MASTER OF SCIENCE

INFORMATION TECHNOLOGY

For more information contact:

Rochester Institute of Technology
Department of Information Sciences & Technologies
152 Lomb Memorial Drive
GOL-2100
Rochester, NY 14623-5603
(585) 475-2700
(585) 475-6584 (fax)

Table of Contents

Rochester Institute of Technology

Master of Science in Information Technology

Department of Information Sciences & Technologies

Introduction

A quick glance at the headlines of any major newspaper or magazine gives a picture of the evolving nature and the degree of interest in the capabilities of information technology. Early in the history of the Internet, *Time* magazine featured a cover story on potential of the "Information Highway;" now the Web is a fundamental part of our culture and daily lives. The promised productivity improvements from information technology have been realized and continue to evolve in scope, flexibility and creativity through global communications systems.

In today's world, computing technology is a mixture of computers and other multi-purpose computing devices, information media, and communication technologies. However, to be successfully deployed and utilized, these technologies must be filtered through an understanding of how humans want and need to use these systems. As the name connotes, the *academic discipline* of information technology[1] (IT) is an multifaceted study of computing hardware and software technologies, creative mediating tools, data repository strategies, communication technologies, and human performance theory and practices. This interdisciplinary mix is the foundation of the Master of Science in Information Technology degree at RIT.

Today we need a different type of computing professional. In an interview early in the evolution of the IT discipline, the Director of the Technology Services Group at the Center for Professional Education, a corporate training organization, stated that organizations are looking for individuals with knowledge and abilities in information technology beyond the computing theory provided by older computing disciplines. Both cost savings and performance enhancements are likely to occur when information technology is applied in a systematic manner to improve organizational information flow, employee knowledge and capabilities, and business processes.[2]

At the end of the last century, process re-engineering was a buzzword in the business community that referred to the overall organizational changes that must occur if businesses were to take full competitive advantage of new information technologies.[3] For decades, businesses used computers and other technological advances to speed up their existing methods of operation, without fundamentally altering the way that they did business. Now, to be competitive, businesses must be prepared to restructure their operations to quickly and effectively integrate new computing technologies as they arise.

Today as new information pathways emerge; evolve and standardize; and age-out at an ever increasing rate, there is critical need for content developers and communication specialists who can maximize the opportunities and effectiveness afforded by new communication media. As the possibilities of ubiquitous computing have become daily reality, the focus on computing hardware as an end in itself has declined, and attention has shifting to the interactive communication capabilities afforded by computing. Thus an understanding of human capabilities, interaction styles, and abilities are key factors in making new computing systems

[1] http://www.acm.org//education/curricula/IT2008%20Curriculum.pdf

[2] Jeff Howell, personal conversation, June 1994.

[3] Hammer, M. J. & Champy, J., *Re-Engineering the Corporation*, Harper Business, NY, 1993.

successful. This demands not only technical expertise, but organizational and social knowledge as well.

Program Purpose and Goals

Purpose: The Web has permanently changed how we solve problems today. In the past technology education was available in narrowly focused programs that address the development of a particular technology in isolation from other technologies. While new technology solutions are needed, there is a much larger need -- the successful deployment of integrated technologies. Today we rely on the integrated power of software, multimedia, databases, and networks to supply the information needed to stay competitive.

The focus of the academic discipline of information technology is to understand the fundamental problems facing business, industry, and education *from the perspectives of users* and to wisely apply available technologies to meet their needs. To develop effective solutions, computing professionals are needed who can see and understand the "larger picture" – the needs of the enterprise as encompassed in the needs of the individual end users.

Goals: The MS program in Information Technology (MS/IT) offered by the department of Information Sciences & Technologies (IST) at RIT is designed to provide a highly flexible framework that allows each student to develop an individualized program of study that suits his or her own goals within the academic discipline of information technology. Starting with a background in fundamental information technology concepts, students have an opportunity to learn about the current themes and directions of information technology in the MS/IT core. Students can then select coursework from concentration areas across the diverse sub-disciplines of the field.

Coursework is available in website and interactive multimedia development; database design, implementation, and management; human-computer interaction and interface architecture; application development and software project management; geographic information science and technology; networking, system administration, and computer security; learning and performance technology; along with related topics from other departments at RIT. No other academic program has attempted such a marriage between these technical and non-technical fields.

Admissions Requirements

Applicants must have a four-year baccalaureate or equivalent degree from a regionally accredited institution with a minimum cumulative grade point average (GPA) of 3.0 out of 4.0 ('B' average). Graduate level work in other disciplines will be considered. Applicants requesting consideration whose undergraduate GPA was less than 3.0 may be required to take the Graduate Record Exam (GRE) exam.[4] Other factors may be considered in the admission process such as strong employment history, especially in a computing or computing related field.

International applicants must have prior academic performance equivalent to a 3.0 grade-point average or a first class diploma from an accredited four-year program. The GRE (standard examination) is required for all foreign applicants. International applicants must submit official transcripts for undergraduate (and any graduate) study in original form. If not originally in English, an official, certified copy of transcripts translated into English must also be included.

[4] RIT's reporting number for ETS's GRE and TOEFL examinations is 2760.

