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# Wesley J. Howe School of Technology Management

**JERRY MACARTHUR HULTIN, DEAN**

**LOUIS F. LAUCIRICA, ASSOCIATE DEAN AND DIRECTOR OF  
UNDERGRADUATE STUDIES**

**EDWARD A. STOHR, ASSOCIATE DEAN FOR RESEARCH AND  
ACADEMICS**

**Bachelor of Science**

Business

**Executive Master of Technology Management**

**Master of Business Administration — Technology Management**

Information Management

Project Management

Telecommunications Management

**Master of Science**

Information Systems

Computer Science (Interdisciplinary)

E-Commerce

Entrepreneurial IT

Financial Services

Global Innovation Management

Human Resource Management

Information Management

Information Security

Integrated Information Architecture (Interdisciplinary)

Pharmaceuticals

Project Management

Quantitative Software Engineering (Interdisciplinary)

Systems Engineering (Interdisciplinary)

Telecommunications Management

Management

General Management

Global Innovation Management

Information Management

Project Management

Technology Management

Telecommunications Management

Business Track

Global Innovation Management

Management of Wireless Networks

On-line Security, Technology and Business

Project Management  
Technical Management Track

**Doctor of Philosophy**

Information Management  
Technology Management  
Telecommunications Management

**FACULTY\***

**Professors**

Edward A. Friedman, Ph.D. (1963), Columbia University  
Jerry MacArthur Hultin, J.D. (1972), Yale Law School  
C. Timothy Koeller, Ph.D. (1979), Rutgers University  
Louis Laucirica, MBA (1971), Pace University  
Donald N. Merino, P.E., Ph.D. (1975), Stevens Institute of Technology  
Richard R. Reilly, Ph.D. (1969), University of Tennessee  
Aaron J. Shenhar, Ph.D. (1976), Stanford University  
Edward A. Stohr, Ph.D. (1973), University of California, Berkeley

**Associate Professors**

Stanley D. Clark II, Ph.D. (1998), Claremont Graduate University  
Patricia J. Holahan, Ph.D. (1992), Purdue University  
John Keating, Ph.D. (1979), Temple University  
Peter A. Koen, Ph.D. (1977), Drexel University  
Thomas Lechler, Ph.D. (1996), Karlsruhe University  
Gary S. Lynn, Ph.D. (1993), Rensselaer Polytechnic Institute  
Joseph Morabito, Ph.D. (1995), Stevens Institute of Technology  
Jeffrey V. Nickerson, Ph.D. (1994), New York University  
Kevin Ryan, Ph.D. (1996), Stevens Institute of Technology  
Ira H. Sack, Ph.D. (1976), Stevens Institute of Technology  
Robert Seymour, Ph.D. (1981), New York University  
Bernard Skown, MBA (1970), Harvard Business School  
Robert Stinerock, Ph.D. (1987), Columbia University

**Assistant Professors**

Fotios Harmantzis, Ph.D. (2002), University of Toronto  
Ann C. Mooney, Ph.D. (2000), University of Georgia  
Michael zur Muehlen, Ph.D. (2002), University of Muenster, Germany

**Distinguished Service Professors**

Parviz F. Rad, Ph.D. (1970), Massachusetts Institute of Technology  
William Stahlin, MBA (1971), Rutgers University

**Distinguished Professors**

Michael R. Cooper, Ph.D. (1972), Ohio State University  
Jerome N. Luftman, Ph.D. (1991), Stevens Institute of Technology

**Service Professor**

Elizabeth Watson, MBA (1994), Fairleigh Dickinson University

**Senior Lecturers**

Zvi Aronson, Ph.D. (1997), Stevens Institute of Technology

Christine Bullen, M.S. (1976), Sloan School, Massachusetts Institute of Technology

Peter Dominick, Ph.D. (1998), Stevens Institute of Technology

Arthur S. Guarino, MBA (1990), Seton Hall University

Michael Poli, M.S. (1996), Stevens Institute of Technology

Barbara Taylor, M.S. (1996), Stevens Institute of Technology

**Visiting Assistant Professor**

Alan Maltz, Ph.D. (2001), Stevens Institute of Technology

**Executives in Residence**

Audrey Curtis, Ph.D. (1980), New York University

Hosein Fallah, Ph.D. (1975), University of Delaware

Allen S. Ginsberg, Ph.D (1970), Stanford University

Steven R. Savitz, M.S. (1978), Columbia University

\*The list indicates the highest earned degree, year awarded and institution where earned.

**ADVISORY BOARDS**

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Chubb	Merrill Lynch	UPS
CIT	NJ Transit	Verizon
CitiGroup	OMICRON	
Fort Monmouth	Pearson	

Stevens has been an active participant in the creation of the Model Curriculum and Guidelines for Graduate Degree Programs in Information Systems, sponsored by the Association for Computing Machinery (ACM) and the Association for Information Systems (AIS). The Stevens Master of Science – Information Systems (MSIS) both endorses and adheres to the model.

**M.S. Telecommunications Management Advisory Board**

APL – Johns Hopkins University  
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Ned Jarmas, Bestfoods  
Thomas Sheehan, Fort Monmouth CECOM  
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 David Brudnicki, Verizon

## UNDERGRADUATE PROGRAMS

Business success in the 21st century is increasingly dependent on the strategic development and utilization of technology. This is a complex challenge since the solutions to many business problems rely on the convergence of a number of technologies and their proper alignment with customer requirements and various other business elements.

To meet this challenge, The Wesley J. Howe School of Technology Management at Stevens has designed a unique undergraduate program, specifically designed to teach students both business and technology in an integrated fashion. This program combines a traditional business curriculum with the most recent elements of technology to satisfy the growing corporate demand for professionals who are effective as liaisons between business and technology units. The innovative "corporate-defined" curriculum of this bachelor's degree program has a strong, broad base of computer science, science, economics, finance, marketing and mathematics, plus a business plan spine.

Since this is a lock-step program, all courses for the Business program need to be taken in the proper sequence. In addition, it is anticipated that students participate in an internship, ideally at the same company during each of the summers between their academic years. These internships typically form the basis for their final business plan, required for BT 402.

### Business 4-Year Course Schedule

#### Freshman Year

Term I				Term II					
		<u>Hrs. Per Wk.</u>					<u>Hrs. Per Wk.</u>		
		Class	Lab	Sem. Cred.			Class	Lab	Sem. Cred.
BT 101	Introduction to Business Planning	2	3	3	BT 102	Diagnosing Internal Capabilities of a Company	3	0	3
BT 121	IT and Applications: Introduction to eTechnology	3	0	3	BT 113	Marketing	3	0	3
MA 117	Calculus and Probability	3	0	3	MA 118	Calculus and Probability II	3	0	3
MGT 111	Social Psychology and Organizational Behavior	3	0	3	BT 131	Technogenesis	3	0	3
MGT 244	Microeconomics	3	0	3	BT 115	Financial Accounting	4	1	4
CS 115	Introduction to Computer Science	2	2	3	MGT 243	Macroeconomics	3	0	3
PE 200	Physical Education I	0	2	1	PE 200	Physical Education II	0	2	1
<b>TOTAL</b>		<b>16</b>	<b>7</b>	<b>19</b>	<b>TOTAL</b>		<b>19</b>	<b>3</b>	<b>20</b>

Wesley J. Howe School of Technology Management

**Sophomore Year**

<b>Term III</b>				<b>Term IV</b>						
		<u>Hrs. Per Wk.</u>					<u>Hrs. Per Wk.</u>			
		Class	Lab	Sem. Cred.			Class	Lab	Sem. Cred.	
BT 201	Diagnosing and Measuring Customer Satisfaction	3	0	3	BT 202	Diagnosing the External Environment	3	0	3	
PEP 111	Mechanics	3	0	3	BT 224	Science & Technology: Modern Physics	3	3	4	
BT 221	Statistics	3	0	3	BT 223	Applied Models and Simulation	3	0	3	
BT 215	Cost Accounting	3	0	3	BT 214	Market Research	3	0	3	
HU 1XX	History/Social Science (B)	3	0	3		FREE ELECTIVE	3	0	3	
PE 200	Physical Education III	0	2	1	HU 1XX	History/Social Science	3	0	3	
<b>TOTAL</b>		<b>15</b>	<b>2</b>	<b>16</b>	PE 200	Physical Education IV	0	2	1	
							<b>TOTAL</b>	<b>18</b>	<b>5</b>	<b>20</b>

**Junior Year**

<b>Term V</b>				<b>Term VI</b>					
		<u>Hrs. Per Wk.</u>					<u>Hrs. Per Wk.</u>		
		Class	Lab	Sem. Cred.			Class	Lab	Sem. Cred.
BT 301	Goal Setting and Revenue Plan Development	3	0	3	BT 302	Management	3	0	3
BT 334	Science and Technology: Energy	3	3	4	MGT 401	MIS/DBMS/Networks	3	0	3
BT 321	Finance	3	0	3	CH 281	Biology and Biotechnology	3	0	3
EM 350	Production and Operations Management	3	0	3	CH 282	Intro. Biology Lab	0	3	1
HU 1XX	Literature/Philosophy (A)	3	0	3	HU 1XX	Literature/Philosophy (A)	3	0	3
PE 200	Physical Education V	0	2	1		FREE ELECTIVE	3	0	3
					PE 200	Physical Education VI	0	2	1
<b>TOTAL</b>		<b>15</b>	<b>5</b>	<b>17</b>	<b>TOTAL</b>		<b>15</b>	<b>5</b>	<b>17</b>

**Senior Year**

<b>Term VII</b>				<b>Term VIII</b>					
		<u>Hrs. Per Wk.</u>					<u>Hrs. Per Wk.</u>		
		Class	Lab	Sem. Cred.			Class	Lab	Sem. Cred.
BT 401	Implementation, Controlling and Capital Acquisition	3	0	3	BT 402	Plan Perfection and Presentation	3	0	3
BT 411	Business Consulting or Engineering Management Design I	0	8	3	BT 412	Business Consulting or Engineering Management Design II	0	8	3
BT 414	eTechnology Infrastructure	3	0	3	BT 415	Entrepreneurship	3	0	3
BT 413	Business Law, Ethics, and Negotiations	3	0	3	HU 3XX/4XX	Humanities Elective	3	0	3
BT 403	Marketing Strategy and Decision Making - Elective	3	0	3	BT XXX	Business Elective	3	0	3
	FREE ELECTIVE	3	0	3		FREE ELECTIVE	3	0	3
<b>TOTAL</b>		<b>15</b>	<b>8</b>	<b>18</b>	<b>TOTAL</b>		<b>15</b>	<b>8</b>	<b>18</b>

**Internship/Electives**

Students may select to do an internship at their Curriculum Partner Company for 2.5 days a week for the entire semester. A company manager and a Stevens' faculty member supervise them. The internships culminate in written and oral reports delivered to representatives from the companies, Stevens faculty and other students in the class.

Projects are selected by the company and approved by Stevens faculty. Intern projects must contain some significant creativity or development component.

Alternatively, during the senior year students may select up to three electives (9 credits) within a chosen area of interest and write a proposal to conduct an independent study that leads to a senior thesis. The student must convince a faculty member of the importance of the subject and convince that faculty member to act as a thesis advisor.

Areas of consideration might include Biomedical Products and Technology, Entrepreneurship, E-business, Technology Marketing, Financial Services, Information and Network Systems, etc.

## **GRADUATE PROGRAMS**

Business success in the 21st century will be increasingly dependent on the strategic development and use of technology. This is a complex challenge since the solutions to many business problems rely on the convergence of a number of technologies and their proper alignment with customer requirements and various other business elements. Therefore, the ability to manage and market technology creatively is essential for enhancing business competitiveness. The Wesley J. Howe School of Technology Management has been designed to meet this need. It features a spectrum of customer-oriented curricula to accommodate gaining expertise and training in important technology management concentrations and research endeavors.

Currently, the School of Technology Management offers many graduate degree programs: The Master of Science in Management, the Master of Science in Information Systems, the Master of Business Administration in Technology Management, the Executive Master of Technology Management, the Doctor of Philosophy Degree with concentrations in Information Management, Technology Management, and Telecommunications Management. In addition, the School participates in several interdisciplinary graduate programs: a Master of Science in Telecommunications Management (with the Electrical and Computer Engineering department), a Master of Science in Information Systems with technical interdisciplinary tracks: Computer Science, Quantitative Software Engineering, Information Security, E-commerce (with the Computer Science department), Integrated Information Architecture (with the Electrical and Computer Engineering department), and Systems engineering (with the Systems Engineering and Engineering Management department).

### **Stevens Undergraduates in Simultaneous Degree or Deferred Graduate Credit Programs**

Undergraduate students with junior or above standing who have at least a 3.0 GPA may obtain permission to take graduate courses by completing a study plan with the Program Director and submitting it to the Registrar's office. Registration into graduate courses requires permission of the course Instructor. Undergraduate students are not permitted in the Master of Science – Information Systems program or courses. Students must obtain a signed certification of standing prior to seeking permissions. This form is available from the Registrar's web site.

#### **Master of Science**

##### ***Master of Science – Management***

The Master of Science – Management program focuses on the practice of manage-

ment and is grounded in a variety of analytic and administrative skills drawn from the fields of management, economics, applied psychology and quantitative methods. Knowledge of these techniques alone does not guarantee success as a manager. Rather, it is the steady development of conceptual and integrative skills, and the active blending of these basic areas of knowledge necessary to identify organizational problems, analyze them, synthesize solutions and then implement the decisions that signal the growth of professional competence. All students take a set of common core courses and select additional courses based upon their chosen concentration.

This 12-course, 36-credit program leads to the degree of Master of Science in Management and is designed for working professionals with at least two years of work experience. However, applicants who do not meet this work experience requirement, but have outstanding academic records, will be considered for admission. For these applicants, an interview with a member of the department's Graduate Admissions Committee is suggested. Admission to the program requires a bachelor's degree with at least a "B" average, and two letters of recommendation. Prerequisites may include a semester of microeconomics (Mgt 503 or equivalent) and a semester of introductory calculus. Upon evidence of satisfactory prior completion of a required course, students may, upon academic advisor approval, substitute an elective.

All international students who are applying who have English as a second language will need a TOEFL score of 550 (210 for computer-based) and must take a Stevens English test upon arrival, which will include both the TOEIC (Test for English for International Communication) and a written essay exam. As a result of these exams, those students who do not become exempt from developmental English will be placed in an appropriate English course offered by Stevens. Following completion of the course(s), the student must take a post-test and pass in order to be exempt from future language courses. Satisfaction of the language skills requirement must occur within the first year of study at Stevens. Either the GRE or GMAT examination is also required for international students.

Five concentrations are available: General Management, Global Innovation Management, Information Management, Project Management and Technology Management. Students considering doctoral study are encouraged to complete a master's thesis as part of their degree.

#### **Core Courses for Master of Science in Management**

- Mgt 600 Managerial Accounting
- Mgt 607 Managerial Economics
- Mgt 680 Organizational Behavior and Theory  
(or Mgt 612 The Human Side of Project Leadership  
for Project Management concentration)
- Mgt 690 Organization Theory and Design
- Mgt 550 Introduction to Project Management
- Mgt 702 Technology Management  
(except for Information Management concentration)
- Mgt 771 Management Information Systems  
(except for Information Management concentration)
- Mgt 796 Statistical Models



***General Management Concentration***

The General Management concentration provides students with a basic grounding in the finance and marketing functional areas of management. It also requires students to apply their broad-based understanding of organizations to specific problems of project management and strategic management. In addition to the core courses, all students who choose the General Management concentration are required to take:

Concentration Courses

- Mgt 551 Strategic Management
- Mgt 623 Financial Management
- Mgt 641 Marketing Management

Electives

Students will choose one elective with the approval of their Academic Advisor.

***Global Innovation Management Concentration***

In the current era of globalization, firms that depend on innovation as their source of growth often need to create and manage their innovations on a global basis. This emerging trend, with its unique promise and complexity, is the focus of the Global Innovation Management concentration. Students learn the business issues, motivations and processes of doing international and global business, with specific attention given to innovation management in this environment. They also gain awareness of the social impact on host countries.

In addition to the core courses, students in the Global Innovation Management concentration will also take:

Concentration Courses

- Mgt 630 Global Business and Markets
- Mgt 650 International Business Management
- Mgt 720 Global Innovation Management

Electives

Students will take one elective with the approval of their Academic Advisor. Mgt 641 Marketing Management is recommended.

