally responsible and where their technical expertise and practical knowledge are critical.

The program focuses on research in the synthesis between communication systems engineering and management of engineering processes. Within this context the following areas receive major attention: Management of Engineering Processes, Network Design, Protocols and Performance, Software Engineering, Wireless and Satellite Communications, Manufacturing Systems Analysis .

Academic Regulations

See the General Regulations (<http://www.carleton.ca/calendars/2012-13/grad/gradregulations>) section of this Calendar.

Admission Requirements

The normal requirement for admission to the master's program is a bachelor's degree in electrical engineering, computer science or a related discipline, with at least high honours standing.

Candidates are required to have two years experience in technical work in telecommunications prior to admission.

Candidates applying for admission with degrees not in the discipline of engineering will be considered by the admissions committee. The committee is responsible for establishing criteria for degree equivalencies.

Program Requirements

Subject to the approval of the admissions committee, students in the master's program may choose to complete the degree by successfully completing either a thesis or a project.

M.A.Sc. - Master's Degree by Thesis

All master's students in the thesis option are required to complete a total of 5.5 credits as follows:

1. 1.5 credits in compulsory courses including:	1.5
TTMG 5001 [0.5]	Management Principles for Engineers
TTMG 5002 [0.5]	Telecommunications Technology
TTMG 5003 [0.5]	Issues in Telecommunications

2. 2.0 credits in approved restricted elective courses from the list below

3. 2.0 credits in thesis	2.0
Total Credits	5.5

M.Eng. - Master's Degree by Project

All master's students in the project option are required to complete a total of 5.5 credits of which at least 5.0 must be at the 5000-level or above, as follows:

1. 1.5 credits in compulsory courses including:	1.5
TTMG 5001 [0.5]	Management Principles for Engineers
TTMG 5002 [0.5]	Telecommunications Technology
TTMG 5003 [0.5]	Issues in Telecommunications
2. 2.0 credits in approved restricted elective courses from the list below	2.0
3. 1.0 credit in approved non-restricted electives	1.0
4. 1.0 credit in a graduate project	1.0
Total Credits	5.5

Restricted Elective Courses

Students in the master's program must complete 1.0 credit in the field of management of engineering processes and 1.0 credit in communication systems engineering. Courses in each of the four sub-fields and the field of management of engineering processes are listed below.

The sub-fields in communication systems engineering are:

- Software Engineering
- Wireless and Satellite Communications
- Network Design, Protocols and Performance
- Manufacturing Systems Analysis

All courses in the field of communication systems engineering are offered by the Department of Systems and Computer Engineering and begin with the prefix SYSC.

Communication Systems Engineering

Software Engineering

SYSC 5007 [0.5]	Expert Systems
SYSC 5101 [0.5]	Design of High Performance Software
SYSC 5301 [0.5]	Advanced Topics in Biomedical Engineering
SYSC 5503 [0.5]	Stochastic Processes
SYSC 5701 [0.5]	Operating System Methods for Real-Time Applications
SYSC 5703 [0.5]	Integrated Database Systems
SYSC 5704 [0.5]	Elements of Computer Systems
SYSC 5706 [0.5]	Analytical Performance Models of Computer Systems
SYSC 5709 [0.5]	Advanced Topics in Software Engineering
SYSC 5802 [0.5]	Introduction to Information and System Science

Wireless and Satellite Communications

SYSC 5503 [0.5]	Stochastic Processes
SYSC 5504 [0.5]	Principles of Digital Communication
SYSC 5606 [0.5]	Introduction to Mobile Communications

SYSC 5608 [0.5] Wireless Communications Systems Engineering

Network Design, Protocols and Performance

SYSC 5001 [0.5] Simulation and Modeling

SYSC 5004 [0.5] Optimization for Engineering Applications

SYSC 5005 [0.5] Optimization Theory and Methods

SYSC 5007 [0.5] Expert Systems

SYSC 5101 [0.5] Design of High Performance Software

SYSC 5109 [0.5] Teletraffic Engineering

SYSC 5201 [0.5] Computer Communication

SYSC 5207 [0.5] Distributed Systems Engineering

SYSC 5503 [0.5] Stochastic Processes

SYSC 5607 [0.5] Source Coding and Data Compression

SYSC 5706 [0.5] Analytical Performance Models of Computer Systems

SYSC 5801 [0.5] Advanced Topics in Computer Communications

SYSC 5808 [0.5] Communications Network Management

Manufacturing Systems Analysis

SYSC 5001 [0.5] Simulation and Modeling

SYSC 5004 [0.5] Optimization for Engineering Applications

SYSC 5802 [0.5] Introduction to Information and System Science

EACJ 5207 [0.5] Robotics:Control/Sensing/Intel

Management of Engineering Processes

TTMG 5004 [0.5] Management of Design Systems

TTMG 5005 [0.5] Management of Telecommunications System Design

TTMG 5006 [0.5] Management of Software Engineering Projects

TTMG 5008 [0.5] Corporate Communications Networks

TTMG 5100 [0.5] Communications Standards

TTMG 5101 [0.5] Integrated Product Development

TTMG 5102 [0.5] Managing Full-Scale Production

TTMG 5103 [0.5] Advanced Topics in Telecommunications Technology Management

TTMG 5104 [0.5] Directed Studies in Design and Manufacturing Management

Non-Restricted Elective Courses

All students in the project option of the master's program are required to complete 1.0 credit from those offered by the Department of Electronics, Department of Mechanical and Aerospace Engineering, Department of Systems and Computer Engineering, School of Industrial Design, or School of Computer Science.