Applicants whose native language is other than English must submit a TOEFL[4] score to demonstrate strong English language skills. A minimum score of at least 570 (paper based), 230 (computer based), or 88 (internet-based) is required. Other evidence of language proficiency, such as writing samples and GRE scores, may also be evaluated to assess functional English ability. For other methods to satisfy this English requirement, contact the Office of Graduate Enrollment Services at (585) 475-2229 or email gradinfo@rit.edu. Applicants who need English language preparation may be admitted conditionally, and will take a prescribed program in English along with a reduced program course load.

Entering students are expected to have background in core information technology concepts. These competencies may be demonstrated by formal academic study as well as by comparable work experience and relevant technical certifications. Specific details are discussed in the "Prerequisites" section later in this document.

All applicants are required to submit the following:

- An electronic or paper application with a well-written statement of purpose that discusses your background, the MS/IT areas in which you would like to study, and your personal goals
- Application fee
- Valid transcripts from all universities listed on the application
- Declaration of Financial Support (international students only)
- Two letters of recommendations from current educational or professional sources

An electronic graduate application is available at the URL http://www.rit.edu/emcs/ptgrad/grad_admission.html (Note: there is an underscore (_) between the 'd' in "grad" and the 'a' in "admission.") Requests for information can also be made from this web site.

Starting your Program of Study

Full-time students may begin their program of study in the fall quarter. Applications for part-time study are currently accepted for fall and spring quarters. The department offers a limited selection of courses in the summer quarter; and it is typically not possible to obtain a full-time course load during this quarter.

Application Deadlines

The application process typically takes four weeks after the Office of Graduate Enrollment Services (http://www.rit.edu/emcs/ptgrad/grad/) has received a complete application. However, foreign applications may take longer due to slow mail service and visa issues. Applications are only evaluated after all of the information has been submitted and verified by a counselor in RIT's Office of Graduate Enrollment Services.

Students can be admitted at various times during the year. However, acceptance into the MS program does not guarantee availability of classes. As the start of the quarter approaches, many classes become full. Students, who apply just before the start of a quarter, may need to wait until the following quarter before starting their course work.

The standard application deadline schedule is shown below:

Quarter	Typical Starting Date of Quarter	Domestic Application Deadline (Part Time)	Domestic Application Deadline (Full Time)	International Application Deadline (Full Time only)
Fall	~ September 5	August 1	August 1	July 1
Winter	~ December 1	Not Permitted	Not Permitted	Not Permitted
Spring	~ March 7	February 1	Not Permitted	Not Permitted
Summer	~ June 1	Not Permitted	Not Permitted	Not Permitted

Prerequisites

The MS/IT admission requirements include prior academic study and/or extensive work experience in fundamental information technology concepts. Specifically we require the following *prior to* admission:

- Solid ability in object-oriented programming, and
- Knowledge of computer hardware and software architecture.

In addition, before study in the MS program can begin, we require pre-program prerequisite knowledge of the following:

- Fundamental computer networking theory and concepts, and
- Basic Web design and interactive multimedia concepts.

Prerequisite knowledge can be obtained through undergraduate or graduate coursework at RIT, equivalent course work at another university, or through documented training and significant work experience. Applicants are recommended to have all prerequisite knowledge prior to admission. The program graduate coordinator may consider applicants without the required prerequisites at his/her discretion. However, an unusually strong background in information technology is necessary and additional coursework will be required to meet the outstanding deficiencies before study in the MS program can begin.

The graduate coordinator verifies that prerequisites have been satisfactorily completed. Coursework used to satisfy MS/IT prerequisites be successfully completed **with the equivalent of a 'B' grade or better**. If you have completed prerequisite work at another college or university, please have an official transcript sent to RIT. If you have equivalent work experience, write a letter to the graduate coordinator describing the work and requesting a waiver of prerequisite(s). Please provide sufficient detail so that the depth of experience and knowledge can be determined. Some form of verification, such as certified copies of training certificates or a letter from your employer on company letterhead, is also required. Placement examinations are available periodically for some of the prerequisite courses. Information about these examinations is available from the department website (http://ist.rit.edu/?q=node/98).

The IST department offers coursework to complete the program prerequisites as shown below. Prerequisites are listed in parenthesis after each course. Course descriptions are available on the IST department website (http://ist.rit.edu/?q=node/187). These courses may not be used to satisfy any part of the 48-quarter credit hours required for the MS degree. Please meet with the graduate coordinator before beginning bridge study.

The MS/IT Prerequisite Bridge Program

Programming:
The IST faculty expect that graduate students will be strong programmers with the ability to pick up a given language on-the-fly, as needed. The type and amount of programming in a specific MS/IT concentration varies; and some concentrations require a particular language or languages. Java is currently the primary language of the graduate program due to its visual interface capabilities and the usefulness in developing Web-based applications. C++, along with UNIX/Linux (4050-402) and Perl (4050-302, 4050-521/4055-721), are used in networking and system administration curriculum.

Prospective students who do not have sufficient background in computer programming can take one of the following course sequences (on campus only) to satisfy the programming prerequisite:

4002-217 [5]	Programming for Information Technology I (Java)
4002-218	Programming for Information Technology II (Java; 4002-217)
4002-219	Programming for Information Technology III (Java; 4002-218)

Prospective students who have previous object-oriented programming experience, but who need to learn the department's foundation language, can take one (1) of the following:

4002-414	Java for Programmers (undergraduate; previous programming experience)
	OR
4002-714	Java for Programmers (graduate; previous programming experience)

→ *Successful completion of this prerequisite is required <u>before</u> an application to the MS/IT program can be considered.*

Hardware and Software Architecture:
Prospective students can take the following course at RIT to complete this prerequisite:

4050-350 Computer Platform Fundamentals (a discrete mathematics course)

This course focuses on computer architecture from a hardware and software perspective, mostly at the microcomputer level. Topics focus on the underlying theory of components and peripherals along with software installation, configuration, troubleshooting, and maintenance. Available on-campus only.