***Information Management Concentration***

The Information Management concentration focuses on management skills and the knowledge required to make efficient use of information in the organization. Today, more than ever, there is a pressing need for information systems that effectively support the strategic objectives of the organization. Consequently, the individuals creating and managing such systems have to be much more familiar with the business aspect of their organization than was necessary in the past. This concentration blends significant aspects of both business management and information systems knowledge, thereby preparing students to specify, develop and manage information systems as a strategic organizational resource.

This program is geared for the business professional seeking an understanding of information management. For those students without an information technology background, the online Web-based course, Mgt 501 Information Management, is required for no credit.

In addition to the core requirements, all students who choose the Information Management concentration take six of the following courses, with the approval of their Academic Advisor:

Concentration Courses (Choose six)

- Mgt 772 Analysis and Development of Information Systems
- Mgt 773 Data Management
- Mgt 776 Managing Information Networks
- Mgt 780 Strategic Management of Information Technology
- Mgt 781 Management of IT Organizations
- Mgt 783 Enterprise Systems Management
- Mgt 784 Integrating IS Technologies

***Project Management Concentration***

This concentration provides specialized advanced study of the theory and practice of project management. Students acquire the skills to address the range of project management issues, including building projects for business success, metrics for project success, planning issues, risk management, leading project teams and the management of complex projects. Two tracks are available to Project Management students that correspond to the tracks in the Project Management Graduate Certificate. The Enterprise-wide track looks at the impact and use of project management at the strategic level of the firm. The Project-specific track prepares the manager with additional project and organization planning tools at the project level of the firm.

In addition to the core requirements, all students who choose the Project Management concentration take:

Concentration Courses

- Mgt 618 Engineering Economics and Management Policy or
- Mgt 795 Management Models
- Mgt 612 The Human Side of Project Leadership or
- Mgt 680 Organizational Behavior and Theory
- Mgt 610 Project Management Theory and Practice

***Project Management Tracks***

Enterprise-wide Track

- Mgt 738 Advanced Project Management

Project-specific Track

- Mgt 611 Project Planning and Monitoring
- Mgt 737 Project Management Office

Students will choose one elective with the approval of Academic Advisor;

Mgt 641 Marketing Management is a recommended elective.

Students from AT&T and Lucent Technologies who have completed the company-sponsored courses in Project Management are not required to take Mgt 550, 610, 612 or 738. They will instead take Mgt 802 Project Management Examination for 12 credits.

***Technology Management Concentration***

Managing technological resources and processes in organizations is increasingly important as more firms utilize technology to create value or attain strategic goals. The Technology Management concentration focuses on the tools and issues involved in managing these critical resources. Students will develop awareness of the management and strategic implications of technology and innovation processes in product and service firms. They will also gain knowledge of the enterprise as a whole, with particular emphasis on the link between technology and business.

In addition to the core requirements, all students who choose the Technology Management concentration take:

Concentration Courses

Mgt 618 Engineering Economics and Management Policy

Mgt 750 Total Quality Management

Electives

Students will choose two electives with the approval of their Academic Advisor.

Mgt 641 Marketing Management, Mgt 720 Global Innovation Management and

Mgt 707 Emerging Technologies are recommended electives.

**Master of Business Administration – Technology Management**

Our emphasis on technology management distinguishes a Howe School education from that provided by most other management schools. Our research and educational programs focus on the determinants of real value for the firm – product and process innovation and strategic project management. We also emphasize the development of communication and leadership skills through innovative pedagogical techniques and the maintenance of small class sizes and an intimate relationship between students and faculty members.

The MBA in Technology Management (TM) adds general management skills to the knowledge of technology management provided by our M.S. degree programs. Graduates from the MBA in TM program will be able to use their business, technology management, and people skills to align technology trends with customer needs and to manage their organizations in an increasingly complex and competitive world.

The MBA in TM is designed for professionals with at least two years of working experience. However, students who do not meet this work experience requirement, but have outstanding academic records, will be considered for admission. Applicants to the MBA in TM program are expected to have a four-year bachelor's degree. All applicants must submit transcripts showing academic achievement in prior studies, two letters of recommendation, and their score on either a GMAT or GRE examination. International students must also submit a TOEFL score. Students currently enrolled in one of the Howe School's M.S. degree programs may apply to join the MBA in TM program prior to obtaining their M.S. degree by submitting a written application together with a GMAT or GRE score. Similarly, students who are currently enrolled in the MBA in TM program may apply to enroll in one of the Howe School's M.S. degree programs prior to obtaining their MBA in TM degree by submitting a written application.

To obtain the degree of MBA in Technology Management, students must take 20 3-credit courses (60 credits) of course work.

Three majors are available in the MBA in TM program: Information Management, Project Management, and Telecommunications Management.

***MBA in TM with Information Management (IM) Major***

Students taking the MBA in TM Information Management major take a number of general management courses in addition to the courses required for an M.S. in Information Systems degree.

Prerequisites for this major include a semester of introductory undergraduate calculus and Mgt 502 Selected Topics in Economics, Statistics, and Accounting for students

not having previous coursework in these areas. For people with little or no information systems professional experience, Mgt 501 Information Management is a prerequisite.

Core Courses for IM Major

- Mgt 550 Introduction to Project Management
- Mgt 600 Managerial Accounting
- Mgt 607 Managerial Economics
- Mgt 623 Financial Management
- Mgt 680 Organizational Behavior and Theory
- Mgt 690 Organizational Theory and Design
- Mgt 760 Operations Management
- Mgt 766 Marketing Online
- Mgt 767 Legal Issues for the IT Professional
- Mgt 768 Entrepreneurship in IT
- Mgt 780 Strategic Management of Information Technology
- Mgt 781 Management of Information Technology Organizations
- Mgt 796 Statistical Models

IM Major Requirements

- Mgt 783 Enterprise Systems Management
- Mgt 784 Integrating IS Technologies
- Mgt 772 Analysis and Development of Information Systems
- Mgt 773 Data Management
- Mgt 776 Managing Information Networks
- Plus two free electives or a thesis

***MBA in TM with Project Management (PM) Major***

Students taking the MBA in TM with a PM major take a number of project management courses in addition to the courses required for an M.S. in Management degree.

Prerequisites for this major include a semester of microeconomics (Mgt 503 or equivalent) and a semester of introductory calculus.

Core Courses for PM Major

- Mgt 550 Introduction to Project Management
- Mgt 551 Strategic Management
- Mgt 600 Managerial Accounting
- Mgt 607 Managerial Economics
- Mgt 680 Organizational Behavior and Theory
- Mgt 623 Financial Management
- Mgt 641 Marketing Management
- Mgt 690 Organizational Theory and Design
- Mgt 702 Technology Management
- Mgt 760 Operations Management
- Mgt 771 Management Information Systems
- Mgt 796 Statistical Models

PM Major Requirements

- Mgt 610 Project Management Theory and Practice
- Mgt 611 Project Planning and Monitoring
- Mgt 612 The Human Side of Project Leadership
- Mgt 618 Engineering Economics and Managerial Policy
- Mgt 737 Project Management Office
- Mgt 738 Advanced Project Management
- Plus two free electives or a thesis

***MBA in TM with Telecommunications Management Major***

Students taking the MBA in TM telecommunications management major take a number of general management courses in addition to the courses required for an M.S. in Telecommunications Management degree.

Prerequisites for this major include a semester of undergraduate introductory calculus (TM 500 or equivalent) and a semester of microeconomics (Mgt 503 or equivalent.) Students who lack an introductory telecommunications background may be required to take TM 550 Introduction to Telecommunications Concepts.

MBA in TM Core Courses for Telecommunications Major

- Mgt 550 Introduction to Project Management
- Mgt 551 Strategic Management
- Mgt 600 Managerial Accounting
- Mgt 607 Managerial Economics
- Mgt 623 Financial Management
- Mgt 641 Marketing Management
- Mgt 680 Organizational Behavior and Theory
- Mgt 690 Organizational Theory and Design
- Mgt 702 Technology Management
- Mgt 710 Risk Management
- Mgt 760 Operations Management
- Mgt 796 Statistical Models

Telecommunications Management Major Requirements

- Mgt 618 Engineering Economics and Managerial Policy
- TM 601 Principles of Applied Telecommunications Technology
- TM 605 Probability for Telecommunications Managers
- TM 610 Business Information Networks
- TM 612 Regulation and Policy in the Telecommunications Industry
- TM 670 Decision Analysis for Corporate Network Systems
- Plus two electives or a thesis

***Master of Science-Master of Business Administration in Technology Management***

This coordinated degree program requires that students take 24 courses (72 credits) of course work. Students graduate with both a Howe School M.S. degree and an MBA in Technology Management degree. Prerequisite to the award of either degree in this program is the simultaneous award of the counterpart degree.

The combination of M.S. and MBA in TM courses provides in-depth preparation for graduates wishing to assume either general management or technology-related managerial positions in organizations. The program is also designed to allow students to specialize in topic areas that are of special interest to their individual careers.

The application requirements are the same as those listed above for the MBA in TM program. Current M.S. or MBA in TM students must apply in writing before they can be admitted to the MS-MBA degree.

The MS-MBA has three majors: Information Management, Project Management, and Telecommunications Management. To satisfy the requirements for the MS-MBA degree, students must satisfy all the requirements listed above to obtain an MBA in TM degree in one of these three areas of major. In addition, students must take an additional four courses approved by an academic advisor.

### **Master of Science in Information Systems**

The Master of Science in Information Systems (MSIS) program evolved from a review by Stevens of industry and student needs. The MSIS Program is designed to provide participants with the requisite management, business, strategic and technical skills needed to help their companies apply information systems technology more efficiently and effectively.

Rapid advancements in technology, dynamic markets and the changing business environment have created increased demand for professionals who can manage and deliver information systems. This demand has been accelerated by new competition, shorter product lifecycles, and more complex and specialized markets. Information systems professionals are required to lead and evolve information resources while partnering with corporate management.

The Stevens MSIS program teaches IT professionals how to help their organizations achieve success through alignment and deployment of business and IT strategies. The program is an interdisciplinary combination of twelve courses, typically taken over a two-year period. It is a practical program that is more like an apprenticeship where students work on real business problems.

Classes combine lectures, cases, individual and team projects, and participant presentations. Many projects will be applicable directly to the participant's sponsoring organization's business needs. Instructors are nationally/internationally recognized experts in information technology, technology management and business strategy. Instructors generally have substantial corporate experience and academic qualifications. Emphasis is placed on providing practical experience that can be applied immediately.

Stevens offers a multi-track M.S. program to help you achieve your Information Technology career objectives. Students choose one of the following 14 career tracks to complete the MSIS degree:

#### Management Tracks

Entrepreneurial IT	(weeknights or Saturdays for students sponsored by their company)
Global Innovation Management	(weeknights or Saturdays for students sponsored by their company)
Human Resource Management	(weeknights or Saturdays for students sponsored by their company)
Information Management	or Saturdays for students sponsored by their company)

IT in Financial Services	(Saturdays)
IT in Pharmaceutical	(Saturdays)
Project Management	(weeknights or Saturdays for students sponsored by their company)

Technical Tracks

Quantitative Software Engineering	(weeknights or Saturdays for students sponsored by their company)
Systems Engineering	(weeknights or Saturdays for students sponsored by their company)
Information Security	(weeknights only)
Integrated Information Architecture	(weeknights or Saturdays for students sponsored by their company)
Computer Science	(weeknights only)
E-Commerce	(weeknights only)
Telecommunications Management	(weeknights only)

In addition to strong, practical, real-world IT and management skills, graduates of the program leave with improved communication, interpersonal and team skills. The MSIS is a professional degree that integrates information and organizational cultures with emphasis on IT professionals who can contribute to the business.

To ensure quality and continuous improvement, participants are asked to appraise their courses twice each semester. These results are reviewed by the faculty and are made available to both participants and their sponsoring organizations.

Degree Requirements:

- Twelve graduate courses (36 credits) with a minimum GPA of 3.0 for the degree of Master of Science.
- Bachelor's degree in Information Systems, Management, Computer Science, and/or equivalent experience. Students without programming experience must take a programming course.
- For people with little or no information systems professional experience, *Mgt 501 Information Management is a prerequisite for all MSIS courses.*

Students considering doctoral study are required to complete a master's thesis as part of their degree.

**Required Core Courses**

- Mgt 550 Introduction to Project Management
- Mgt 623 Financial Management
- Mgt 680 Organizational Behavior and Theory
- Mgt 780 Strategic Management of Information Technology
- Mgt 781 Managing the IT Resource
- Mgt 783 Enterprise Systems Management
- Mgt 784 Integrating IS Technologies

***Management Concentrations***

Information Management Track – Concentration Courses

Mgt 772 Analysis and Development of Information Systems

Mgt 773 Data Management

Mgt 776 Managing Information Networks

Students will also choose two electives or write a thesis with the approval of their Academic Advisor.

The typical admission profile includes career advancement in general management, nontechnical information technology leadership, technology leadership or consulting, 3+ years information technology/business experience and a Bachelor's in business/management, sciences or liberal arts.

Entrepreneurial IT Management Track – Concentration Courses

Mgt 776 Managing Information Networks

Mgt 766 Marketing Online

Mgt 767 Legal Issues for the IT Professional

Mgt 768 Entrepreneurship in IT

Mgt 772 Analysis and Development of Information Systems

Typical admission profile includes career advancement in information technology e-related business, general management in e-business, entrepreneurship or consulting, 3+ years information technology/business experience.

IT in the Pharmaceutical Industry – Concentration Courses

Mgt 721 Pharmaceutical Services Industry Trends and Issues

Mgt 722 New Drug Development

Mgt 723 Pharmaceutical Marketing & Sales

Mgt 724 Pharmaceutical Supply Chain

Select one from:

Mgt 772 Analysis and Development of Information Systems

Mgt 773 Data Management

Mgt 776 Network Management

Typical admission profile includes nontechnical information technology leadership in a pharmaceutical corporate environment, 3+ years information technology/business experience and a Bachelor's in business, information systems, political science or international relations.

IT in Financial Services Industry – Concentration Courses

Mgt 761 Financial Services Industry Trends and Issues

Mgt 762 Capital Markets

Mgt 763 Back Office

Mgt 764 Financial Services Market & Sales

Select one from:

Mgt 772 Analysis and Development of Information Systems

Mgt 773 Data Management

Mgt 776 Managing Information Networks

Typical admission profile includes nontechnical information technology leadership in a financial services corporate environment, 3+ years information technology/business experience and a Bachelor's in business, information systems political science or international relations.



Global Innovation Management Track – Concentration Courses

- Mgt 773 Data Management
- Mgt 630 Global Business and Markets
- Mgt 650 International Business Management
- Mgt 720 Global Innovation Management
- Mgt 772 Analysis and Development of Information Systems

Typical admission profile includes nontechnical information technology leadership in a global environment, 3+ years information technology/business experience and a Bachelor's in business, information systems, political science or international relations.

Human Resource Management Track –Concentration Courses

- Mgt 773 Data Management
- Mgt 566 Job Analysis and Performance
- Mgt 530 Human Resource Administration and the Law
- Mgt 529 Organizational Change and Development
- Mgt 772 Analysis and Development of Information Systems

Typical admission profile includes IT human resource management/staff career advancement, information technology leadership, 3+ years information technology/business experience and a Bachelor's in business, information systems or human resources.

Project Management Track – Concentration Courses

- Mgt 610 Project Management Theory and Practice
- Mgt 612 The Human Side of Project Leadership
- Mgt 738 Advanced Project Management
- Mgt 772 Analysis and Development of Information Systems
- Mgt 773 Data Management

Typical admission profile includes career advancement as information technology project leader or functional area project leader, 3+ years information technology/business experience and a Bachelor's in information systems, computer science, business/management, sciences or liberal arts.

***Technical Concentrations***

Computer Science Track – Recommended Concentration Courses

(Interdisciplinary)

- CS 561 Database Management Systems I
- CS 551 Software Engineering and Practice I
- CS 552 Software Engineering and Practice II
- CS 666 Information Networks I

Plus, one computer science elective.

Students will develop a plan of study with the approval of their Academic Advisor.

Typical admission profile includes information systems technical career advancement and 3+ years information technology experience. A strong mathematics and technical background is recommended.

Information Security – Concentration Courses (Interdisciplinary)

- Mgt 787 Cyber Security Principles for Managers
- Mgt 788 Enterprise Architecture for Information Security
- CS 573 Fundamentals of Computer Security
- CS 694 E-Business Security & Information Assurance

Select one from:

- Mgt 772 Analysis and Development of Information Systems
- Mgt 773 Data Management
- Mgt 776 Managing Information Networks

Typical admission profile includes technical management and leadership or consulting, 3+ years information technology or networking experience and a Bachelor's in information systems or computer science. A strong mathematics and technical background is recommended.