Technology Innovation Management (TTMG) Courses

TTMG 5001 [0.5 credit]

Management Principles for Engineers

Develops a common level of knowledge among students on topics in project management, leadership, industrial marketing, managerial economics and organizational behaviour. These topics are relevant for engineers and computer scientists who manage the engineering processes that deliver innovative telecommunications systems, products and services.

TTMG 5002 [0.5 credit]

Telecommunications Technology

Fundamentals of telecommunications technology with emphasis on importance of bandwidth, communications reliability and networks. Topics include: information sources and coding of outputs; channel characteristics; signals; networks, signalling and switching; standards and regulation; major world systems and operators; and the thrust of new and future technology.

TTMG 5003 [0.5 credit]

Issues in Telecommunications

Discussion of key readings relevant to the telecommunications industry. Topics include the introduction of new products to the global market, technology sourcing, intellectual property rights, industry trends, technology and ethics, user interface design, new business opportunities and product identification, industry characteristics, regulation and international competition.

TTMG 5004 [0.5 credit]

Management of Design Systems

The focus is on how to design, maintain, expand and evolve organizations that deliver hardware, software and systems designs, and on the methods and tools used to improve their performance. Topics include: essence of design; how to set-up and lead fast-to-market organizations.

Prerequisite(s): TTMG 5001 and TTMG 5002.

TTMG 5005 [0.5 credit]

Management of Telecommunications System Design

The focus is on the groups that evolve the architecture and technological infrastructures of firms and on product management. Topics include: relationship between architecture and product management; appropriability regimes; technology and complementary assets; managing projects that deliver products at different stages of their life cycles.

Prerequisite(s): TTMG 5001 and TTMG 5002.

TTMG 5006 [0.5 credit]

Management of Software Engineering Projects

Models for the development of software. Software project management tools. Quality control. Risk assessment and management. Examples are drawn from software development in telecommunications applications.

Prerequisite(s): TTMG 5001 and TTMG 5002.

TTMG 5008 [0.5 credit]**Corporate Communications Networks**

Communications networks as a vital resource within organizations. Private networks as an infrastructure for information flow within a firm and across its interfaces. Applications and operations of corporate telecommunications networks. Networks as a source of competitive advantage. Implementation issues.
Prerequisite(s): TTMG 5001 and TTMG 5002.

TTMG 5100 [0.5 credit]**Communications Standards**

Importance of global standards in telecommunications and information technology for product development and business. Relevant public standards classified by type. The standards setting process. Formulation and execution of standards setting strategies. Integrating the firm's standards program with engineering processes, product management, systems groups and marketing.
Prerequisite(s): TTMG 5001 and TTMG 5002.

TTMG 5101 [0.5 credit]**Integrated Product Development**

The new product introduction process and time-based competition, basic concepts of integrated product development (concurrent engineering), the voice of the customer, quality function deployment, cross-functional teams, integrating information systems and technical tools, organizational support, manufacturing and design, cost estimation, implementation problems.
Prerequisite(s): TTMG 5001 and TTMG 5002.

TTMG 5102 [0.5 credit]**Managing Full-Scale Production**

Overall philosophy of just-in-time and time-based competition; just-in-time production and manufacturing resource planning; total quality management; socio-technical systems and employee participation; advanced manufacturing; manufacturing and facilities strategy, capacity planning; manufacturing flexibility; product/process evolution and the experience curve; service aspects of manufacturing.
Prerequisite(s): TTMG 5001 and TTMG 5002.

TTMG 5103 [0.5 credit]**Advanced Topics in Telecommunications Technology Management**

In-depth exploration of an advanced topic in the field of telecommunications technology management. A different topic is covered each semester and more than one section, with different topics, may be offered in the same semester.
Prerequisite(s): One of TTMG 5004, TTMG 5005, TTMG 5101, or TTMG 5102.

TTMG 5104 [0.5 credit]**Directed Studies in Design and Manufacturing Management**

The student explores, through extensive literature surveys, specific topics in the areas of design and manufacturing management. The objective is to acquire a suitable background to initiate and complete thesis work requiring this preparation. Precludes credit for any other directed studies in the program.

TTMG 5901 [1.0 credit]**M.Eng. Project****TTMG 5909 [1.0 credit]****M.Eng. Thesis**

Summer session: some of the courses listed in this Calendar are offered during the summer. Hours and scheduling for summer session courses will differ significantly from those reported in the fall/winter Calendar. To determine the scheduling and hours for summer session classes, consult the class schedule at central.carleton.ca

Not all courses listed are offered in a given year. For an up-to-date statement of course offerings for the current session and to determine the term of offering, consult the class schedule at central.carleton.ca