→ *Successful completion of this prerequisite is required <u>before</u> an application to the MS/IT program can be considered.*

Networking and Data Communications:
The student can take one (1) of the following courses at RIT to complete this prerequisite:

4050-351	Computer Fundamentals (4050-350; on-campus only)
	OR
4055-746	Telecommunications Network Protocols (none; available on campus and online)

These courses cover the basic concepts, theories, and components relevant to computer networking including electricity and magnetism, data encoding and transmission, topologies, protocols, and the OSI model.

→ *Students may be accepted into the MS/IT program before completing this prerequisite, but must successfully complete it during their first quarter of study in the program.*

[5] <u>Note</u>: effective fall quarter of academic year 2001-2, the course numbers for Information Technology changed from 0602 and 0604 to 4002 and 4004 as part of the conversion to the B. Thomas Golisano College of Computing & Information Sciences.

Basic Web Site Design and Multimedia Concepts:
The student can take one (1) of the following courses at RIT to complete this prerequisite:

4002-320 Introduction to Multimedia: The Internet & the Web (computer literacy)
OR
4004-741 Fundamentals of Web-Based Multimedia (computer literacy)

These courses cover key concepts necessary for a basic working knowledge of the World Wide Web, web page design and development, digital graphics, and interactive multimedia. Offered on-campus only.

→ *Students may be accepted into the MS/IT program before completing this prerequisite, but must successfully complete it during their first quarter of study in the program.*

Curriculum

The MS/IT degree program consists of eleven (11) four-credit courses and a four-credit capstone experience for 48 quarter-credit hours of graduate study. The degree plan is composed of one core course, two or three student-selected concentrations, an elective, and the MS capstone.

MS/IT Core (4 credits)
The program core consists of one course (4 credit hours) which is designed to expose students to the breadth of opportunity in information technology and prepare them for developing a MS capstone topic:

4002-718 Current Themes in Information Technology

Students are expected to complete this core course during their first quarter of study in the MS program unless otherwise advised by the graduate coordinator. This course is available in both on-campus and distance formats.

Concentrations (36 credits)
A concentration is a group of three or more courses that focus on a specific information technology area of knowledge. Each concentration is designed to explore, in some depth, a unique aspect of this diverse computing discipline. With the advice and approval of the graduate coordinator, the student combines concentration courses to create a plan of study. A plan of study can include all of the courses listed for a given concentration area or related coursework across concentration areas can be selected and combined. The overall plan of study must be academically cohesive, provide academic rigor, and support the student's personal goals.

Each student selects nine (9) courses in two (2) synergistic IT knowledge areas to complete concentration study, as follows:

- Two concentrations: one with four (4) courses and a second with five (5) courses, or
- Two concentrations: one with six (6) courses and a second with three (3) courses, or
- Three (3) three-course concentrations in very strongly related topic areas.

The standard concentrations areas and those pre-approved from other departments at RIT are detailed in subsequent pages.

Elective (4 credits)[6]
MS/IT courses from concentrations not selected by the student may be taken as the elective. With approval of the graduate coordinator, an undergraduate IST course at the 4xx-level or above is acceptable if there is no graduate-level equivalent (see the Graduate Student Handbook

[6] Note: the total number of credits for the elective and Capstone Experience must sum up to 8.

for details and excluded courses) and the student has not exceeded the three-undergraduate-courses rule. Graduate-level courses from other programs, such as Interactive Media Design & Imaging, Computer Science, or Business, are acceptable with prior approval from the graduate coordinator. MS/IT bridge courses or bridge courses from other graduate programs at RIT may not be used towards the degree requirements.

Capstone Experience (4 or 8 credits)[6]

The purpose of the MS/IT capstone is to allow students to demonstrate their creativity and professional capabilities in one or more of the concentration areas that they studied. The capstone requirement may be a MS project, 4002-898, or a MS thesis, 4002-897. Students must successfully complete a minimum of four (4) credits of capstone experience.

For individuals interested in a specific area of research or development, the capstone can be expanded to 8 credits by dropping the elective. Obviously an eight-credit project or thesis involves considerably more work. Based on past history, the majority of students do a project, and nearly all MS theses and projects are four credits.

Students typically begin working on the capstone after they have completed all of their coursework. Each student assembles a capstone committee consisting of two (project) or three (thesis) faculty members who will guide the capstone experience and approve the final work. Students should anticipate spending approximately six (6) months in completing the MS capstone requirement. See the MS Capstone Guide (http://ist.rit.edu/?q=node/76) for more information.

Standard Concentration Areas

The IST department has designed the concentrations below to categorize course offerings. The prerequisites for each course are given in parenthesis after the course name. The general prerequisites, required background for each concentration, and other relevant information are included below each list of courses. All concentration areas pre-suppose completion of the MS/IT bridge requirements. Depending upon faculty research and other initiatives, additional IST graduate or upper-level undergraduate coursework may be available.