E-Commerce Technical Track – Concentration Courses (Interdisciplinary)

Select two from

- Mgt 772 Analysis and Development of Information Systems
- Mgt 776 Managing Information Networks
- Mgt 766 Marketing Online
- Mgt 767 Legal Issues for IT Professionals
- Mgt 768 Entrepreneurial IT

And, select three from the following:

- CS 561 Database Management Systems I
- CS 537 Interactive Computer Graphics I
- CS 533 Cost Estimation and Metrics
- CpE 636 Integrated Services - Multimedia
- TM 619 E-Commerce Technologies

Typical admission profile includes E-commerce technical career advancement and 3+ years information technology. A strong mathematics and technical background is recommended.

Integrated Information Architecture Track – Concentration Courses (Interdisciplinary)

- NIS 560 Introduction to Networked Information Systems
- CS 561 Database Management Systems I
- NIS 611 Digital Communications Engineering I
- Mgt 773 Data Management

And, select one from the following:

- CpE 654 Design and Analysis of Network Systems
- CpE 592 Multimedia Network Security
- CpE 636 Integrated Services - Multimedia
- CpE 678 Information Networks I

Typical admission profile includes technical management and leadership in systems architecture, 3+ years information technology experience and a Bachelor's in information systems or computer science. A strong mathematics and technical background is recommended.

Quantitative Software Engineering Track – Concentration Courses (Interdisciplinary)

- CS 540 Fundamentals of Quantitative Software Engineering
- CS 564 Software Requirements Acquisition and Analysis
- CS 565 Software Architecture and Component-Based Design
- CS 533 Cost Estimation and Metrics
- Mgt 773 Data Management

Typical admission profile includes application systems analysis or testing career advancement, 3+ years information technology experience and a Bachelor's in information systems or computer science. A strong mathematics and technical background is recommended.

Systems Engineering Track – Concentration Courses (Interdisciplinary)

- SYS 625 Systems Operational Effectiveness and Life-Cycle Analysis
- SYS 650 System Architecture and Design
- SYS 611 Modeling and Simulation
- SYS 660 Decision Risk Analysis
- Mgt 772 Analysis and Development of Information Systems

Typical admission profile includes general technical management and leadership or consulting, 3+ years information technology experience and a Bachelor's in information systems or computer science. A strong mathematics and technical background is recommended.

Telecommunications Management Track – Concentration Courses

- TM 601 Principles of Applied Telecommunications Technology
- TM 605 Probability for Telecommunications Managers
- TM 610 Business Information Networks
- TM 612 Regulation and Policy
- Mgt 773 Data Management

Typical admission profile includes general management in telecommunications industry or telecommunications management, 3+ years information technology/network experience and a Bachelor's in information systems or computer science. A strong mathematics and technical background is recommended.

**Master of Science – Telecommunications Management**

The Telecommunications Management Graduate Program (M.S. and Ph.D.) is an interdepartmental program involving the Wesley J. Howe School of Technology Management and the Electrical and Computer Engineering Department of the Charles V. Schaefer, Jr. School of Engineering. The Wesley J. Howe School of Technology Management administers this program. The MS in Telecommunications Management is also offered in Beijing, China in partnership with Beijing Institute of Technology.

The Telecommunications Management curriculum addresses the demanding requirements of the telecommunications industry, businesses and government for technical expertise combined with business skills. The program provides students with advanced technical knowledge of applied telecommunications integrated with business management. Admission to the program requires a bachelor's degree with at least a "B" average, including a semester of calculus. For students who lack this prerequisite, Stevens offers a non-credit calculus course for telecommunications management (e.g., TM 500). International students need a TOEFL score of 550 (210 for computer-based).

A student in this program is likely to be an individual who is, or aspires to be, a manager or supervisor in a corporation's or government agency's communications department. The student will typically be responsible for various aspects of planning, implementation and management of the systems that satisfy the corporate requirements for voice, video and data communications. The goal of this student is to become a management professional responsible for the management of communications planning and resources, including people, networks and systems, and for decisions involving plan-

ning and budgeting for annual expenditures for acquisition, installation and maintenance, of products and services. Each sector of industry (government, regulatory, common carrier, financial, equipment vendor, consultant, R&D) will have corresponding profiles of professionals who need such technical expertise and management skills. This degree program builds an advanced foundation for more specialized study while enabling professionals from all industry sectors to understand and interact with customers and communications professionals who make the decisions on how businesses will implement telecommunications.

Specialized courses are available in the areas of management of wireless networks, network management and evaluation, global innovation management, communications security and project management. Students who wish to continue beyond their master's degree may pursue the Ph.D. program in Technology Management with a specialization in Telecommunications Management.

In addition to a number of off-campus (corporate-sponsored) programs, Telecommunications Management is offered on campus, weekdays and on Saturdays. Courses are offered year-round, in three terms.

**Core Courses – Telecommunications Management**

- TM 601 Principles of Applied Telecommunications Technology
- TM 605 Probability for Telecommunications Managers
- TM 610 Business Information Networks
- TM 612 Regulation and Policy in the Telecommunications Industry
- TM 670 Decision Analysis for Corporate Network Systems
- Mgt 550 Introduction to Project Management
- Mgt 600 Managerial Accounting
- Mgt 618 Engineering Economics and Management Policy

***Concentration and Elective Courses***

In designing a study plan with an advisor, students may choose any four courses from the tracks, or on-campus students may choose a concentration in a focused area of study and take the elective courses listed within the concentration.

Business Management Track (choose four)

- Mgt 641 Marketing Management
- Mgt 680 Organizational Behavior and Theory
- Mgt 690 Organization Theory and Design
- Mgt 702 Technology Management
- Mgt 710 Risk Management: Methods and Applications
- Mgt 750 Total Quality Management
- Mgt 766 Marketing Online
- Mgt 767 Legal Issues for the IT Professional
- Mgt 768 Entrepreneurship in IT
- Mgt 776 Managing Information Networks
- TM 616 Global Wireless Industry
- TM 765 Selected Topics in Telecommunications Management

Technical Management Track Courses (choose four)

- TM 611 Emerging Telecommunications Technologies
- TM 613 Knowledge Discovery and Data Mining for Telecommunications Managers

TM 614 Principles of Traffic Engineering and Performance Analysis  
TM 615 Wireless Communications and Mobile Computing  
TM 617 Next Generation Wireless Networks  
TM 619 E-Commerce Technologies  
TM 621 Telecommunications Signaling and Switching  
TM 624 Network Management  
TM 694 E-Business Security and Information Assurance  
Mgt 710 Risk Management: Methods and Applications  
TM 765 Selected Topics in Telecommunications Management  
Mgt 787 Cyber Security Principles for Managers  
Mgt 788 Enterprise Architectures for Information Security

Global Innovation Management (choose four)

Mgt 630 Global Business and Markets  
Mgt 650 International Business Management  
Mgt 702 Technology Management  
Mgt 720 Global Innovation Management

Management of Wireless Networks (choose four)

TM 615 Wireless Communication and Mobile Computing  
TM 616 Global Wireless Industry  
TM 617 Next Generation Networks  
TM 618 Performance of Emerging Mobile Wireless Networks  
EE 584 Wireless Systems Security

Online Technology, Business and Security (choose four)

TM 619 E-Commerce Technologies  
TM 694 E-Business Security and Information Assurance  
Mgt 766 Marketing Online  
Mgt 767 Legal Issues for the IT Professional  
Mgt 768 Entrepreneurship in IT  
Mgt 787 Cyber Security Principles for Managers  
Mgt 788 Enterprise Architectures for Information Security

Project Management Concentration (choose four)

Mgt 550 Introduction to Project Management (core, required for all)  
Mgt 610 Project Management Theory and Practice  
Mgt 612 The Human Side of Project Leadership  
Mgt 738 Advanced Project Management  
Mgt 611 Project Planning and Monitoring  
Mgt 737 Project Management Office

***Satisfying Prerequisites***

Students who satisfy Telecommunications Management admissions requirements but lack calculus and an introductory telecommunications background, may be required to complete the following non-credit courses:

TM 500 Calculus for Telecommunications Managers  
TM 550 Introduction to Telecommunications Concepts

These courses are offered at least once every academic year.

Graduate Certificate in Telecommunications Management

TM 601 Principles of Applied Telecommunications Technology  
TM 605 Probability for Telecommunications Managers

TM 610 Business Information Networks  
TM 612 Regulation and Policy in the Telecommunications Industry  
(All credits earned may be applied towards the master's degree.)

### **Executive Master of Technology Management (EMTM)**

The EMTM program focuses on the effective development and use of technology in customer-driven organizations. It is based on an integration of business and technology topics focused on educating participants to manage technology creatively in order to enhance business competitiveness in a global business environment. Orientation is given in general business skills such as finance and marketing, and emphasis is placed on aligning technology development with business plans through application of TQM, and the use of emerging technology, innovation and multifunctional teams.

The Executive Master of Technology Management degree program is composed of eleven courses (plus ten workshop practicums) that are achieved in six trimesters. The courses are supplemented by a series of one-day workshops where student teams manage a company via a robust business simulation. Applicants are required to have a Bachelor of Science degree in engineering, science or computer science. A select number of students with business and/or economics undergraduate majors are admitted each year. At least five years' industrial experience is required.

All courses are taught by Stevens faculty and Executives-in-Residence and are scheduled at company locations in northern and southern New Jersey. Classes are held one evening per week and run from 3:30 p.m. to 9:30 p.m. There is a short break for dinner, which is provided on site. In the final semester, the capstone course requires several non-consecutive weekend (Friday evening/Saturday) sessions on the Stevens campus. Students complete their degree in 20 months at one of the off-campus locations.

### **Core Courses for the Executive Master of Technology Management degree**

Mgt 624 Financial Analysis for Technological Organizations  
Mgt 745 Practicum – Accounting  
Mgt 628 Accounting Lab  
Mgt 642 Marketing Management in Technical Organizations  
Mgt 746 Practicum – Marketing  
Mgt 629 Marketing Lab  
Mgt 707 Emerging Technologies  
Mgt 757 Practicum – Effective Communications for Managers  
Mgt 714 Technology Strategy  
Mgt 749 Practicum – Technology Strategy  
Mgt 715 Strategic Business Management  
Mgt 748 Practicum – Strategic Management  
Mgt 740 Managing Multifunctional Teams  
Mgt 742 Practicum – Multifunctional Teams  
Mgt 741 Innovation Management Process  
Mgt 751 Project Management and Leadership  
Mgt 759 Practicum – Project Management and Leadership  
Mgt 752 Corporate Venturing  
Mgt 754 Practicum – Corporate Venturing  
Mgt 755 Process Management in High-Tech Organizations

Mgt 747 Practicum – Process Management  
Mgt 798 Integration and Application of Technology Management  
Mgt 743 Practicum – Teaming

### **Executive MBA in Technology Management (EMBA in TM)**

The EMBA in TM is designed for professionals with at least five years of managerial and/or senior professional experience in business/government organizations. The EMBA in TM program is designed for individuals on a trajectory to a senior management position (e.g. R&D Director or VP, etc.). Applicants are expected to have a bachelor's degree. All applicants must submit transcripts showing academic achievement in prior studies, two letters of recommendation from their companies, a letter stating their career objectives, a resume and their GMAT score. International students should also submit a TOEFL score. Students currently enrolled in one of the Howe School's M.S. degree programs may apply to join the EMBA in TM program prior to obtaining their M.S. degree by submitting a written application together with a GMAT score. Similarly, students who are currently enrolled in the EMTM program may apply to enroll in the EMBA program in TM by submitting a written application. Prerequisites for this program include a semester of microeconomics (Mgt 503 or equivalent) and a semester of introductory calculus.

### **PH.D. PROGRAM**

The School of Technology Management offers a Ph.D. with concentrations in Information Management, Technology Management, and Telecommunications Management. The Howe School also participates in an interdisciplinary Ph.D. program in Telecommunications Management. Within these concentrations, students may focus their research on a number of more specialized areas in which the faculty has strength including project management, innovation management and systems integration. The Ph.D. program is primarily designed for full-time students; however, outstanding part-time students may be admitted.

### **Admission and Graduation Requirements for Doctoral Program**

Students may be admitted upon completion of the master's degree or its equivalent. All applicants to the Ph.D. program must submit either a GMAT or GRE score. International students whose native language is not English must also take the TOEFL test. Additional admission criteria for each specific concentration are detailed below.

To obtain a Ph.D., a student needs to complete at least 90 credits (beyond the BS level). A maximum of 30 credits is awarded for a master's degree from another school. As part of their coursework, students are required to attend research colloquia (lectures) given at the Howe School by prominent visiting researchers.

When certified for candidacy following completion of the written exams and all coursework, students are required to write and defend a dissertation in a selected area of concentration. It is expected that doctoral dissertations will make significant contributions to the creation of knowledge and the development of theory and practice in a selected area. Please refer to the Graduate Student Handbook for specific requirements.

### **Information Management Ph.D. Concentration**

The Information Management Ph.D. is designed for highly-qualified students interested in careers in teaching and research in the management of information. Graduates

are equipped to pursue careers in either academia or industry.

The program is based on the premise that information systems always exist within the context of a specific organization. Their effectiveness is greatly dependent upon the attitudes towards such systems of the individuals using them. With this in mind, students are required to take courses and seminars in Information Management and Organizational Behavior and Theory. After completion of their course work, students are examined in design and development of information systems, information management and organizational theory and behavior, networks and distributed information management, strategic management of information systems and the management of the information technology organization. Appropriate preparation for this program is a Master of Science degree in Information Systems or its equivalent, Computer Science, and Telecommunications Management, or an MBA. Students with insufficient background in database management systems and organization theory may be asked to take introductory master's level courses for no credit toward the Ph.D. degree. In addition to the GRE or GMAT score, applicants are asked to submit with their application a sample of writing such as a published paper, a master's thesis, a semester project paper or an extensive case study for which they were the principal or sole author.

**Typical Schedule for Information Management Ph.D. Students**

The schedule below is an example of a schedule for a student with a Master's degree in Information Management or a related field. Core courses are shown in bold.

<i>Year</i> <b>First</b>	<i>Fall Semester</i> <b>Mgt 552 Multivariate Analysis</b> Mgt 704 Research Seminar: Information Management and Organizational Structure and Behavior I Mgt 781 Management of Information Technology in Organizations	<i>Spring Semester</i> <b>Mgt 599 Research Methods</b> Mgt 705 Research Seminar: Information Management and Organizational Structure and Behavior II Mgt 780 Strategic Management of Information Technologies
<b>End of 1st Year</b>	The student's status in the program is reviewed by the Information Management Ph.D. Committee.	
<b>Second</b>	<b>Mgt 730 Design and Analysis of Experiments</b> Mgt 778 Principles of Information Management I Elective	<b>Mgt 706 Technogenesis Research</b> Mgt 779 Principles of Information Management II Elective
<b>End of 2nd year</b>	Students are qualified to take Qualifying Examinations in Information Management and Organizational Theory during the third year in program.	



Wesley J. Howe School of Technology Management

<b>Third</b>	Mgt. 960 Research in Management One additional class selected from the list below.	Mgt. 960 Research in Management One additional class selected from the list below. Dissertation research
<b>End of 3rd year</b>	Successful Completion of Qualifying Examinations Oral Defense of Dissertation Proposal*	
<b>Fourth</b>	Mgt. 960 Research in Management Completion and defense of doctoral dissertation	

Note: \* Students must complete these requirements before a dissertation proposal can be approved. Doctoral preliminary examinations may be written or oral at the discretion of the committee chair. Courses in bold represent the common core. Guidance on electives should be obtained from the advisor.

Students in the Information Management program select two additional courses or seminars from among the following :

- Mgt 716/726/736 Seminars: Advanced Topics in Information Technology Management
- Mgt 777 Information Management Applications of Artificial Intelligence
- Mgt 783 Enterprise Systems Management
- Mgt 784 Integrated IS Technologies
- Mgt 801 Special Problems in Management

***Qualifying Examinations***

In the third year of the program, after the completion of the first eight courses, students are required to sit for two qualifying examinations, one in Information Management topics and the other in Organizational Theory and Management topics. These examinations are prepared and scored by the faculty involved in teaching the courses during the first two years of the program.

**Technology Management Ph.D. Concentration**

The Ph.D. program in Technology Management is designed for highly-qualified students interested in careers in teaching and research. Graduates are equipped to pursue careers in either academia or industry. A candidate for the Ph.D. program in Technology Management is expected to have demonstrated research competency in order to be admitted to the program. Applicants are asked to submit with their application a sample of their research, such as a published paper or a master's thesis or other research paper for which they were the principal or sole author.

**Typical Schedule for Technology Management Ph.D. Students**

The schedule below is an example of a schedule for a student with a Master's degree. Core courses are shown in bold.

<i>Year</i>	<i>Fall Semester</i>	<i>Spring Semester</i>
<b>First</b>	<b>Mgt 552 Multivariate Analysis</b> Mgt 716 Research Seminar elective	<b>Mgt 599 Research Methods</b> Mgt 801A Special Problems
<b>End of 1st Year</b>	Successful completion of Qualifying Exam for TM Ph.D.*	
<b>Second</b>	<b>Mgt 730 Design and Analysis of Experiments</b> Mgt 801B Special Problems in Management Elective	<b>Mgt 706 Technogenesis Research</b> Mgt 736 Research Seminar Elective
<b>End of 2nd year</b>	Completion of independent research – for students who did not complete a Master's Thesis* Successful completion of Qualifying exam in Research Methods	
<b>Third</b>	Mgt. 960 Research in Management	Mgt. 960 Research in Management
<b>End of 3rd year</b>	Successful Completion of Doctoral Preliminary Examinations Oral Defense of Dissertation Proposal*	
<b>End of 3rd or start of 4th year</b>	Completion and defense of doctoral dissertation	

Note: \* Students must complete these requirements before a dissertation proposal can be approved. Doctoral preliminary examinations may be written or oral at the discretion of the committee chair. Courses in bold represent the common core. Guidance on electives should be obtained from the advisor.

**Qualifying Examination**

This is a comprehensive examination on Technology Management subjects. Students entering the program with a Master's degree are expected to take this examination after completing one year in the program. This examination will be prepared and scored by the Technology Management doctoral committee. The qualifying examination in Technology Management is designed to demonstrate understanding and competence in areas relevant to Technology Management. This examination should be taken at the end of the first year of coursework in the Ph.D. program. This is a one-day exam and students choose four topics in Technology Management. The purpose of this exam is to ensure competency before students go further in the doctoral program. Two of the topics must be in Quantitative Methods and two additional topics must be in the

Management/Organization area.

***Comprehensive Examination in Research Methods***

A second one-day examination in research methods can be taken at any time but it is suggested that students take this exam after completing Mgt 599, Mgt 552 and Mgt 730. This examination covers basic and advanced research methods and basic and multivariate statistics. This examination must be passed before students can begin their dissertation.

**Telecommunications Management Ph.D. Concentration**

The Ph.D. program in Telecommunications Management is designed for highly qualified students interested in careers in teaching and research. Graduates are equipped to pursue careers in either academia or industry. A candidate for the Ph.D. program in Telecommunications Management is expected to have demonstrated research competency in order to be admitted to the program. Applicants are asked to submit with their application a sample of their research, such as a published paper or a master's thesis or other research paper for which they were the principal or sole author.

**Typical Schedule for Telecommunications Management Ph.D. Students**

The schedule below is an example of a schedule for a student with a Master's degree in Telecommunications Management or a related field. Core courses are shown in bold. Mgt 960 must be taken to satisfy the remaining 24 points of the dissertation requirement.

<i>Year</i>	<i>Fall Semester</i>	<i>Spring Semester</i>
<b>First</b>	<b>Mgt 552 Multivariate Statistics</b> (or alternate research methods course) Mgt 716/726/736 or other Electives	<b>Mgt 599 Research Methods</b> TM765 Selected Topics in Telecom Management Mgt 736 Research Seminar in Telecom or Electives
<b>End of 1st Year</b>	The student's status in the program is reviewed by the Telecommunications Management Ph.D. Committee.	
<b>Second</b>	<b>Mgt 730 Design &amp; Analysis of Experiments</b> TM/Mgt 801A Special Problems Elective	<b>Mgt 706 Technogenesis Research</b> TM/Mgt 801B Special Problems Mgt 736 Research Seminar Elective
<b>End of 2nd year</b>	Students are qualified to take Qualifying Examinations in Telecommunications Management.	
<b>Third</b>	Mgt 960 Research in Management	Mgt 960 Research in Management
<b>End of 3rd year</b>	Successful Completion of Qualifying Examination Oral Defense of Dissertation Proposal*	
<b>End of 3rd, or start of 4th year</b>	Mgt 960 Research in Management Completion and defense of doctoral dissertation	

Notes:

\* Students must complete these requirements before a dissertation proposal can be approved.  
 Doctoral preliminary examinations may be written or oral at the discretion of the committee chair.  
 Courses in bold represent the common core. Guidance on electives should be obtained from advisor.

Students in the Telecommunications Management program select two additional courses or seminars from among the following:

- Mgt716/726/736 Seminars: Advanced Topics in Information/Technology Management/Telecommunications management
- TM 765: Selected Topics in Telecommunications Management
- Mgt 710 Risk Management
- TM 615 Wireless Network Mobile Computing

TM 617 Next Generation Wireless Networks

TM 618 Performance Management of Wireless Networks

### ***Qualifying Examination***

This is a comprehensive examination on Telecommunications Management subjects. Students entering the program with a Master's are expected to take this examination no later than the end of the second year in the program. This examination will be prepared and scored by the Telecommunications Management doctoral committee. The qualifying examination in Telecommunications Management is designed to demonstrate your understanding and competence in areas relevant to Telecommunications Management: fundamentals of telecommunications and quantitative methods for telecommunications; and two areas from the following topics: engineering economics, policy and regulation, wireless, performance analysis.

### ***Comprehensive Examination in Research Methods***

A second one-day examination in research methods can be taken at any time but it is suggested that students take this exam after completing Mgt 599, Mgt 552 and Mgt 730. This examination covers basic and advanced research methods and basic and multivariate statistics. This examination must be passed before students can begin their dissertation.

### ***Graduate Certificate Programs***

The School of Technology Management offers the following programs leading to a Graduate Certificate of Special Study. Students are required to meet regular admission requirements for the master's program and complete the courses listed below. Each Graduate Certificate program is self-contained and highly focused, carrying 12 graduate credits. All of the courses may also be used toward the master's degree as well as for the graduate certificate.

#### ***Entrepreneurial IT (Trimester)***

Mgt 771 Management Information Systems (Semester I)

Mgt 766 Marketing Online (Semester II)

Mgt 767 Legal Issues for the IT Professional (Semester II)

Mgt 768 Entrepreneurship in IT (Semester III)

#### ***Global Innovation Management***

Mgt 650 International Business Management

Mgt 630 Global Business and Markets

Mgt 702 Technology Management

Mgt 720 Global Innovation Management

#### ***Human Resource Management***

Mgt 530 Human Resource Administration and the Law

Mgt 680 Organizational Behavior and Theory

Mgt 566 Job Analysis and Performance

Mgt 529 Organizational Change and Development

#### ***Information Management***

Mgt 773 Data Management

Mgt 772 Analysis and Development of Information Systems

Mgt 781 Management of Information Technology Organizations

Mgt 780 Strategic Management of Information Technology

*For students with little or no information systems professional experience, Mgt 501 is a prerequisite for all MSIS courses.*

***Information Security***

Mgt 787 Cyber Security Principles for Managers

Mgt 788 Enterprise Architecture for Information Security

CS 573 Fundamentals of Computer Security

CS 694 E-Business Security & Information Assurance

***IT in Financial Services***

Mgt 761 Financial Services Industry Trends & Directions

Mgt 762 Capital Markets

Mgt 763 Back Office

Mgt 764 Financial Services Marketing & Sales

***IT in Pharmaceutical***

Mgt 721 Pharmaceutical Industry Trends & Directions

Mgt 722 Pharmaceutical Industry New Drug Development

Mgt 723 Pharmaceutical Industry Marketing & Sales

Mgt 724 Pharmaceutical Supply Chain

***Management of Wireless Networks***

TM 615 Wireless Communication and Mobile Computing

TM 616 Global Wireless Industry

TM 617 Next Generation Networks

TM 618 Performance of Emerging Mobile Wireless Networks

***Project Management***

Mgt 550 Introduction to Project Management

Mgt 610 Project Management Theory and Practice

Mgt 612 The Human Side of Project Leadership

Mgt 738 Advanced Project Management

***Technology Management***

Mgt 550 Introduction to Project Management

Mgt 702 Technology Management

Mgt 750 Total Quality Management

Mgt 760 Operations Management or Mgt 641 Marketing Management

***Telecommunications Management***

TM 601 Principles of Applied Telecommunications Technology

TM 605 Probability for Telecommunications Managers

TM 610 Business Information Networks

TM 612 Regulation and Policy in the Telecommunications Industry

## **TECHNOLOGY APPLICATIONS IN SCIENCE EDUCATION**

This Graduate Certificate program focuses on applications of technology to enhance teaching and learning in pre-college science and mathematics. The program deals with software, the Internet and computer-based probes that can be used as tools by teachers at middle-school and high-school levels. The courses provide teachers with the cognitive insight and learning theory bases for utilization of technology in these subject areas. Both subject matter and strategy are discussed to enable effective classroom implementation.

This program has evolved from more than a decade of experience at Stevens Institute of Technology's Center for Improved Engineering and Science Education (CIESE).

The program addresses issues of classroom management, the relationship of technology to newly emerging standards and current developments in school reform.

### **Courses are offered online at [www.WebCampus.Stevens.edu](http://www.WebCampus.Stevens.edu)**

Mgt 785 Introduction to the Development of Computer-Based Instructional Systems

Mgt 651 Internet Applications for Use in Science Education

Mgt 627 Mathematical Tools for Data Analysis

## **STEVENS-FORDHAM EXCHANGE PROGRAM**

Stevens has arranged an exchange program for Stevens' graduate students with the Office of Graduate Studies of Business Administration at Fordham University, located at Lincoln Center in New York City.

This program enables graduate students at Stevens to enroll in advanced courses in accounting, finance and marketing at the Graduate School of Business Administration at Fordham, Lincoln Center, in New York. In turn, Fordham MBA students can enroll in selected computer science and engineering courses at Stevens. Students register and pay for exchange courses at their home schools, and grades are sent directly to the Registrar of the home school. The School of Technology Management coordinates the program for Stevens.

## **RESEARCH**

### **Center for Technology Management Research (CTMR)**

Profs. R. Reilly and E. Stohr

<http://attila.stevens-tech.edu/ctmr/>

CTMR conducts research on issues related to innovation and the management of technologies in a global context. Our mission is to develop concepts and frameworks to help executives address the challenges of a rapidly changing technology-based world. Research results are disseminated through publications, books, working papers, an annual conference, and sponsor forums.

CTMR supports the Stevens Institute of Technology theme of Technogenesis—the educational frontier wherein faculty, students and colleagues in industry jointly nurture the process of conception, design, and marketplace realization of new technologies.

**Center for Global Technology Management (CGTM)**

H. Fallah, T. Lechler and L. Stevens

The Center for Global Technology Management (CGTM) is the Howe School's focal point for research and educational programs in global studies. In research, the center focuses on issues related to global innovation practices and theory. The center's educational program includes a range of courses leading to a "global concentration" in several Howe School graduate programs. The center also plans a series of executive courses as well as student exchange programs at the undergraduate and graduate level with global corporations and international business schools.

**Consortium for Corporate Entrepreneurship**

Prof. Peter Koen

<http://www.ceconsortium.org/>

The Consortium for Corporate Entrepreneurship (<http://www.ceconsortium.org>) continues to focus its research in three areas: optimizing the front end of innovation, approaches and organizational structures for getting to breakthroughs and knowledge creation, and knowledge flow at the front end.

Through its mission statement—to better understand the Front End of Innovation in order to increase the number, speed and success probability of highly profitable products entering development—the Consortium offers a collaborative environment, where academia and industry are dedicated to the discovery portion of the front end leading to breakthrough innovation.

Although these are topics of growing interest within the corporate creative community, little has previously been established. In a world of rapidly evolving technologies, the success of interdependent relationships spawned between creator-innovators and their corporate environments is based on an increasingly synchronized set of events. The Consortium and its industry sponsors seek to recognize behaviors and activities that can be applied as powerful tools in enhancing creativity, productivity and profitability. Industry sponsors include: ExxonMobil; Ethicon, a J&J Franchise; and Aventis.

**Stevens Alliance for Technology Management**

L. Gastwirt

<http://attila.stevens-tech.edu/stmm/satm>

Mission: The Alliance is an industry-university partnership under the auspices of the Wesley J. Howe School of Technology Management at Stevens Institute of Technology. It was founded in 1991 to identify, disseminate and facilitate the deployment of more effective practices for the development and utilization of technology. Current Alliance Sponsors, in addition to Stevens Institute, are AT&T, Bestfoods, ExxonMobil Research and Engineering, ISO, Lucent Technologies, Pershing, Teknor Apex and the US Army Research, Development, and Engineering Center. Past Sponsors have included AlliedSignal, Bellcore, Engelhard Industries, GTech, IBM, Merck, and SIAC.

**Center for Improved Engineering and Science Education (CIESE)**

E.A. Friedman

[www.ciese.org](http://www.ciese.org)

The Center for Improved Engineering and Science Education (CIESE), [www.ciese.org](http://www.ciese.org), was founded in 1988 to lend Stevens' expertise in integrating computers into its curricu-



lum to improve science, mathematics, engineering, and technology education. CIESE's mission is to increase the pool and improve the capabilities of all students to pursue higher education and careers in these disciplines. In pursuing this mission, CIESE's work has encompassed both precollege educators as well as post-secondary education. The Center helps K-12 educators exploit the power of technology to improve teaching and learning in science, mathematics and other disciplines. These activities complement Stevens' objectives by helping students acquire the foundations necessary to excel in science, mathematics and other subjects. Achievement in these "gateway" subjects enables students to go on to the advanced study required in engineering and other technologically-rich fields.

CIESE works collaboratively with teachers, school system administrators, as well as university faculty to provide intensive, hands-on training, support and counsel to infuse technology, in meaningful ways, into the curriculum. Technology is seen as both a tool for teachers and a new mode for bringing exciting content to students. In the past, students might have read in a textbook about earthquakes that happened several years ago; today it is possible for them to log onto a web site and see the location and intensity of earthquakes that have occurred within the past 24 hours. Bringing these real-world phenomena into the classroom both motivates and engages students to learn in ways not possible with more traditional tools.

Through partnerships with school districts, as well as colleges, universities and other organizations in New Jersey and four other states, the CIESE program is in the process of training 10,000 teachers and reaching more than a quarter-million children. CIESE is currently implementing: a five-year, \$9.28 million U.S. Department of Education Technology Innovation Challenge Grant; a three-year, \$750,000 AT&T Foundation grant; a three-year, \$600,000 New Jersey Department of Education grant; a three-year, \$1 million program to strengthen science education for New Jersey's neediest schools; as well as several specific teacher-training programs with New Jersey and New York schools and districts.

Central to CIESE activities are unique and compelling Internet-based curriculum materials for K-12 science and mathematics education. The Savvy Cyber Teacher (SCT) workshop series is a 10-part, 30-hour teacher-training program providing educators with hands-on experience using e-mail, web browser software and search engines. It uses original Internet-based curriculum material that features "real time" data on scientific and natural phenomena and opportunities for global collaboration with scientists, experts and school children around the world. Teachers create their own web pages to organize their lessons and post student work. SCT materials and other training programs are available to schools and teachers through grant-funded programs or fee-for-services arrangements with CIESE.

## UNDERGRADUATE COURSES

### **BT 101 Introduction to Business Planning and Field Study (2-3-3)**

During this first-year course, students gain a fundamental understanding of how businesses are organized, key functions within a company and how companies operate, using a Business Plan model as the teaching tool. Students start their exposure to a group of companies to assist them in determining what company, product or service they will choose for their Business Plan.

### **BT 102 Diagnosing Internal Capabilities of a Company (3-0-3)**

During this first-year course, students develop skills in conducting an in-depth internal analysis of a company, to include the type of questions and information needed for a situational diagnosis of a company's product or service, R&D efforts, operations, organization and management, and financial capabilities. Students continue their in-depth analysis on three selected companies, using the research and analysis learned in this and BT 101. Prerequisite: BT 101.

### **BT 113 Marketing (3-0-3)**

The purpose of this course is to provide the conceptual frameworks and decision tools required for success in both technology-based and non-technology-based markets: the student learns to define and select specific customer segments; to monitor the business environment for both opportunities and threats, with particular attention to the ever-changing technological and global context, and to develop marketing strategies for serving each targeted customer segment profitably. Although this course introduces the

student to the basic theory and analytical methods characterizing modern marketing practice, there is an emphasis on both the marketing of technology products/services as well as the impact of technology on the general practice of marketing. Students are required to present both a detailed marketing plan and several rigorous case analyses.