The department updates courses and concentrations as technology advances. Your program worksheet is the framework for your graduate studies with us. Each student meets with the graduate coordinator and develops a plan of study from the available concentrations that suits his/her goals prior to beginning study. Plans of study are developed by selecting related courses from within and across concentrations that address these goals. If you started with us under a previous handbook and you have questions about changes to concentrations or course availability, contact the graduate coordinator.

Website & Interactive Multimedia Design & Development

Web Development (offered in on-campus format)

Website development for an intranet or the World Wide Web; includes fundamental aspects of Web design (graphic design, XHTML, CSS, usability and semantics), programming, server administration, content management, marketing, testing and deployment.

4004-737 Website Design and Technology (4004-741)
4004-736 Web Client-Side Programming (4004-737)
4004-739 Web Server-Side Programming (4004-737 and a two-course OOP sequence)
4004-751 Web-Database Integration (4004-736, 4004-739 and a database course)

Details: In addition to the courses above, 4004-745 is strongly recommended. Knowledge of relational theory and database development, equivalent to 4002-720, is required for 4004-751.

XML Data Management (offered in on-campus format)

eXtensible Markup Language (XML) is a markup, meta-language used to define data structures and complex documents for electronic data interchange and Web services.

4002-770 Introduction to XML (4004-737; 4004-739 recommended)
4002-771 XML Programming (4002-770, as pre- or co-requisite, and 4002-714)
4002-772 Transformation and Presentation (4002-770)

Multimedia Application Development[8] (offered in on-campus format)

This concentration focuses on the creation of interactive software that combines text, 2D and 3D digital graphics, animation, still video images, full-motion images and sound for an in-depth study of multimedia concepts and the creation of interactive virtual worlds.

4004-730 Interactive Media Implementation (4004-741 and a two-course OOP sequence)
4085-727 Digital Audio and Computer Music (4004-730)
4085-746 Programming for Interactive Multimedia (4004-730)
4085-738 Multi-User Media Spaces (4085-746)

Details: Contact Prof. Biles (jabics@rit.edu) if you are interested in digital music.

The User Experience

A study of the design, evaluation, and implementation of interactive computing systems and their impact on human beings – including the reasoning behind choosing specific functionalities.

Human-Computer Interaction[7] (available in on-campus and periodically in online formats)

4004-745 Foundations of Human-Computer Interaction
4004-748 Usability Engineering (4004-745 and 4004-730)
4004-749 Usability Testing (4004-748 and a statistics course; online requires one campus visit)
4004-755 Advanced Topics in HCI (4004-745)
4002-765 User-Centered Design Methods (4004-745)
4002-823 Agent-Based Modeling (4004-730 and a statistics course)
4002-892 CSCW and Groupware (4004-745; offered only periodically)

Details: Students also need a solid background in basic Web technologies (4004-741) and experience with multimedia programming (4004-730) for interface prototyping.

[7] This concentration consists of selected coursework from our MS in Human-Computer Interaction (HCI). Contact Prof. Yacci (mayici@rit.edu) for more information about these courses or this program.

The User Experience (continued)

Media and Interaction[8] (offered in on-campus format)

This concentration focuses on the social, visual perception, interaction style, and sensory aspects of creating functional user interfaces for computer-mediated experiences.

4085-757 Graphical Elements of the User Experience (4004-730)
4085-794 Online Identity, Social and Community Behavior (graduate standing and departmental approval)
4085-744 Building Online Communities (4004-794 and department approval)
4085-855 Innovation and Invention (advanced expertise in a technical or creative discipline)

Details: Requires both formal and informal research activities, as well as a creative approach to content creation and social software construction. Readings on media theory and interaction are required.

Application Development (partially available in online format)

A study of the best practices for designing and building IT software solutions to suit the needs of users within today's enterprise domains.

4002-710 Object Technologies (4002-714) (available online)
4002-720 Data Modeling and Database Implementation (2-crs OOP sequence) (available online)
4002-725 Component Development (4002-710) (available online)
4002-784 Fundamentals of Database Client/Server Connectivity (4002-720)
4002-890 Native Application Development for Mobile Devices (4002-714) (graduate version of 4002-542)

Details: Students may want to consider including a project management course in this concentration. "Learn a language" programming courses (such as 4002-714, 4003-707, etc.) may not be part of this concentration or of the MS/IT plan of study.

Software Project Management (available in online format only)

This concentration addresses the process of project management with an emphasis on the issues relevant to achieving successful software development projects within the enterprise domain; topics include software development planning, monitoring, costing, and control.

4002-830 Project Management
4002-831 Process Management
4002-820 Economics of Software Development (4002-830 & 831 recommended)

Details: This concentration requires *two or more years of full-time employment experience* in the software development process *plus* solid programming skills. Students without this employment experience should consider the project management course offered by the Saunders College of Business; refer to the "Concentrations Offered by Other RIT Departments" section later in this document.

The faculty recommend that 4002-820 be taken last.

8 This concentration includes selected coursework from the School of Interactive Games & Media (4085-xxx). Contact Prof. Egert (caeics@rit.edu) for more information.

Database Theory & Practices (partially available in online format)

A study of the management of organizational data within the enterprise domain, along with an in-depth practical investigation of the design, implementation, and management of database systems.

4002-720 Data Modeling & Database Implementation (2-course OOP seq.) (available online)
4002-784 Fundamentals of Database Client/Server Connectivity (4002-720)
4055-744 *NIX Fundamentals (for Databases)
4002-774 Information Assurance Fundamentals (graduate standing in GCCIS)
4002-785 Fundamentals of DBMS Architecture & Implementation (4002-720 and 4055-744)
4002-787 Database Performance & Tuning (4002-785)
4002-789 Data Warehousing (4002-785)
4002-821 Data Architecture & Management (4002-710) (available online only)

Details: Contact Prof. Holden (edward.holden@rit.edu) for more information.

Informatics Computing

Bioinformatics (available on-campus only)

These courses provide an introduction to the field of biomedical informatics and the application of computing technologies to the organization, management, analysis, and modeling of biomedical data.

4002-763 Advanced Bioinformatics Computing (4002-714 and discrete mathematics)
1001-722 Bioinformatics Seminar (offered periodically; contact department)

Details: This concentration area requires background in discrete math (1016-265) and computer programming. Knowledge of biology is helpful but not required. Contact Prof. Anne Haake (arhics@rit.edu) for more information on 4002-763. Contact Prof. Mike Osier (michael@bioinfomatics.rit.edu) about 1001-xxx courses.

Geographic Information Science & Technology (available on-campus only)

The study of Geographic Information System (GIS) applications and techniques, Geospatial Technology, Cartography and Geovisualization, location-aware computing, spatial modeling, Web GIS, GIS programming, Geodatabases and Geographic Information Science theory and practices.

4002-740 Geographic Information Science & Technology (graduate standing)
4002-748 Spatial Modeling & Visualization (4002-740)

Details: Contact Prof. Tomaszewski (bmtski@rit.edu) for more information, or visit his website, for more information. Additional courses in this area are anticipated.

eLearning Technologies (available on-campus and in online format)

These courses focus on the development of the learning materials and instructional programs that capture and disseminate the knowledge assets necessary for today's digital academic, corporate, and governmental environments.

4002-722 Fundamentals of Instructional Technology
4002-723 Interactive Courseware (4002-722 and OOP programming)
4002-724 Performance Support Systems Design (4002-722)
4002-823 Agent-Based Modeling (4004-730 and a statistics course)

Details: Contact Prof. Yacci (mayici@rit.edu) for more information.

Networking, Network Security & Systems Administration

The concentrations below are all offered through collaboration with the Networking, Security & System Administration department. A maximum of four (4) courses in networking or system administration may be included in the MS/IT degree, with approval of the graduate coordinator.

Networking[9] (available in online format unless noted otherwise)

These courses cover concepts fundamental to the process of how computers communicate with each other to share resources and information across a computer network. Issues related to network scale, connection methods, architectures, and topologies are addressed.

4055-761 Principles of System Administration (4055-746)
4055-755 Secure Wireless & Wired Data Networks (4055-746)
4055-815 Introduction to Routing and Switching (4055-746) (not online)

Details: Familiarity with networking theory (4055-746) and the UNIX/Linux operating system are necessary. Knowledge of shell scripting is desirable.

System Administration[9] (available in online format unless noted otherwise)

These courses address the fundamental issues in operating and maintaining a computer system or network, specifically installing, supporting, and maintaining servers and network services, and planning for and responding to threats and other service problems.

4055-721 Perl for System Administration (two-course OOP sequence)
4055-761 Principles of System Administration (4055-746)
4055-780 Computer System Security (4055-761) (not online)

Details: Familiarity with networking theory (4055-746) and the UNIX/Linux operating system are necessary. Knowledge of shell scripting is required.

System Survivability[9] (partially available in online format)

This concentration addresses the basic security topics necessary for administering Web-facing and network-accessible business systems. Topics include deploying software patches, preventing break-ins, and other preventative measures such as firewalls and intrusion detection systems.

4055-761 Principles of Sys. Administration (4055-746)
4055-755 Secure Wireless & Wired Data Networks (4055-746)
4055-780 Computer System Security (4055-761) (not online)

Details: Familiarity with networking theory (4055-746) and the UNIX/Linux operating system are necessary. Knowledge of shell scripting is required.

Students interested in computer crime or ethics may also be interested in:

- Criminal Justice courses; contact the department at (585) 475-2432.
- 0110-745 Legal and Ethical Issues in Technology Intensive Environments (contact Prof. Oliver in the Saunders College of Business at boliver@saunders.rit.edu)

[9] A fourth course may be included with permission of the Graduate Coordinator; pre-approved options are:
4055-850 Network Design and Performance (4002-455, 4055-746, 4055-761)
4055-862 Advanced Routing Protocols (4055-746; 4055-815 recommended)
4055-882 Enterprise Security (4055-746)
4055-886 Security Audits of Web Servers & Applications (4055-780)

Special Topics

One (1) special topics concentration may be requested. This option can be used to design a concentration from other courses offered by the IST department, graduate coursework from other departments at RIT, or graduate coursework from other universities. All applicable prerequisites must be completed. Prior approval of the Graduate Coordinator is required. See the "RIT Policies and Regulations" section of this handbook for more details.

Concentrations Offered by Other RIT Departments

MS/IT students can include up to a maximum of 12 graduate credits from other departments at RIT in their plans of study, with the prior permission of the Graduate Coordinator. The following concentrations are pre-approved. Contact the department offering the courses for prerequisite questions, course descriptions, and scheduling information.