### **BT 115 Financial Accounting (4-1-4)**

This course deals with the methods and principles of financial accounting. It focuses on the recording and measurement of the business activities and the preparation of financial reports. The emphasis is on summarizing activities for persons external to the business. Topics include: financial statements, principles of accrual accounting, the measurement and reporting of detailed balance sheet items and the analysis of financial reports.

### **BT 121 IT and Applications: Introduction to eTechnology (3-0-3)**

The recent developments in Information Technology (IT) and e-business have brought dramatic changes in the way companies operate, compete and conduct business. During this course, students are introduced to the organizational structure of E-business and are provided with a solid theoretical foundation for understanding applications from a managerial orientation. The focus is on how new technology is conducted and managed, in addition to its opportunities, limitations, issues and risks. The goals for the course are to encourage students to develop skills in two areas: IT Fundamentals and Business Applications. Specific topics include: Architecture of IT, E-business and the Internet, future trends in IT and under-

standing business applications as they relate to IT.

**BT 131 Technogenesis: Introduction to Innovation and Creativity (3-0-3)**

This course introduces students to innovation and creativity. Included are techniques to stimulate creativity in groups and individuals. The course utilizes individual and team projects to develop an intrinsic understanding of the environment, humans' interactions with it, and innovations to improve that interaction. Students report the results of their innovation efforts through written and oral presentations. Guest lectures and laboratory visits to introduce students to the innovation processes are included. This course is open only to Business and Technology majors.

**BT 201 Diagnosing and Measuring Customer Satisfaction (3-0-3)**

During this second-year course, students learn how to perform an external customer analysis on a company they have selected. Students will present their findings at the end of the semester, summarizing their customer satisfaction analysis. Students gain an understanding and appreciation of the issues that must be addressed to initiate a Customer Satisfaction Measurement (CSM) program, the issues involved in the development and implementation of CSM, and finally, managerial considerations involved in CSM. Topics include: customer satisfaction, "Customer Value Model," and collecting and analyzing demographic and psychographic data. Prerequisite: BT101, BT102.

**BT 202 Diagnosing the External Environment (3-0-3)**

Students continue to build upon the mar-

ket research and situational analysis techniques from prior courses by evaluating the external factors that can significantly impact a company's performance. Topics include: identifying key market-related forces and their impact on the company's marketing strategy; the impact of technological and socioeconomic developments; analyzing and understanding the impact of economic development on a company's financial strategy; and understanding the impact of legislative and regulatory actions. Students complete an externally-focused analysis of a company's operations and use the results of the analysis to identify threats and opportunities related to that company's performance. Prerequisite: BT101, BT102 and BT201.

**BT 214 Market Research (3-0-3)**

This course exposes students to the entire marketing research process, from the problem formulation stage (at the very beginning) to the research findings report (at the very end). This objective is achieved in two ways: in the classroom and in the field, where students are required to work closely with an actual business client on a marketing research project concerning an actual product or service. (The instructor assists the students in securing a business client.) During the course, the topics covered include the marketing research process and problem formulation, research design, primary data collection, data collection forms, attitude measurement, sampling procedures, sample size, collecting the data, data analysis, interpretation of results and the final research report. The course builds heavily on the statistical foundation laid down during BT 221 Statistics. A statistical package (SPSS) is used during the analysis stage of the research process. Prerequisite: BT 113 and BT 221.

**BT 215 Cost Accounting  
(3-0-3)**

This course deals with the methods and principles of managerial accounting. It is concerned with the use of accounting data by individuals within a business in order to enhance managerial decision-making and control. Topics covered include cost estimation and management, cost accounting systems, cost allocation, decision analysis, budgets, variances and responsibility accounting. Prerequisite: BT 115.

**BT 221 Statistics  
(3-0-3)**

This course provides students with an understanding of the use of statistical methods as applied to business problems, in general, and to marketing research applications in particular. Topics include: descriptive statistics; probability theory, discrete and continuous probability distributions; sampling theory and sampling distributions; interval estimation; hypothesis testing; statistical inference about means, proportions and variances; tests of goodness-of-fit and independence; analysis of variance and experimental design; simple and multiple regression; correlation analysis. This course has been developed with particular attention to the specific statistical foundation required by students enrolling in BT 214 Marketing Research the next term. A statistical package (SPSS) is used throughout the term.

**BT 223 Applied Models & Simulation  
(3-0-3)**

This course covers contemporary decision support models of simulation, and forecasting for business activity. Students learn how to identify and conceptualize stochastic problems, choose the appropriate methods, collect and process the data (data mining) and create stochastic simulations. Analytical methodologies are

based on statistical simulation, operations research optimization and statistical forecasting. Computer simulations are performed on PCs equipped with a user-friendly graphical interface with multimedia reports generation for visualization. Students conduct business game simulations for group decision support. EM 345 may be taken as an alternative. Prerequisites: Ma 117 and BT 121.

**BT 224 Science and Technology:  
Modern Physics  
(3-3-4)**

This is the second in the four-course science and technology sequence for the business and technology program students. It is designed to provide students with an overview of modern science and technologies, as well as scientific and engineering methodologies. A three-hour laboratory is an integral part of the course, which includes experimentation, demonstrations and group projects. Prerequisite: MA117 and PEP111.

**BT 301 Goal Setting and Sales/  
Revenue Plan Development  
(3-0-3)**

Students learn how to set preliminary goals, objectives and strategies. They begin to develop the specific aspects of their business plan including an actual sales/revenue plan. Topics covered also include preparing an R&D plan and the use of historical information to prepare sales, revenues, and marketing and sales expense estimates. Students work independently and in class; individually and in teams. Prerequisites: BT 101, BT 102, BT 201 and BT 202.

**BT 302 Management  
(3-0-3)**

This course covers the basic managerial components of planning, organizing, influencing and controlling with selected

study and discussion of important and sometimes controversial topics including global management, social and ethical responsibility, human resources, change, leadership and communication. By term-end, students are expected to complete the 'Managerial' portion of their Business Plan. Prerequisites: BT 101, BT 102, BT 201, BT 202 and BT 301.

**BT 321 Finance  
(3-0-3)**

This course covers capital budgeting, capital structure, dividend policy, mergers and acquisitions, and aspects of international finance. The impact and techniques for web-based finance is also covered. Prerequisites: BT 115, MA 117, BT 221 and EM 350.

**BT 334 Science and Technology:  
Energy  
(3-3-4)**

The course is the third in a four-course sequence, for the business and technology program students, designed to provide students with an overview of modern sciences and technologies as well as scientific and engineering methodologies. This course presents an introduction to the student to environmental science and the impact of man's activity on the environment. This course also introduces the student to the principles of technology management with the goal of preparing them to write the R&D portion of their business plan. A three-hour laboratory is an integral part of the course, which includes experimentation, demonstrations and group projects. Prerequisites: BT 224.

**BT 401 Implementation, Controlling  
and Capital Acquisition  
(3-0-3)**

Students learn how to use their business plan, deal with problems encountered, how to up-date and get funding. They are

exposed to the issues of law, ethics and negotiation as applied to business implementation. Students are required to make their first full-plan presentation to peers and faculty. Topics include type of capital and alternative sources, venture capital and building the organizational infrastructure for plan support. Prerequisites: BT 101, BT 102, BT 201, BT 202, BT 301 and BT 302.

**BT 402 Plan Perfection  
and Presentation  
(3-0-3)**

Students see the culmination of their efforts in this final semester. They make their presentation; it is evaluated by industry and venture leaders. Prerequisites: BT 101, BT 102, BT 201, BT 202, BT 301, BT 302 and BT 401.

**BT 403 Marketing Strategy  
and Decision Making  
(3-0-3)**

This elective course provides students the opportunity to draw together and build upon, the marketing and business knowledge acquired in prior courses. Students are challenged to apply and extend this knowledge in a variety of marketing opportunities, forecasting, test market interpretation, product management, pricing decisions, development of the marketing communication mix, and sales force management. Cases are extensively used. Prerequisites: BT113, BT214

**BT 411/412 Business Consulting in  
Engineering I and II  
(0-8-3)**

Students are required to join senior engineering project teams and contribute to the project in terms of helping the group develop a business plan for its design product.

**BT 413 Business Law, Ethics and Negotiations (3-0-3)**

This course covers the fundamentals of contract law, aspects of environmental regulations, lobbying, ethics and the law and negotiating techniques. Specific discussion includes the legal and ethical aspects of the new web-based economies and businesses internationally.

**BT 414 eTechnology Infrastructure (3-0-3)**

This course introduces the students to the managerial analysis and application of network and software applications necessary to develop, maintain and enhance a business presence in the electronic marketplace. This course builds upon previous courses in Information Technology, including network and software applications from a management and implementation perspective, and introduces advanced concepts in these areas. Prerequisites: CS 115, BT 121 and EM 350.

**BT 415 Entrepreneurship (3-0-3)**

This course covers differentiated and contrasted aspects of an entrepreneurial organization. In addition, students are exposed to the latest E-business tools used to expand a business and facilitate entrepreneurial start-up firms. Included are differences in funding techniques, hiring, and practice and leveraging of supplier resources.

**BT 450 Global Management Seminar (Elective) (3-0-3)**

This seminar will examine the processes of globalization for multi-national companies and why they seek markets in other countries. US and foreign countries' cultural, labor and management issues will be compared. How management practices

transfer across cultures will also be examined. Includes visits to overseas companies as part of a field study experience.

**Mgt 111 Social Psychology and Organizational Behavior (3-0-3)**

Using an applied and experiential format, this course exposes students to theory, methods and research in organizational behavior and social psychology. Topics relating to individual differences and group dynamics in organizational settings are stressed. Learning occurs through discussion, group activities and the completion of assessment instruments. Emphasis is on helping students understand and improve their skills in key areas including decision-making, leadership, negotiation and conflict resolution.

**Mgt 243 Macroeconomics (3-0-3)**

The forces which govern the overall performance of the national economy are covered. Areas discussed include: supply and demand analysis, national income theory, monetary systems, alternative approaches to economic policy, current macroeconomic problems and international economies. Prerequisite: Mgt 244.

**Mgt 244 Microeconomics (3-0-3)**

The behavior of and interactions between individual participants in the economic system are covered. In addition to providing a theoretical basis for the analysis of these economic questions, the course also develops applications of these theories to a number of current problems. Topics include: the nature of economic decisions, the theory of market processes, models of imperfect competition, public policy towards competition and the allocation of factors of production.

**Mgt 401 MIS/DBMS/Networks  
(3-0-3)**

A technical and managerial perspective that considers the management of Information Technology (IT). Topics include hardware, software, data/information, networks, applications, organization considerations and frameworks for managing. Students assess applications, analyze case studies and explore important aspects of a company's IT environment.

**GRADUATE COURSES**

*All Graduate courses are 3 credits except where noted.*

**Management Courses**

**Mgt 501 Information Management**

A technical and managerial perspective that considers the management of an Information Technology (IT) organization for students with little or no academic or professional IT experience. Topics include: hardware, software, data/information, networks, applications, organization considerations and frameworks for managing. Students assess applications, analyze case studies and explore an important aspect of their company's information technology environment. This non-credit, web-based course is in place to prepare MSIS students that do not have IT experience. It (or equivalent experience) is a prerequisite for any MSIS course.

**Mgt 502 Introduction to Accounting, Microeconomics, Statistics and Finance**

This non-credit, self-paced, web-based course is provided as a prerequisite to the required Finance course for MSIS students. It introduces students to four important business disciplines: Accounting, Microeconomics, Statistics

and Financial statements. It is intended for students without the respective background from either previous course work or work experience.

**Mgt 503 Microeconomics**

This is a concentrated course in basic economics with particular emphasis on price theory; it is a prerequisite for candidates for the master's degree. Topics include: the nature of economic decisions, the theory of market processes, models of imperfect competition, public policy towards competition, the allocation of factors of production and current economic problems. No credit for departmental majors.

**Mgt 550 Introduction to Project Management**

This course deals with the basic problems of managing a project, defined as a temporary organization built for the purpose of achieving a specific objective. Both operational and conceptual issues will be considered. Operational issues include definition, planning, implementation, control and evaluation of the project. Conceptual issues include project management vs. hierarchical management, matrix organization, project authority, motivation and morale. Cases will be used to illustrate problems in project management and how to resolve them.

**Mgt 551 Strategic Management**

An interdisciplinary course which examines the elements of, and the framework for, developing and implementing organizational strategy and policy in competitive environments. The course analyzes management problems both from a technical-economic perspective and from a behavioral perspective. Topics treated include: assessment of organizational strengths and weaknesses, threats and opportunities; sources of competitive advantage; organizational structure and strategic planning; leadership, organiza-

tional development and total quality management. The case method of instruction is used extensively in this course. Prerequisites: Mgt 607, Mgt 690 or their equivalents.

#### **Mgt 552 Multivariate Analysis**

Experimental design, statistical estimation and hypothesis testing from multivariate distribution. Topics covered will include regression models, multivariate analysis of variance, canonical correlations, classification procedures and factor analysis. Computer applications of these techniques will be examined. Prerequisite: Mgt 796.

#### **Mgt 557 New Business Ventures**

The principal issues involved in new business formation and development will be presented in this overview course. This will include both the initiation of new ventures within existing firms and the entrepreneurial start-up situation. Particular topics addressed include: business opportunity identification, the start-up process, management team development, business plans, valuation, raising capital, budgeting, deal structures, intellectual property, management of growth, compensation, securities law and public offerings, tax considerations, issues of business maturity and business failure. Prerequisites: Mgt 600, Mgt 607, Mgt 623 and Mgt 680 or permission of the instructor.

#### **Mgt 599 Research Methods**

Research philosophy, ethics, and methodology will be discussed. Each student will, under the guidance of the instructor, formulate a problem, search the literature, and develop a research design. In addition, the student will examine and criticize research reports with special emphasis on the statement of the problem, the sampling and measuring techniques that are used, and the analyses and interpretation of the data. Emphasis is on applying research methodology to real-world orga-

nizational problems. Prerequisite: Mgt 796.

#### **Mgt 600 Managerial Accounting**

This course will develop accounting analysis useful for managerial decision-making purposes. Topics will include an introduction to elements of financial accounting, cost-profit-volume analysis, manufacturing costs and elements of cost accounting, special decision analysis, budgeting, variances and controllability, and responsibility accounting. Prerequisite: Mgt 503 recommended.

#### **Mgt 607 Managerial Economics**

This course examines the use of economic information and analysis in making business decisions. Topics include modeling concepts, demand analysis and forecasting, production and cost analysis, pricing, capital budgeting and uncertainty. Prerequisite: Mgt 503, Mgt 600 or their equivalents; Statistics recommended.

#### **Mgt 608 Macroeconomic Analysis**

The objective of this course is to develop competency in the analysis of macroeconomic phenomena as they shape the state of the American economy. Topics include: recent macroeconomic history, the monetary system, models of macroeconomic markets, unemployment, inflation, international trade and finance, macroeconomic policies and the use of macroeconomic data in management decision-making. Prerequisite: Mgt 503 or equivalent.

#### **Mgt 610 Project Management Theory and Practice**

This course provides a theoretical perspective on project management for a better understanding of project implementation in modern organizations. The course is based on the premise that success in project leadership depends on a proper managerial style and attitude, and not on specific tools for planning and controlling. The course focuses on developing the



manager's conceptual thinking and on building "the project manager's mind." The course helps managers see the entire project landscape and the long-term issues that are critical to project success. It will also address the organizational aspects of initiating and running the program. Prerequisite: Mgt 550

**Mgt 611 Project Planning and Monitoring**

Formalized procedures, tools and techniques used in conceptual and detailed planning of the project. Development of work breakdown structure as the foundation for project cost and project duration. Application of project data in monitoring the project progress and in formulating remedial actions in response to unexpected occurrences. Prerequisite: Mgt 550

**Mgt 612 The Human Side of Project Leadership**

Project success depends, to a great extent, on the human side. Success in motivating project workers, organizing and leading project teams, communication and sharing information, and conflict resolution, are just a few areas that are critical for project success. However, being primarily technical people, many project managers tend to neglect these "soft" issues, assuming they are less important or that they should be addressed by direct functional managers. The purpose of this course is to increase project managers' awareness of the critical issues of managing people and to present some of the theories and practices of leading project workers and teams.

**Mgt 618 Engineering Economics and Management Policy**

This course covers the discipline of engineering economics and how this discipline influences management policy and decision-making. The major emphasis is on the selection process for capital investments,

both tangible and intangible, and how this process is structured and constrained by the time value of money, the source of funds, market demand and competitive position. The first part of the course covers the basics of engineering economy on which the selection process rests. The remaining parts cover the selection process itself, beginning with deterministic analyses based on single-valued estimates, continuing on, where significant, to risk analyses based on multivariate estimates, and concluding with multiattribute analyses in which both the monetary and non-monetary factors involved in investment decisions are combined into single figures of merit. In passing through the process, capital budgeting, cost estimation, probability analysis, uncertainty analysis and Monte Carlo simulation are introduced and applied. Case studies are used where appropriate. Prerequisite: Mgt 600

**Mgt 623 Financial Management**

Financial manager's functions, liquidity vs. profitability; financial planning; capital budgeting; management of long-term funds, money and capital markets, debt and equity; management of assets, cash and accounts receivable, inventory and fixed assets. Prerequisites: Mgt 600, Mgt 607.

**Mgt 624 Financial Analysis for Technical Organizations**

This course presents concepts regarding the collection, processing and reporting of financial information in a technology-based business. Managerial accounting and cost accounting, and their uses and limitations will be discussed. Use of financial statements, budgets and cost estimates in management decision-making will be emphasized. The impact of the risk and uncertainty associated with financial decisions will be illustrated via case studies.

**Mgt 625 Investments and Capital Markets**

This is an introductory course in capital markets with an emphasis on the management of investments. Topics include: discounting, net present value, risk, the capital asset pricing model, diversification, the term structure of interest rates, financial markets, the efficient markets hypothesis, technical and fundamental analysis, options pricing and portfolio management. Prerequisite: Mgt 600.

**Mgt 626 Cost Analysis and Control**

This course presents advanced techniques and analysis designed to permit managers to estimate and use cost information in decision-making. Topics include: historical overview of the management accounting process, statistical cost estimation, cost allocation and uses of cost information in evaluating decisions about pricing, quality, manufacturing processes (e.g., JIT, CIM), investments in new technologies, and investment centers. Prerequisites: Mgt 503 or equivalent, Mgt 600.

**Mgt 628 Accounting Lab**

This course is designed to provide students with an understanding of the basic tools and procedures of accounting in order to assure a common level of understanding for the class. The course consists of a web-based, self-administered tutorial with quizzes and problems, a three-hour lecture and Q&A class prior to the first class meeting of Mgt 624, and a post-test. The class and tutorial can be waived if a student has sufficient background in accounting. The post-test is mandatory. (0.8 credit)

**Mgt 629 Marketing Lab**

This course is designed to introduce students to the Capstone simulation as it relates to marketing. Covered topics will include the fundamentals of the Marketing

Mix including pricing, advertising, distribution and product-related issues. A final exam will determine competency. Students with graduate education in marketing may just take the exam. (0.8 credit)

**Mgt 630 Global Business and Markets**

Provides a broad, multidisciplinary understanding of global business. The theoretical context for engaging in international trade is established, with attention to the current economic and political environment. Then the business-level rationale and techniques for initiating trade, as well as the functional area decisions that must be made, are discussed. Topics include: comparative advantage, culture, protectionism, financial flows, entry strategies, marketing, managing payments, material and manufacturing. Prerequisites: Mgt 503 or equivalent.

**Mgt 632 Power, Politics and Policy**

This course will focus on the relationship and impact that international relations, international business, and foreign policy have on world trade, commerce, and finance. The course will provide the student with a better understanding of how the complexity of international difference affects political, economic, and cultural behaviors. Among the topics for discussion: the content and scope of international politics, the international struggle for power, the role and impact of non-governmental organizations, foreign policy as a tool for promoting international commerce, the role of international law and world public opinion, the rise of regionalism, the political economy of international trade. Note: Undergraduates (even with a Master-s study plan) are not permitted to take this course.

**Mgt 641 Marketing Management**

The study of marketing principles from the conceptual, analytical and managerial points of view. Topics include: strategic

planning, market segmentation, product life cycle, new product development, advertising and selling, pricing, distribution, governmental and other environmental influences as these factors relate to markets and the business structure. Prerequisites: Mgt 600, Mgt 607 or permission of the instructor.

**Mgt 642 Marketing Management in Technical Organizations**

This course focuses on the methodology involved in developing and writing an effective marketing plan. It covers how to obtain the information that is needed and how to write a rigorous marketing plan for a product or service. The course details the steps needed to perform a market opportunity analysis (MOA) and explores how to develop market-based strategies and tactics to capitalize on the identified opportunities.

**Mgt 643 Econometrics**

An introduction to the science of designing statistical models of economic processes. Students will be required to build and estimate a number of models during the term. Topics include: regression theory, statistical difficulties in regression analysis, advanced topics in single-equation regression, models of qualitative choice (e.g., probit, logit) and simultaneous equation estimation. Prerequisites: Mgt 503 or equivalent, Mgt 796 or permission of the instructor.

**Mgt 644 Cyber Security Principles for Managers**

This comprehensive course will cover the key security concepts for managers. In the first phase, security fundamentals will be covered with emphasis on levels of security (network, system software, middleware, applications, business processes), authentication, authorization, access, and integrity. In the second phase, the key security technologies such as cryptograph-

ic algorithms (symmetric and asymmetric encryption), PKI, digital certificates, and corporate security will be discussed. The last phase of this course will discuss the management issues of security policies and security administration and describe how various security technologies and approaches can be applied to cyber security. Topics will include an overview of Internet security, web security, web application security, wireless and mobile web security, and other emerging cyber information issues. Students will conduct security audit of web sites and web-based corporate applications. Prerequisites: Students should have had exposure to network architecture, data architecture, and application architecture prior to taking this course by completing the following: Mgt 772, Mgt 773, and Mgt 776 or their equivalents.

**Mgt 645 Enterprise Architectures for Information Security**

This course focuses on the analysis and management of Information Security Architectures. Information Security Architectures consist of organizational, process, and technology (e.g., data, applications, network, systems) domains. The integration and effective management of such architectures is essential to effectively respond to technical risk dynamics. The course will focus on evaluating the architectural domains and their integration. The course will rely on management research on information security, risk, IT strategic planning, and distributed computing. The student will learn the relationships between business requirements, technical requirements, and technical risk, and make appropriate choices for risk mitigation. The course will provide insights on the continuous management of the information security function in organizations. Prerequisites: Students should have had exposure to network architecture, data

architecture, and application architecture prior to taking this course by completing Mgt 772, Mgt 773, Mgt 776 or their equivalents. In addition, they will have completed another proposed class, Mgt 777 "Cyber-Security Management Principles."

**Mgt 646 Human Resource Processes: Techniques and Applications**

Job analysis is the fundamental building block for virtually all human resources practices. This course first introduces students to the theory, practices and techniques for analyzing and describing the nature of work and individual jobs in organizations. It then focuses on how this information is applied to develop other human resources systems such as selection, job design, training and compensation. A particular emphasis is placed upon the development and implementation of performance appraisal systems. Research and practices regarding various approaches to performance appraisal are discussed, as are the implications of performance appraisal for motivation, development and organizational effectiveness.

**Mgt 647 Legal and Social Environment of Human Resources**

This course reviews the key laws and legal principles impacting human resources practices and employer and employee relationships. Through a review of actual cases, federal and state laws impacting civil rights and equal opportunity, wages and hours, privacy, safety and health, employee benefits and insurance, worker's compensation, and labor relations and arbitration are covered. The constitutional, social and economic implications of human resources law are also discussed. This is a dynamic field of study with changes occurring literally on a weekly basis. Students will be expected to participate actively in classroom discussions and role-play exercises.

**Mgt 650 International Business Management**

This course provides students with an exposure to management in the international economic environment: global industries and regional markets, multinational corporations and international economic organizations. Case studies, business games and presentations illustrate different strategies of firms considering the competitive environment, the national culture, legislation and taxation policy of local governments, and the organizational structure of the firm.

**Mgt 654 Organizational Change and Development**

This course introduces students to the social science techniques and change interventions used to improve organizational effectiveness and enhance the personal development of individuals. Special emphasis is given to the application of systems theory for diagnosing and planning change efforts at the organizational, group and individual levels. Relationships between organization development and broader issues such as strategic planning and environmental contingencies are also stressed. The efficacy of organization development initiatives is also critically considered as are the challenges posed in trying to simultaneously improve an organization's performance while also helping it to be more responsive to the interests and needs of its members. Prerequisites: MGT 680 or permission of instructor

**Mgt 680 Organizational Behavior and Theory**

Organization scientists generally think of organizations as being comprised of three levels of analysis: the individual, the group or department, and the organization itself. Using a systems perspective, this course focuses on the group and interpersonal factors accompanying an organization's operation. Topics covered

include understanding organizations as structured systems, individual differences and performance, group dynamics and performance, learning, motivation, leadership, and principles of communication particularly as they relate to decision-making and conflict management.

#### **Mgt 685 Employee Compensation**

This course examines reward systems in organizations broadly defined to incorporate salary, benefits and incentive pay programs. Topics covered will include: legislative issues affecting pay; job evaluation; wage and salary administration; merit pay and other incentives; types of benefit programs; management and administration of compensation and benefits; and issues related to equity and comparable worth.

#### **Mgt 690 Organization Theory and Design**

Organization scientists generally think of organizations as being comprised of three levels of analysis: the individual, the group or department, and the organization itself. This course focuses on the problems and challenges managers face in dealing with the organization as a whole and the interrelationships between organization groups. Specific issues and problems which are covered include: the relationship of the organization with the external environment; the influence of the organization's strategies, size and production technology on the organization's design; and strategies for managing organizational processes such as conflict, culture and change.

#### **Mgt 701 Management Policy Dynamics**

The students will be divided into small groups and supplied with a simulated history of a firm. It will be the responsibility of each group to structure itself to be able to make decisions about the goals of its company and to make operational deci-

sions aimed at implementing these goals. A computer model simulates the performance of the firm that would result from these decisions. Both quantitative analysis and group decision-making are emphasized. It is recommended that this course be taken in the last term. Prerequisites: Mgt 680, Mgt 690 and Mgt 600 and/or 623, or permission of the instructor.

#### **Mgt 702 Technology Management**

This course introduces the student to topics in the management of technology and examines the critical role of technology as a strategic resource to enable management to achieve organizational objectives. Topics include entrepreneurship, developing and managing new ventures, managing innovation, the technology life cycle and technology forecasting, management of research and development (R&D) personnel and projects, evaluation of R&D projects and integrating technology strategy with the organization's overall business strategy. Prerequisite: Mgt 690 or permission of instructor.

#### **Mgt 707 Emerging Technologies**

This course discusses emerging technologies, how they evolve, how to identify them, and the effect of international, political, social, economic and cultural factors on them. Topics covered in the course include accuracy of past technology forecasts, how to improve them, international perspective on emerging technologies, future customer trends, and forecasting methodologies such as monitoring, expert opinion, trend analysis and scenario construction. Emerging technologies will be examined through student company examples, invited speakers and videos.

#### **Mgt 710 Risk Management: Methods and Applications**

Theoretical and practical aspects of risk assessment and management will be cov-

ered. Major topics include: importance of innovation and technological changes in current competitive environment, risk and uncertainty, decision trees, binomial methods and derivation of Black-Scholes option pricing formula, extension of option methodology to non-financial (real) options, VAR (value at risk), a framework for risk assessment, and several real-world case studies. The course is designed for all students of the School of Technology Management. Prerequisites: TM 605 or CS 505, Ma 500 or TM 500, and Mgt 702 or advisor permission.

**Mgt 714 Technology Strategy+**

This course discusses the technology strategy process and develops skills, methodologies and critical thinking in order to achieve technological competitive advantage. Subjects covered include technology life cycles, type and characteristics of RD&E project portfolio selection, and an overview of successful development strategies. Case studies will be used to build competence and confidence in the concepts.

**Mgt 715 Strategic Business Management+**

This course focuses on the major elements of the strategic management model including mission, external and global environment, company profile, strategic analysis and choice, long and short term objectives; action plans/tactics, policies, restructuring, reengineering, strategic control and continuous process improvement (CPI). Student teams analyze and formulate strategies for companies they select. This course includes concepts and management principles that will be expanded in Mgt 714 (Technology Strategy), Mgt 755 (Process Management in High-Tech Organizations) and Mgt 707 (Emerging Technologies).

**Mgt 720 Global Innovation Management**

This course is focused on the globalization paradigm and its effects on the management of innovation. It is an interdisciplinary course, which analyzes the different managerial areas of strategy, organization, technology and market as integrated with the innovation process in a global context. The underlying theories and models are explored to understand how the innovation process is affected by local, national and global influences; what cultural and organizational drivers are at work; and how to manage commercialization of new products on a life-cycle basis, in a diverse and ever-changing global market. Case studies will be used to support the theoretical constructs and reinforce learning. Prerequisite: Mgt 702.

**Mgt 721 Pharmaceutical Industry Trends and Issues**

The course will provide an overall look at IT in the pharmaceutical industry, its structure, and trends and issues which have driven it, are affecting it now, and are likely to change it in the future. This course will focus on the business forces shaping the pharmaceutical industry. In addition, this course will use management research on the integration of IT with the business. The student will learn how to evaluate important business trends and how IT can be used to support business success. Topics include a pharmaceutical industry overview, regulatory compliance, new drug development, manufacturing and logistics, product marketing, the role of IT in the pharmaceutical industry, company strategies, E-pharma, and 21st century pharmaceutical-market future trends.

**Mgt 722 Pharmaceutical Industry New Drug Development**

This course is designed to provide the student with an in-depth understanding of the pharmaceutical research & development process and the role of Information

Technology (IT) in this process, with the goal of helping the student to be an effective provider of information system development and operations in this arena. The various phases of the process will be described in detail including key regulatory imperatives and the role of project management. The current contributions of IT to each phase will be reviewed; the global perspectives on international harmonization and worldwide submissions will be discussed; the economics of IT in drug R & D will be highlighted; illustrative case studies will be presented; and a view of the future of IT in R & D will be put forth. Topics include organizational models in R & D and IT, a comprehensive view of the main components of the R&D process, current contributions of IT to each of the main components of the R&D process, the global perspective, and the economics of IT in drug development.

**Mgt 723 Pharmaceutical Industry Marketing and Sales**

This course focuses on the organizational, management and technology issues and considerations related to the sales and marketing function of the pharmaceutical industry as one of its principal boundary-spanning functions. This course will use extensive research and current literature on pharmaceutical sales and marketing business approaches and information technologies that drive or support sales and marketing plans as well as information and knowledge management considerations that drive competitive distinctiveness. This course will also explore the real and potential information and knowledge linkages between the sales and marketing function and the discovery, product development and supply chain functions of the pharmaceutical industry. Topics include linkage of the R&D/marketing and sales cost spiral, the industry focus on enhancing marketing and sales effectiveness, the

relationship between information delivery mechanisms and physician prescribing habits, information technology's growth in marketing and sales, pharmaceutical sales and marketing and its relationship to the information value chain, the impact of new trends in discovery on sales and marketing approaches, and the growing role of the healthcare consumer.

**Mgt 724 Pharmaceutical Industry Supply Chain**

This course focuses on the issues surrounding supply chain design, planning and execution for the pharmaceutical and biotech industries from drug discovery to delivery. This course will use research on information systems, optimization, e-business, and decision-support technologies and lessons learned from their effective use in global Supply Chain Management for manufacturing and distribution in the process industries. The student will learn how to evaluate global Supply Chain issues from the perspectives of various stakeholders in relationship to overall organization and societal goals. They will further understand the different mechanisms for collaboration and create a process for establishing and maintaining an effective global SCM solution architecture. Topics include good manufacturing practice and regulations, advanced planning and scheduling, global competition, mergers and acquisitions, innovation, new tools and partnerships, effective global supply chain management, and qualifying for a global supply chain manager position.

**Mgt 725 Financial Services Industry Trends and Issues**

This course concentrates on IT trends and issues in the financial services industry. Due to the diversity of this industry (banking, brokerage, and insurance), along with the assortment of customer characteristics (i.e. retail vs. institutional) we will modularize

the lectures by industry and customer partitions. This segregation will provide for a better understanding of this ever-changing industry. Upon successful completion of this course, students will have a solid understanding of the industry, market dynamics, and how their roles in technology have an immense impact in the industry. This course will cover the structure and functioning of financial services, from the perspective of banking, insurance, capital markets, and brokerage. Topics include industry consolidation and globalization, investment banking, fixed-income markets, the equity markets, the regulatory environment, and financial analysis approaches. Trends in IT and its effect on each of these areas will be discussed.

**Mgt 727 Financial Services Industry Back Office**

This course is designed to provide the student with an in-depth understanding of the back office trade process and the role of information technology (IT) in this process, with the goal of helping the student to be an effective provider of information system development and operations in this arena. The various phases of the trade process will be described, including key regulatory requirements. The current contributions of IT to the process will be reviewed, including straight-through processing, T+1, and foreign exchange trades. Topics include the structure and vocabulary of a trade and trade processing, the Street-Side view of a process flow, global processing, straight-through processing, regulatory and compliance, back-office best practices, improving efficiencies, and real-time processing.