Business[10] - Offered by the Saunders College of Business. Contact Ms. Peggy Tirrell at ptirrell@saunders.rit.edu or (585) 475-2795 for information.

Technology Management (available in on-campus format unless noted otherwise)

Technology management addresses the responsibility of business organizations to identify, introduce, and monitor the assimilation of computing technologies.

0102-742 Technology Management (0102-740)
0102-761 Managing Research & Innovation (0102-742)
0102-762 Managing New Process and Product Development (0102-742)

Details: These courses require the prerequisite course 0102-740 Organizational Behavior and Leadership (available in on-campus and online formats). Students without this background, can include 0102-740 as one of the courses in this concentration.

Management of Service Systems (available in on-campus format)

These courses focus on careers in IT-intensive service organization and industries, such as health care, financial services, etc.

0112-711 Managing Service Systems
0112-712 Service-Oriented Information Systems (0112-710)

And one (1) of the following:
0112-755 Information Technology Strategy & Management
0112-760 Integrated Business Systems
0112-761 Business Process Analysis and Workflow Design (0112-760)

Details: The standard prerequisite course, 0112-710, is waived for MS/IT students.

eCommerce (available in on-campus format)

Ecommerce refers to the business processes involved in conducting commerce with goods and services over the Web.

0112-755 Information Technology Strategy & Management
0105-761 Marketing Concepts
0105-772 Internet Marketing: Strategies & Tactics (0105-761)

Details: Business concentrations can be structured flexibly to meet individual interests. Students may also want to consider either of the following as part of a business concentration or as the MS/IT elective:

- 0106-744, Project Management
- 0110-745, Legal and Ethical Issues in Technology Intensive Environments (contact Prof. Oliver in the Saunders College of Business at (585) 475-6668 or boliver@saunders.rit.edu)

[10] Due to the Saunders College of Business's AACSB accreditation regulations, students matriculated in programs outside of that college cannot take more than four (4) graduate business classes.

Telecommunications Technology (available in both on-campus and online formats)

Telecommunications is the exchange of information over a distance via any cable, wire, radio, optical, or other electromagnetic systems. Offered by the ECT Engineering Technology (TET) Department. Contact Prof. Warren Koontz at (585) 475-5706 or wlkmet@rit.edu.

0614-722 Principles of Telecommunications Networks (4055-746)

And two (2) other courses in consultation with the graduate coordinator and TET.

Details: 0614-722 should be completed before other courses are taken.

Computer Graphics Design (available in on-campus format only)

The design theory, methodology, and aesthetics of creating 2D and 3D graphic images with a computer – primarily for entertainment and interactive multimedia installations.

2014-721 3DDG Modeling

And two (2) from the following:
2014-722 3DDG Interactive Motion
2014-731 3DDG Lighting (2014-721)
2014-732 3DDG Shading (2001-721)
2014-733 3DDG Character Design (2014-721)
2014-747 3DDG Rendering (2014-721)
2014-798 3DDG Production Pipeline (2014-721 plus at least one other 3DDG course)
2014-75x Special Topics (as required by topic)

Details: Offered by the Interactive Media Design & Imaging (IMDI) department in the College of Imaging Arts & Sciences; contact Prof. Marla Schweppe at (585) 475-2754 or mkspph@rit.edu. MS/IT students are welcome to join the IMDI department's student SIGGRAPH organization.

Automated Manufacturing (partially available in online format)

Automated manufacturing is the application of mathematics, robotics, metallurgy, programmable machinery, and computer-assisted machining techniques to create computer-enhanced manufacturing processes. Offered by the Manufacturing and Mechanical Engineering Technology department; contact Prof. Ramkumar at (585) 475-6174 or smrmet@rit.edu .

0617-870 Manufacturing Automation Controls (available in online format)
0303-729 Advanced Systems Integration (C++; call (585) 475-7142 for more information)

And another course in consultation with the Graduate Coordinator

Health Systems Administration (partially available in online format)

These courses address the development, structure, and current forces – including the application of computing technologies – that are transforming health care today.

0635-754 eHealth

And two (2) other courses in consultation with the graduate coordinator

Details: Offered by the department of Service Systems; contact Dr. Underhill at lmuism@rit.edu or (585) 475-7359. Courses may be taken in any order. A 3-course certificate is also available.

Computing Facilities

The computing facilities of the department of Information Sciences & Technologies are driven solely by curricular needs. Our focus for the computers and networks that we provide is the needs of our students. Students use our labs to investigate concepts, and to design and develop content for either stand-alone computers or network delivery. Many of our students also work as lab assistants, adding an additional practical dimension to their educational experiences.

Many IST courses are laboratory-based. Some courses have separately-scheduled laboratory sessions in which an instructor provides a structured learning experience that reinforces lecture concepts. Other courses are taught in specially-designed "active learning labs" in which each student has a computer. These courses use alternating lecture and hands-on sessions to facilitate active learning. The labs also have display facilities with one or more large screens located at the front of the room so students may see demonstrations of work and immediately apply them.

Our Open Lab provides students with access to generalized computing resources outside of scheduled lab and class times. In addition there are specialized laboratories within the department and college that support curriculum in the areas of website design, streaming media and audio production, human-computer interaction, database implementation and administration, and networking and system administration. Due to our cross-platform commitment, our computing labs contain Windows, Macintosh and/or UNIX platforms.