**Mgt 728 Financial Services Industry Marketing and Sales**

This course concentrates on effective selling and marketing IT strategies in the financial services industry. Due to the

diversity of this industry (banking, brokerage, and insurance), along with the multiplicity of customer characteristic (i.e. retail vs. institutional) we will modularize the lectures by industry and customer partitions. This segregation will provide for a better understanding of this ever-changing industry. Upon successful completion of this program, students will identify client constituent's product needs and the ability for financial services companies to deliver this product (service) in a timely, cost-effective fashion. Corporate branding and marketing strategies will be reviewed and challenged by the student. Topics include the "sell-side", the "buy-side", the selling distribution process, e-business selling strategies, marketing strategies and corporate bonding, the role of data warehousing and sales data mining, and partnership with the client.

**Mgt 730 Design and Analysis of Experiments**

This course starts with the design and analysis of one factor analysis of variance. Methods of testing specific questions using planned comparisons are stressed. Models with two or more factors are considered with detailed instruction on the analysis of interactions. Repeated-measures designs are also covered, as well as designs with random as well as fixed factors. Prerequisite: Mgt 796.

**Mgt 733 Applied Regression Analysis**

A substantial portion of the models developed to describe phenomena in both the physical and social sciences utilizes regression analysis from simple linear regression to multiple regression; nonlinear coefficient estimators are derived, their properties discussed and numerous examples are used to demonstrate various aspects of interpretation. Tests of significance are also covered for most of the techniques presented. Prerequisite: Mgt 796.



**Mgt 737 Project Management Office**

A comprehensive, all-inclusive description of the Project Management Office (PMO), highlighting features most appropriate and relevant to specific project situations. Motivations for adopting a PMO, such as project performance, project manager competency or the organizational desire to excel. Short-term and long-term functions are identified and discussed. Project evaluation models and PMO implementation guidelines are presented and discussed in detail. Co- or Prerequisites: Mgt 550 and Mgt 611.

**Mgt 738 Advanced Project Management**

This course deals with advanced problems in project management that were not addressed in previous courses. It also expands on several previously mentioned topics. The course addresses the critical points in project management for the experienced project manager and looks at projects in their broad sense, as seen by top management and from an organizational global perspective. Co- or Prerequisites: Mgt 550 and Mgt 610.

**Mgt 740 Managing Multifunctional Teams+**

This course focuses on understanding the interplay of group, inter-group and organizational factors on the performance of multifunctional teams in technology-based organizations. The course integrates theory and research on multifunctional teams with the skills necessary for effectively managing them. Topics covered include managing decision-making and conflict in multifunctional teams, managing the team's boundary and inter-group relations, organizational designs that support working cross-functionally, and measuring and rewarding team performance. Cases are used to illustrate the problems of working cross-functionally. Individuals

are given feedback on their team management skills.

**Mgt 741 Innovation Management Process+**

This course focuses on how to take a product or service from concept to market quickly and successfully. It covers the conventional stage-gate process and explores when it works and when it does not, and offers alternative innovation strategies that are appropriate for different innovation environments including break-through new products and services. The main emphasis of this course is on developing and commercializing technically-sophisticated products and services.

**Mgt 742 Practicum – Multifunctional Teams+**

Students will participate in individual and team assessments to understand their strengths and weaknesses in this area. Assessments will be reviewed with students and an individual student profile will be established on the web. (0.5 credit)

**Mgt 743 Practicum – Teaming+**

Students participate in several assessments and practicum activities designed to enhance their skills as team members and team leaders. The acquisition of team skills is monitored through an on-going process of assessment, feedback, and goal setting. (0.5 credit)

**Mgt 744 Analytic Methods of Forecasting**

Emphasis is on the practical aspects of the Box-Jenkins methodology for fitting and forecasting linear stochastic models of industrial time series; model identification, model estimation, model diagnostic checking and model forecasting of seasonal and nonseasonal series; contrasts with exponential smoothing; laboratory analysis of selected time series. Prerequisite: Mgt 796.

**Mgt 745 Practicum – Accounting+**

Students will use a business simulation to demonstrate working knowledge of accounting topics that focus on material in Mgt 624. Students are part of decision-making teams that compete against other teams in class. A complete student assessment package will be completed. (0.6 credit)

**Mgt 746 Practicum – Marketing+**

Students will use a business simulation to demonstrate working knowledge of marketing topics that focus on the material in Mgt 642. Students are part of decision-making teams that compete against others in the class. (0.5 credit)

**Mgt 747 Practicum – Process Management+**

Students participate in a business simulation to demonstrate working knowledge of technology management topics that relate to the material in Mgt 755. Students are part of decision-making teams that compete against other teams in the class. (0.5 credit)

**Mgt 748 Practicum – Strategic Management+**

Student teams form companies as part of a business simulation and compete against the other teams in the class. Student teams formulate and present a five-year strategic plan for their company using the knowledge gained in Mgt 715. (1 credit)

**Mgt 749 Practicum – Technology Strategy+**

Students participate in business simulations to demonstrate working knowledge of technology and strategy topics that relate to material in Mgt 714. (0.5 credit)

**Mgt 750 Total Quality Management**

Principles and techniques of total quality management (TQM) with emphasis on their application to technical organiza-

tions. Topics include management philosophy, concepts and critique of quality "Gurus," TQM model and strategy; TQM tools and techniques; Dept. of Defense 5000.51-G TQM guides; review and critique of the Deming and Baldrige Awards; concurrent engineering; quality function, deployment and design for cost. Students will form teams to analyze a case study involving TQM concepts and techniques.

**Mgt 751 Project Management and Leadership+**

This course provides a theoretical and practical perspective on modern project management and leadership in technology-based organizations and forms the conceptual basis to develop "a project leader mindset." The course will focus on strategic project success, as well as project cultures, project organization and project processes as they are employed in different project types and for different levels of project uncertainty, complexity and pace. The leadership part of the course is based on the premise that people are the real engine behind project results, and they must be lead and motivated in a very unique way. Different leadership styles will be discussed, together with motivation and career issues in different project and organizational settings.

**Mgt 752 Corporate Venturing+**

This course focuses on corporate venturing and entrepreneurship. Business and financial issues associated with starting and buying an entrepreneurial, high-technology business are addressed. Subjects covered include a discussion of previous corporate ventures, critical success factors and an international perspective on corporate venturing. Lessons learned from new technology start-ups will be discussed along with an evaluation of the decision processes used by venture capitalists. The final project is the develop-

ment of a venture plan for the student's company. Over half of the business plans receive funding. Start-up funding on previous projects has ranged from \$50,000 to \$1,000,000,000.

**Mgt 754 Practicum – Corporate Venturing**

This practicum teaches the lead user methodology for identifying unarticulated (i.e., unstated customer needs) needs to develop new breakthrough products and services. (0.7 credit)

**Mgt 755 Process Management in High-Tech Organizations +**

The basic concepts and principles of how process management applies to technical and business functions will be covered. Total Quality Management (TQM) and Concurrent Engineering will be explored in detail. The Baldrige and Deming Awards will be compared to illustrate the various process management concepts. Selected TQM topics will be discussed to illustrate the concepts of TQM, CPI and CCE.

**Mgt 756 Practicum – Technology and Quality Management+**

Interaction with faculty to apply research methods and case-study techniques to topics initiated in Mgt 750 or Mgt 702. Students are encouraged to work in teams to develop case studies that demonstrate techniques and solutions to problems in the management of technology and total quality management areas. With permission of the instructor. Prerequisite: Mgt 750 or Mgt 702.

**Mgt 757 Practicum – Effective Communication for Managers+**

In this workshop lab, students will learn several skills to help them present and write more effectively. Specific topics include components of effective writing, ten steps for effective presentations, using advanced computer technologies in oral

presentations, and portraying the correct image. (0.7 credit)

**Mgt 758 Practicum – Oral and Written Communication Competency+**

Students will be graded on several team and individual oral presentations and written reports which demonstrate their competency in both oral and written communications. Each student will have an oral/written report card. (0.6 credit)

**Mgt 759 Practicum – Project Management and Leadership+**

Students will participate in individual and team projects that demonstrate leadership qualities that were discussed in the Project Management Leadership course (Mgt 751.) A synopsis of the leadership qualities will result from the team projects. (0.6 credit)

**Mgt 760 Operations Management**

Covers the general area of management of operations, both manufacturing and non-manufacturing. The focus of the course is on productivity and total quality management. Topics include quality control and quality management, systems of inventory control, work and materials scheduling and process management. Cross-listed with ME 560.

**Mgt 762 Capital Markets**

This course is designed to familiarize the student with the current workings of the capital markets. This course describes fundamental analytical techniques and state of the art financial instruments. It begins with the time value of money and progresses to bond mathematics, portfolio management, and derivatives. The role of information technology is emphasized in both the development and delivery of financial instruments. Students will learn to structure IT applications to meet the needs of a trader or broker. Topics include the time value of money, bond math, the yield curve, analytical tools, trading and investment strategies, money market instruments and

repurchase agreements, corporate bonds, macro-economic dynamics, derivatives, securitization, equities, and the role of IT in capital markets.

**Mgt 766 Marketing Online**

Developing products requires an understanding of content development, knowledge of industry trends, and the ability to develop deals that bring your product to market. This course examines consumer demand, consumer behavior, industry projections, delivery platforms, distribution channels, market research, and the product development process (from concept to consumer support). Both general marketing practices and those particular to the online environment are addressed. Students are required to work in teams and create a marketing plan. There are no prerequisites.

**Mgt 767 Legal Issues for the IT Professional**

The course is a study of every major area of law that has an impact on the IT professional. The focus is on issues pertaining to electronic commerce and other technology-intensive business practices. The course discusses basic commercial law, jurisdictional issues and the contracting environment for online activity, including UCITA, intellectual property law, domain names, the protection of databases, privacy and publicity rights, and government regulation, including content-based restrictions, criminal law and the prospective taxation of e-commerce. The goal of the course is to provide basic background in these issues for non-lawyers, and to promote sensitivity to the technological and business scenarios in which legal issues arise, enabling better management of their technological resources and commercial opportunities. Prerequisite: Mgt 771.

**Mgt 768 Entrepreneurship in IT**

In this course students will evaluate and

create their own prospective business strategies. They will develop an understanding of entrepreneurship and innovation in starting and growing a business venture. Students will be given an opportunity to actually start their own business or create a business in their company by learning how to take advantage of the new order of business opportunities of the information age. This course's main objective is to show students how to identify these opportunities, be able to formulate and evaluate both qualitatively and quantitatively whether the opportunity is worth pursuing, and, of course, how it may be pursued. Actual case studies and experiences will be intertwined with the course content. There are no prerequisites.

**Mgt 771 Management Information Systems**

Management's needs for information have greatly increased in importance, quantity and variety. This course studies the use of computerized information systems to satisfy those needs. Subjects include the types of information systems, the use of the computer to develop reports and information in support of the key decision-making responsibilities of management, computer technology from a manager's viewpoint, prioritization of information system needs, and systems development methodology. The student will analyze an organization's information needs and prepare an information systems plan.

**Mgt 772 Analysis and Development of Information Systems**

This course presents and analyzes various approaches to information analysis and development of organizational information systems within a system development life cycle (SDLC), e.g. the waterfall, concentric and prototyping approaches. Topics include strategic planning for

SDLC, front-end and back-end phases of SDLC, project management, CASE methodologies, and balancing user, organizational and technical considerations. Prerequisite: Mgt 501 or equivalent.

**Mgt 773 Data Management**

This course deals with strategic uses of data, data structures, file organizations, and hardware as determinants of planning for and implementing an enterprise-wide data management scheme. Major course topics include data as a valuable enterprise resource, inherent characteristics of data, modeling the data requirements of an enterprise, data repositories, and system development lifecycles. Prerequisite: Mgt 771 or equivalent.

**Mgt 776 Managing Information Networks**

This course introduces the technical as well as managerial aspects of distributed information systems. The emphasis is on synthesizing the underlying technologies (networks, databases and applications) with management approaches (planning, staffing and organizing). Topics include: opportunities and challenges of distributed information systems, review of network technologies (LANs, WANs, MANs, high speed networks), network architectures, client/server computing, distributed databases, distributed applications, open systems standards and the management of distributed information systems. Case studies are introduced to illustrate different challenges and approaches to solutions.

**Mgt 780 Strategic Management of Information Technology**

The objective of this course is to address the important question, "How to improve the alignment of business and information technology strategies?" The course is designed for advanced graduate students. It provides the student with the most cur-

rent approaches to deriving business and information technology strategies, while ensuring harmony among the organizations. Topics include business strategy, business infrastructure, IT strategy, strategic alignment, methods/metrics for building strategies and achieving alignment. This course should be taken after Mgt 781. Cross-listed with NIS 632.

**Mgt 781 Management of Information Technology Organizations**

The objective of this course is to investigate and understand the organizational infrastructure and governance considerations for Information Technology (IT.) It concentrates on developing the students' competency in current/emerging issues in creating and coordinating the key activities necessary to manage the day-to-day IT functions of a company. Topics include: IT's key business processes, IT governance, organizational structure, value of IT, role of CIO, outsourcing, systems integration, managing emerging technologies and change, and human resource considerations. This course should be taken towards the end of the Information Systems degree program. Cross-listed with NIS 631.

**Mgt 783 Enterprise Systems Management**

This course focuses on the role of Information Technology (IT) in reengineering and enhancing key business processes. The implications for organizational structures and processes, as the result of increased opportunities to deploy information and streamline business systems are covered. Cross-listed with NIS 630.

**Mgt 784 Integrating IS Technologies**

This course focuses on the issues surrounding the design of an overall information technology architecture. The traditional approach in organizations is to

segment the problem into four areas - network, hardware, data and applications. Instead, this course concentrates on interdependencies among these architectures. In addition, this course will utilize management research on organizational integration and coordination. The student will learn how to design in the large, make appropriate choices about architecture in relationship to overall organization goals, understand the different mechanisms for coordination available, and create a process for establishing and maintaining an on-going enterprise architecture. Prerequisites: Mgt 772, Mgt 773 and Mgt 776 or their equivalents. Cross-listed with NIS 633.

#### **Mgt 794 Decision Analysis for Corporate Networks**

This course is designed to integrate the student's knowledge of accounting, engineering economics and multi-attribute decision-making techniques for evaluating and selecting complex systems, such as telecommunications networks for corporate communications. A review of accounting, financial and engineering economic concepts will be followed by the study of utility analysis and simple and multi-attribute decision analysis. Case studies involving telecommunications facilities will be used and issues of equipment acquisition, financing, accounting, cost estimation and system performance will be discussed. Prerequisites: Mgt 600, Mgt 618.

#### **Mgt 795 Management Models**

This course covers mathematical and computer-based models which assist managers in decision-making, including resource allocation, transportation, inventory management, congestion phenomena, service processes, and shortest routes and maximum flow of goods. Emphasis is on model formulation from real-world situations, development of alternative solutions

using computer models, and post-optimality analysis.

#### **Mgt 796 Statistical Models**

The major portion of the course covers an introduction to the probabilistic and statistical concepts and models used in day-to-day business decision-making. Topics include data analysis, correlational techniques, regression, statistical inference and forecasting.

#### **Mgt 798 Integration and Application of Technology Management+**

This is the capstone course for the program. It is designed to integrate the knowledge developed in the other courses via a business simulation in which teams of students compete in running their companies in a complex simulated environment. The course includes lectures and workshops that demonstrate theory and techniques of cross-functional decision-making in the management of technology. Individuals and teams will be observed and assessment feedback will be given. (5.0 credits)

+ Open only to students in the Master of Technology Management program.

#### **Mgt 800 Special Problems in Management\***

With permission of the instructor. Limit of six credits for the degree of Master of Science.

#### **Mgt 801 Special Problems in Management\***

With permission of the instructor. Limit of six credits for the degree of Doctor of Philosophy.

#### **Mgt 802 Project Management Examination\***

This will test the project management knowledge of students who have completed approved training programs in

project management. Upon successful completion (graded pass/fail), students will be awarded 12 credits toward the Master of Science in Management with a Project Management concentration. The credits cannot be used toward the Project Management Graduate Certificate of Special Study and are not transferrable to other institutions.

**Mgt 803 Project Management Examination**

This will test the project management knowledge of students from AT&T, Lucent Technologies and Verizon who have completed company-sponsored project management courses. Upon successful completion, (graded pass/fail) students will be awarded three credits towards a Master of Science degree. The examination is normally given twice each year.