The IST department's Database Labs are designed to facilitate experimentation with data management, database administration, client/server access, and database performance concepts. The labs support both the Windows and Linux operating systems in native, virtual and cloud-based environments. Students have access to multiple database management software (DBMS) packages, including MySQL and Oracle. Special high-end rack-mounted servers, as well as a data warehouse appliance, are available for the exploration of database performance issues and data warehousing design and implementation.

The IST usability testing facilities have state-of-the-art networked PC and Macintosh computers with a selection of input devices such as touch screens, joysticks, haptic mice, track balls, etc. The testing facilities have security-style video cameras that can record activities for the observer, high-quality desk microphones to record the user's comments (and to act as an intercom), a microphone/headset for speech input, and a scan converter for recording an active subject computer. The observer can monitor the display of the user's screen and utilize equipment for note taking, communication, and session recording.

Our students may also take courses from the Networking, Security, and System Administration (NSSA) department and from the School of Interactive Games & Media (IGM), both of which have extensive laboratory facilities to support their curriculum. For NSSA, these include computer networking, system administration, telephony and data integration, security, and projects labs that are designed to facilitate the exploration of computer networking. Extensive testing and cabling equipment, a wide variety of network appliances, and flexible topology options – via direct connection and roll-around racks – support coursework, special projects, and graduate capstone study.

IGM has a Streaming-Media Lab that houses video and audio studios that support sound and video content creation for digital video and animation courses. The digital video production studio has a "talk show style" set for streaming video productions, SDI cameras, and a chroma key screen. The lab's audio studio is designed for both voiceover/narration work and for groups of three or four performers to do dialog work or record music. In addition to supporting class work, it is creative environment available for student and faculty use. The two studios are linked by a professional, digital control room complete with sound board, professional-quality

microphones, and industry-standard sound editing equipment, as well as video switchers, encoders, and media servers. High-end PCs and dual-screen setups are also available for multi-user game development, along with a collaborative lab space with Macintosh computers for interactive multimedia and social media development.

Our computing facilities are connected to the RIT gigabit campus backbone with connections to the Internet (http://www.rit.edu/its/services/tele/). Students have access to RIT facilities from their dorm rooms, wireless access points in campus buildings and from off-campus locations. Institutional facilities provide locations for students to develop their own presence on the Web. The overall campus facilities have consistently been rated in the top twenty universities by national surveys. Thus these general and specialized facilities make our computing environment one of the most up-to-date for innovative exploration of information technology concepts of any university in the United States.

Online Learning Option

This degree cannot be entirely completed online. However, some of the courses used in this curriculum can be completed through RIT's online learning (distance) option. With distance learning at RIT, the educational experience is location independent. However, there are scheduled assignment and meeting times. The students and instructor typically interact over the Web using platform-independent conferencing software that provides presentation, email, discussion groups, file transfer, testing, and chat facilities. Visit http://online.rit.edu for more information about online learning at RIT.

The following concentrations are entirely available through RIT's online learning option:

- Telecommunications Technology (ECT Engineering Technology Department)
- Software Project Management (with appropriate background; contact graduate coordinator)
- eLearning Technologies (both on campus and online)

The following concentrations are partially available through distance learning:

- Application Development (selected courses only; see MS/IT Concentrations section)
- Human-Computer Interaction (selected courses only; see MS/IT Concentrations section)
- Networking (selected courses only; see IST Concentrations section)
- System Administration (selected courses only; see MS/IT Concentrations section)
- System Survivability (selected courses only; see MS/IT Concentrations section)
- Health Systems Administration (selected courses only; contact the department of Hospitality & Service Management)

The following concentrations are only offered on-campus:

- Website & Interactive Multimedia Design & Development concentrations
- Media & Interaction
- Database Theory & Practices (except for 4002-720 which is periodically offered online)
- Informatics Computing
- Saunders College of Business concentrations (except for 0102-740 which is offered online)
- Computer Integrated Manufacturing (College of Engineering)
- Computer Graphics Design (Interactive Media Design & Imaging department, College of Imaging Arts & Sciences)

Students in the Rochester area may choose to study in either format depending upon personal preference and course availability.

Cooperative Work Experience

The MS in Information Technology program includes an optional cooperative work experience (coop). There is no tuition fee for coop, since it is treated as a zero-credit course. Salaries typically range from $10 to $30 per hour, depending upon position and area of the country. While you won't earn enough to pay your tuition expenses, you can earn money to help support your living expenses. Plus, the work experience gained through coop can help you start your IT career.

Graduate students may do a **maximum of 2 academic terms** of co-op after all pre-requisites, including any required English preparation study, and 2/3 of the program has been completed with 3.0/4.0 GPA or better. Full eligibility details are included in the Graduate Student Handbook.

Time for Campus Courses

Nearly all of our on-campus classes are offered evenings, starting at 6:00 pm, at least once during each academic year. More popular courses may be offered multiple times: mornings, afternoons, late afternoons, and/or evenings.

RIT Policies and Regulations

Transfer of Credit

A student may propose to transfer up to twelve (12) quarter-credit hours (nine semester-credit hours) into this program. The courses must be graduate level, directly relate to the MS/IT program, and have been taken at a regionally accredited university within the past 5 years with a grade of 'B' or better. A written proposal that addresses the relevance of the course(s) to the student's MS program should be submitted to the graduate coordinator who will evaluate each request and determine credit transferability.

Courses from Other Colleges or Universities

A student may propose taking up to three (3) graduate-level courses from another college at RIT or another university (see credit transfer discussion above) as a concentration or taking one course as the elective. Outside undergraduate courses cannot be approved. Please submit a written proposal that addresses the relevance of the courses to your MS studies to the graduate coordinator for approval. For currently enrolled students, the proposal must be submitted and approved before the course(s) are taken.

Once your plan of study has been defined, no additional approval is needed if you take courses outside of the IST department that are listed in approved concentrations. If you take courses from other departments or universities without prior approval, there is the possibility that the courses will not count towards your MS/IT degree.

RIT's 7-Year Degree-Completion Rule

A student must successfully complete all of the requirements for his or her MS program within seven (7) years of the date of the first (oldest) course counted towards the student's degree. This requirement includes courses transferred into the program from other RIT departments or other universities, but excludes prerequisite courses. For example, if the first course was completed in fall quarter 2011 (20111), then the program must be completed by the end of fall quarter 2018 (20181; November 2018). Please contact the graduate coordinator immediately if you find that you are coming close to your 7-year deadline.

Undergraduate Courses
A graduate student may request that up to three (3) upper-level undergraduate courses from the department of Information Sciences & Technologies be used towards the student's plan of study. The courses must have a number of 400 or greater. The courses must be selected in areas of study where equivalent graduate-level courses are not currently available. Permission of the graduate coordinator must be obtained before each course is taken. Undergraduate courses in other RIT departments may not be used towards the MS degree.

Academic Honesty
Academic honesty is an expectation of all students at RIT. Any act of improperly representing another person's work as one's own is an act of academic dishonesty. The RIT code of academic conduct is documented in the university's Policies and Procedures manual:

- http://www.rit.edu/academicaffairs/policiesmanual/sectionD/D8.html
- http://www.rit.edu/academicaffairs/policiesmanual/sectionC/C0.html

The IST department's academic honesty policy is also posted on the departmental website (http://ist.rit.edu/?q=node/108). Additional details of the ramifications of violating these policies are available in the Graduate Student Handbook.

Other Useful Information
Full information on all policies and useful contacts at RIT is in the Graduate Student Handbook which in available on the IST department website.

Contact Information

Please visit the department of Information Science & Technologies' web site at http://ist.rit.edu for more information and the main RIT web site at http://www.rit.edu for general information on RIT and links to all programs. More information on the Distance Learning program can be found at the web site http://online.rit.edu/.

To schedule an appointment (in person, via the telephone or through the Web) with the graduate coordinator, contact the Student Services office during normal business hours (8:30 am to 4:30 pm USA Eastern Time) or send email. Contact information is shown below.

US Mail:
Graduate Program Director
School of Informatics, GCCIS
Rochester Institute of Technology
152 Lomb Memorial Drive
Rochester, New York 14623-5603

E-mail: InformaticsGrad@rit.edu

Telephone: (585) 475-2700

FAX: (585) 475-6584

Course Descriptions for Information Sciences & Technologies Courses

Course descriptions for graduate and undergraduate information technology courses (4002-xxx) offered by the Information Sciences & Technologies (http://ist.rit.edu) department are available on the department website at http://ist.rit.edu/?q=node/187. Select "Information Sciences & Technologies" from the department pull-down menu.

Graduate Course Descriptions for IST Website Development Courses

Course descriptions for graduate website and interactive media courses (4004-xxx) offered by the Information Sciences & Technologies department are available on the IST website at http://ist.rit.edu/?q=node/187. Select "Information Sciences & Technologies" from the department pull-down menu.

Course Descriptions for NSSA Courses

Course descriptions for graduate (4055-xxx) and undergraduate (4050-xxx) computer networking, system administration and network security courses offered by the Networking, System Administration, and Security department (NSSA; http://www.nssa.rit.edu) are available on the IST website at http://ist.rit.edu/?q=node/187. Select "Networking, Security & System Administration" from the department pull-down menu.

Course Descriptions for IGM Courses

Course descriptions for graduate (4085-xxx) and undergraduate (4080-xxx) game and multimedia courses offered by the School of Interactive Games & Media (IGM; http://igm.rit.edu) are available on the IST website at http://ist.rit.edu/?q=node/187. Select "Interactive Games & Media" from the department pull-down menu.

Information about course availability is on the RIT website at http://register.rit.edu/courseSchedule/. You will need to select a specific academic term.

Academic terms at RIT are each 10 weeks long and identified by a 5-digit code: *yyyyn*, where *yyyy* is the calendar year (i.e. 2011) at the beginning of the current academic year (i.e. 2011-12) and *n* designates the term (1 = fall, 2 = winter, 3 = spring, and 4 = summer).

RIT courses are identified by a 9-digit code which specifies department (*d*), course number (*c*) and section (*s*) number: *dddd-ccc-ss*. Day sections are generally designated as *0s* or *1s*. Evening sections are generally designated *7s* and *8s*. Online sections are designated *9s*. Specialty sections are generally designated *3s*; for example "blended sections," which meet both on-campus and online each week, are designated as *39*. Other special situations exist; so check course notes for details.

2011-2012 Academic Calendar

(not included)

2012-2013 Academic Calendar

(not included)

Worksheet for MS in Information Technology

(not included)