**Mgt 900 Thesis in Management\***

For the degree of Master of Science. Six to 12 credits with departmental approval.

**Doctoral Seminars**

**Mgt 704-705 Research Seminar: Information Management and Organizational Structure and Behavior I, II**

Primarily for doctoral candidates. Will concentrate on the features that information and computer-based communication systems need to support the goals and responsibilities of various components of the organization, as well as the effect that the introduction and use of information and computer-based communications systems have on the organization's performance. Will include measures of effectiveness, organization characteristics, job enrichment and distribution of responsibility for information systems and computer-supported group work. Prerequisite: permission of the instructor.

**Mgt 716, Mgt 726, Mgt 736 Seminars: Advanced Topics in Information Management, Technology Management and Telecommunications Management**

Specialized topics at the leading edges of research and theory in information management/technology management will be intensively explored. Each research seminar will focus on a different set of topics.

**Mgt 778 Principles of Information Management I**

This course is open only to doctoral students in information management with the permission of the instructor. Students should normally have completed all M.S.-level core courses before they enroll. This course will cover vital topics in information management that will help the student prepare to perform original research in some significant aspect of information management. The course will stress both the technical and organizational aspects of the information resource and, in particular, how these aspects interrelate. Students will be expected to do a wide range of readings, participate in seminar presentations given by Stevens and outside professional speakers, as well as prepare and present their own research projects.

**Mgt 779 Principles of Information Management II**

This course is open only to doctoral students in information management with the permission of the instructor. It is generally recommended for students who have completed Principles of Information Management I. Students should normally have completed all M.S.-level core courses before they enroll. The course will stress both the technical and organizational aspects of the information resource and, in particular, how these aspects interrelate. Students will be expected to

do a wide range of readings, participate in seminar presentations given by Stevens and outside professional speakers, as well as prepare and present their own research projects.

**Mgt 790 Innovation Management and Technogenesis**

This course will survey current research and theory in seven different areas related to the management of innovation. These areas include: Creativity, the Front-end of Innovation, Innovation Management, Leadership and Teamwork, Project Management, the Economics of Innovation, and CSCW and Groupware: Brainstorming and Creativity. Students will read leading-edge papers in each area and lead discussions with a faculty member who is expert in each area facilitating the discussion. Each student will write a research proposal on one of the topics covered in the course.

**Mgt 960 Research in Management\***

Original research leading to a doctoral dissertation. Hours and credits to be arranged.

**TG 501 Entrepreneurship for Business and Engineers and Scientists**

This course exposes students to entrepreneurship in the broader sense and will relate to venturing in both large and small business organizations. It will address the crucial aspect of Technogenesis - nurturing new technologies from concept to realization.

\*by request

**Telecommunications Management Courses**

**TM 500 Calculus for Telecommunications Managers**

The goal of this course is to provide stu-

dents with the background in calculus necessary for the telecommunications curriculum. Topics covered include review of algebra, plane coordinates and functions, differentiation, series, geometric series and exponential series, elements of counting, illustrations of the material on discrete distributions, z-transform, integration of simple functions, integrals over the entire line and basic probability densities. This course may not be taken for credit towards a degree at Stevens.

**TM 550 Introduction to Telecommunications Concepts**

This course sets the foundation for courses that are to follow covering concepts and major technologies of the telecommunications industry. Telecommunications regulations, end-to-end service and historical events are stressed. This course is open to Telecommunications majors only and is intended for students with a minimal telecommunications background. This course may not be taken for credit toward a degree at Stevens. Variable credits 0-3.

**TM 601 Principles of Applied Telecommunications Technology**

This course covers required technical concepts of applied telecommunications and an overview of the industry as a regulated and competitive environment. The main issues of telecommunications systems and network transmission, signaling and switching are covered. Attention is given to the following topics: analog and digital communications; telephony; data communications; signal types; modulation; multiplexing; network design concepts; and relevant standards. These topics are presented with attention to the functional interrelationship of the various sectors of the industry, business and government regulatory bodies, all of which are affected by this technology.



**TM 605 Probability for Telecommunications Managers**

This course provides a background in probability and stochastic processes necessary for the analysis of telecommunications systems. Topics include: axioms of probability, combinatorial methods, discrete and continuous random variables, expectation, Poisson processes, birth-death processes and Markov processes. (Counts as credit only for the NIS program). Cross-listed with NIS 605.

**TM 610 Business Information Networks**

Concentrated study of data and computer communications, information network architectures and standards. Topics include: information characteristics and requirements for voice, video, image and data; protocol definitions and performance analyses for distributed networks; network topologies; local area networks (LAN) functional characteristics, performance and analysis studies for Ethernet and token ring as primary technologies; inter-networking; metropolitan area networks (MAN) including FDDI, DQDB; and wide area networking (WAN) technologies including frame relay and asynchronous transfer mode (ATM). Prerequisites: TM 601, TM 605.

**TM 611 Emerging Technologies**

This course covers a wide range of emerging state-of-the-art transmission and switching technologies, evolving communication protocols, and their applications. This course is a super-loaded look at the key technologies that are about to enter the mainstream. The course studies technologies that impact both the service provider industry as well as corporate enterprise IT environment. Topics included in this course are: VoIP protocols (H.323, SIP, SGCP, MGCP, IPDC, etc.) and soft witches; Multiprotocol Label

Switching (MPLS) and their applications such as VPN and Traffic Engineering; Wavelength Division Multiplexing (WDM) and optical switching; Gigabit/10 Gigabit Ethernet and Storage Area Networks (SAN); Wireless LANs (IEEE 802.11a/b/g, 802.15, 802.16, etc.); management and performance modeling tools. Prerequisites: TM 601, TM 610.

**TM 612 Regulation and Policy in the Telecommunications Industry**

Historical perspective of telecommunications as a regulated industry, effects of regulation on industry growth in pre- and post-divestiture environments; special case of divestiture of AT&T; government regulatory agencies and processes; management issues related to business between regulated and non-regulated corporations; tariff structures, rules and rate making in the regulated environment. Issues of privatization and deregulation in international telecommunications and their effects on global companies are also studied.

**TM 613 Knowledge Discovery and Data Mining for Telecommunications Managers**

This course covers topics in intelligent extraction of data and information from data stores and data warehouses. The course complements several theoretical techniques such as neural networks, data-driven decision, rule-based systems, machine learning and decision trees with case studies from several telecommunications companies such as Bell Atlantic, US West, etc. Prerequisite: TM 605.

**TM 614 Principles of Traffic Engineering and Performance Analysis**

Introduction to the principles of traffic engineering and performance analysis

which play a crucial role in the design, provisioning, measurement, management and control of modern telecommunications systems. Topics include models for traffic arrival and service processes, superposition and decomposition, traffic burstiness, grade of service (GOS), quality of service (QOS) issues, efficiency, trunk reservation priority, peakedness, interactive systems, throughput/delay tradeoffs, bottleneck analysis, overload performance and control, and buffer management principles. Open, closed and mixed queuing network flow control models are studied as well as throughput and delay analysis for controlled and random access LAN. Prerequisites: TM 601, TM 605.

#### **TM 615 Wireless Communications and Mobile Computing**

This course provides a broad overview of the important field of wireless and personal communications. Topics to be examined include the mobile wireless standards of AMPS, North American TDMA (IS-138), GSM and CDMA (IS-95). Security and privacy, network management and interworking in wireless systems (IS-41) will also be examined. An overview of RF propagation factors and selected cellular design approaches is presented. Wireless data are introduced by examining cellular digital packet data. Selected goals and challenges of the field of mobile computing are examined along with the resulting network architectures and applications. Prerequisites: TM 601, TM 610.

#### **TM 616 Global Wireless Industry**

This course is focused on the global wireless industry and mobile wireless systems. The course will analyze the various complexities facing management when deploying or operating a wireless mobility system. The four main areas of the management of mobile wireless systems that will be cov-

ered in the course are the global wireless mobility market, regulatory requirements, management challenges, and decision methods. The course will utilize a combination of traditional instructor-led material in addition to homework assignments that will be geared toward reinforcing the lecture material. A team-based class project will also be assigned. Specific topics covered include the global wireless industry (service providers, handset and infrastructure vendors, and standards and trade organizations), international regulation, wireless operators' organization and metrics, and the initial planning, deployment decisions, forecasting, and budget considerations in wireless system deployment.

#### **TM 617 Next Generation Wireless Systems**

This course provides a broad perspective on the services, applications, requirements, architecture, standards, and impact of emerging wireless networks. The new wireless services and applications, which are driving the development and deployment of new wireless networks, are defined and differentiated. The tradeoffs between customer requirements and network performance are analyzed. The fundamentals of next generation network interfaces and resource management and the impact of multiple international standards are explored. The architecture and operational scenarios of the two major third generation standards (UMTS and cdma2000) are examined and differentiated. UMTS and cdma2000 are compared from multiple perspectives including network evolution, services and applications, global markets, and financial perspectives. Specific topics examined include services, applications, and QoS in next generation wireless networks along with the architecture and operational scenarios of global standards (UMTS and cdma2000) in next generation wireless networks. Prerequisite: TM615

**TM 618 Performance of Emerging Mobile Wireless Networks**

This course develops a fundamental understanding of the performance, management and life-cycle analysis of emerging mobile wireless networks. The major components of a mobile wireless network; the Radio Access Network (RAN) and the core Back-Bone Network (BBN), are described in terms of their major functional elements. The impact of these functional elements upon the ability of the system to achieve established performance metrics is examined. This course will also examine the trade-offs in system performance and management that each of the elements has on system complexity, planning, and ability to meet the required performance objectives. Life-cycle analysis and in particular, the migration of mobile wireless systems to third generation networks is discussed with emphasis on the impact of migration on system architecture and cost. The topics of system performance, management and life cycle analysis are crucial to wireless managers and professionals in the planning and migration of mobile wireless networks. The course includes a team project where the students will apply the knowledge covered by the course to a practical case study. Prerequisites: TM 605, TM 610, TM 615

**TM 619 E-Commerce Technologies**

The course provides an understanding of electronic commerce and related architectures, protocols and technologies. It describes the e-commerce concept, objectives and market drivers, as well as requirements and underpinning techniques and technologies, including the Internet, WWW, multimedia, intelligent agents, client-server and data mining. Security in e-commerce is addressed, including types of security attacks, security mechanisms, Virtual Private Networks (VPNs), firewalls, Intranets and extranets. Implementation issues in e-commerce,

including the design and management of its infrastructure and applications (ERP, CRM, SCM), are discussed. M-commerce is addressed; electronic payment systems with their associated protocols are described, and various B2C and B2B applications are presented. Also, policy and regulatory issues in e-commerce are discussed. Cross-listed with CS 619, CpE 619 and NIS 619. Prerequisite: CS 666, CpE 678, TM 610 or Mgt 776.

**TM 621 Telecommunications Signaling and Switching**

This course covers the technologies of switching systems for circuit, packet, and broadband-switched networks. The focus of this course is switching systems instead of transmission systems. Topics include: telephony switching, switching fabric architectures and analysis of their complexity, optical and photonic switching, Asynchronous Transfer mode (ATM) for broadband networks. The various layers of ATM are investigated with switching fabric and architecture alternatives. Included in this course is the study of high-speed packet networks based on Label Switching (MPLS) and their applications (e.g., VPN, Traffic Engineering). Other related topics include IP telephony and its standards such as H.323, SIP, SGCP. This course also covers circuit-switched network signaling used in user-to-network and network-to-network call control. Major topics include Common Channel Signaling Systems 7 (CCS7), Signaling Transfer Point (STP), ISDN User Part (ISUP), Transaction Capabilities Part (TCAP), and routing techniques. The course will cover Inter-working of SS7 and IP Session Initiated Protocol (SIP), H.323 signaling protocol series. Included in the course are discussions on existing products in the industry such as Lucent Technologies' 5ESS, Ericsson's AXE10, Juniper's M160, Tellium's Aurora System.

### **TM 624 Network Management**

This course presents technical management issues of network control and operations. This subject is approached with the introduction of organization issues and requirements for network systems groups within corporations, and then principally concentrates on the current technical issues of network management standards such as SNMP and SNMPv2. The course requires students to engage in the detailed study of the evolving standards of Management Information Bases (MIB) in the industry and the messaging protocols required to implement Network Management Systems (NMS). Semester projects include the group development of computer-based simulated network management systems to apply the knowledge gained in the course and detailed competitive analysis of current systems implemented in industry. Topics include network management concepts, administrative and operational management, performance management, fault management, configuration management, security management and accounting management (RMON). Prerequisites: TM 601, TM 605, TM 610.

### **TM 670 Decision Analysis for Corporate Network Systems**

This course surveys sector implementation of corporate telecommunication networks and the business issues involved in their selection. Issues of equipment acquisition, financing and accounting will be studied in depth. Additionally, the equipment/system selection process will use the techniques of probabilistic outcomes, simulation, sensitivity analysis and multi-attribute analysis to better define the risks and opportunities of these investments. Also studied are telecommunications systems' effects on the balance sheet of the corporation as financial assets or liabilities: strategic assets, active

revenue-producing tools or passive service provision in the corporation's realization of a business plan. Prerequisites: TM 601, TM 610, Mgt 600, Mgt 618. Mgt 794 is equivalent to TM 670.

### **TM 684 Wireless Systems Security**

Wireless systems and their unique vulnerabilities to attack; system security issues in the context of wireless systems, including satellite, terrestrial microwave, military tactical communications, public safety, cellular and wireless LAN networks; security topics: confidentiality/privacy, integrity, availability, and control of fraudulent usage of networks. Issues addressed include jamming, interception and means to avoid them. Case studies and student projects are an important component of the course. Cross-listed with EE 584 and NIS 584.

### **TM 694 E-business Security and Information Assurance**

Information assurance and security are recognized as very important areas in electronic business transactions and financial systems, from the managers', users' and providers' viewpoints. This course addresses the security of e-business and cyber environments from an end-to-end perspective, including data center security and access security. The information security phases of inspection, protection, detection, reaction and reflection are emphasized. Topics also include: application, server and database security, virtual local area networks (VLANs), secure access techniques and secure electronic payment systems. The course also reviews financial Electronic Data Interchange (EDI) and smart card security in banking applications. The course includes a project and some lab experiments related to SSL, SET, EDI, server and application security. Cross-listed with CS 694. Prerequisite: CS 666 or TM 610 or equivalent.

**TM 765 Selected Topics in Telecommunications Management**

A participating seminar on topics of current interest and importance in the field of applied telecommunications technology and networking.

**TM 800 Special Problems in Telecommunications Management\***

An investigation of a current research topic under the direction of a faculty member. A written report is required which should have the substance of a publishable article. Earned credits range from one to five credits to be applied to the MS in Telecommunications Management degree.

**TM 801 Special Problems in Telecommunications Management\***

With permission of the instructor. Limit of six credits for the degree of Doctor of Philosophy.

**TM 900 Thesis in Telecommunications Management\***

For the degree of Master of Science. Six to 12 credits with departmental approval.

\*by request

**Science Education Courses**  
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**Mgt 627 Mathematical Tools for Data Analysis**

This course will endeavor to equip the student with tools to visually analyze data and to elicit questions suggested by the data. Modern technology provides tools for graphical display and simulation heretofore unavailable. This course of study introduces the student to such technological innovations and will include such topics as stemleaf plots, histograms, hanging rootograms, hanging chi-grams, box plots, contingency tables and related

chi-square tests, typical values, measures of spread, regression models, Q-Q plots, and nonparametric tests such as the sign test, the Wilcoxon signed rank test, Mann-Whitney tests and Kendall's tau. The emphasis will be on exploratory data analysis in contrast to confirmatory analyses, and will utilize real data extracted from the web and elsewhere. Offered online only.

**Mgt 651 Internet Applications for Use in Science Education**

This course is designed to enable students at course end to navigate the web effectively, to explore Ask-an-Expert Sites to, develop and assess collaborative projects and to utilize subject guides and search engines. Students will be taught how to introduce web site materials into traditional courses, how to locate resources for social sciences or language arts, how to create a web site and how to use FTP. Students will make final presentations. Students will acquire the range of requisite skills to enable and foster the seamless introduction of Internet materials into science or mathematics courses. Emphasis will be on the acquisition of real-time data from the Internet. Offered online only.

**Mgt 785 Introduction to the Development of Computer-Based Instructional Systems**

This course includes the study of the various types of computer-based instructional (CBI) approaches: tutorials, drills, simulations, instructional games and tests; the process of producing such materials: preparation, design, storyboarding, programming and evaluation. It offers instruction in the use of authoring systems with which CBT materials may be readily produced. Assignments include the critique of an existing CBI program and the creation of a short tutorial. Offered online only.