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Bulletin:
Information Technology & Management Graduate Programs
2008–2010

Information Technology & Management

Center for Professional Development
Daniel F. and Ada L. Rice Campus
201 E. Loop Road
Wheaton, IL 60187
www.cpd.iit.edu/itm/

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The mission of the Master of Information Technology & Management program is to educate and inform students to prepare them to assume technical and managerial leadership in the information technology field. The Information Technology and Management program applies a hands-on, reality-based approach to education that allows students to apply what they learn in class to solve real-life problems. The program provides an innovative experience where students work on cutting-edge, industry-sponsored projects. This teaching philosophy prepares students to become innovators, entrepreneurs and leaders of the future. For some areas of study, it is possible to complete the entire MITM degree online.

Degree Offered

Master of Information Technology & Management

Certificate Program

Computer and Network Security Technologies

Faculty

C. Robert Carlson, Professor, Director of the Center for Professional Development and Academic Director, Information Technology and Management Degree Programs. B.A. Augustana College, Ph.D. University of Iowa. Database design, object-oriented modeling and design, software engineering, and IT entrepreneurship

Carol Davids, Alva C. Todd Industry Professor and Director of the VoIP Laboratory, Center for Professional Development. B.S.E.E. Cornell University, M.I.T.M. Illinois Institute of Technology. Voice over IP, networks, and digital and voice communications.

Dennis Hood, Lecturer. B.S. Rensselaer Polytechnic Institute, M.S. Stevens Institute of Technology. Project Management, process engineering, human-computer interaction and information technology management.

Jeffrey Kimont, Industry Associate Professor. B.S.E.E. Midwest College of Engineering, M.S.C.S. North Central College. Object-oriented programming, client-server programming, agile programming, Web application development, embedded systems and grid computing.

William Lidinsky, Alva C. Todd Industry Professor and Assistant Director, Information Technology and Management Degree Programs. B.S.E.E., M.S.E.E. Illinois Institute of Technology, M.B.A. University of Chicago. Computer networking, computer and network security, computer and network forensics and steganography.

Valerie Scarlata, Instructor and Program and Media Coordinator, Information Technology and Management Degree Programs. B.A. Columbia College, M.I.T.M. Illinois Institute of Technology. Online design. Web application development, rich client applications, multimedia and instructional technologies.

Raymond E. Trygstad, Lecturer and Associate Director, Information Technology and Management Degree Programs, and Director of Information Technology, Center for Professional Development. B.S. United States Naval Academy, M.S.S.M. University of Denver. Online design, multimedia, system administration, operating system virtualization, information security management, and information technology policy.

Laboratory and Research Facilities

The Center for Professional Development operates and administers over 200 computers and servers at the Main and Rice Campuses to support teaching, learning and research. Nine laboratories include Sun Solaris facilities, a networking/network security and computer forensics facility, a dedicated Voice over IP (VoIP) facility which includes an entire CISCO VoIP LAN as well as video and mesh wireless capabilities, and the world's first 10GBASE-T 10-gigabit Ethernet academic computing facility. The security/forensics, VoIP and 10GBASE-T laboratories provide additional facilities for student projects and applied research, some of which is undertaken in conjunction with industry partners. Additionally one Rice Campus IITV/IIT Online classroom is wired for full network connectivity for notebook computers. All laboratories are normally available for student use outside of class hours, and one or more laboratories are available for student use weekdays between 10 am and 10 pm at the Rice Campus. A wireless network at the Rice Campus provides complete coverage of the campus and operates at all times that the campus is open. Students make extensive use of the network infrastructure provided to support personal notebook computers.

Admission Requirements

Applicants for admission must have earned a four-year bachelors degree from an accredited institution with a minimum cumulative undergraduate GPA of 3.0/4.0. International applicants are required to submit a GRE score with a minimum score of 1200 (combined score for tests taken prior to Oct. 1, 2002) or 900 quantitative + verbal and 2.5 analytical writing (for tests taken on or after Oct. 1, 2002) and may be required to submit a TOEFL score (see page 26). Admission as a non-degree student follows the university policy set forth in this bulletin.

Students whose undergraduate degree is not in a computer-related area or who do not have significant experience or certifications in the information technology field will be required to demonstrate proficiency in the undergraduate courses that are prerequisites for the graduate program. Proficiency may be demonstrated by taking and passing a written exam or taking and passing, with a grade of "B" or better, the prerequisite undergraduate courses at IIT. Current prerequisites for the Master of Information Technology & Management include computer hardware and operating system literacy (ITM 301 or ITM 302 or equivalent coursework, certification or experience) and an ability to program at a basic level using a contemporary programming language (ITM 311 or ITM 312 or equivalent coursework, certification or experience). Students enrolled in undergraduate post-baccalaureate studies (see page 28) may take these courses as part of that program. Proficiency may also be demonstrated by presentation of documentation of equivalent training or certification; in this case waivers of the prerequisites may only be granted by the graduate adviser or the ITM Associate Director.

Placement Examinations

Students entering the Master of Information Technology and Management degree program may be required to take placement examinations based on an evaluation of their background and their undergraduate degree program.

Students may be required to demonstrate proficiency in the use of a contemporary object-oriented programming language through completion of a programming proficiency examination. Students will be requested to complete a representative set of basic programming tasks and will have a choice of programming languages in which to complete the tasks; Visual Basic is not an acceptable language for this purpose. References may be consulted, but the test is timed so ability to code is necessary. Students who cannot satisfactorily complete the exam may be required to attend a refresher workshop or short course in their selected programming language, or may be required to complete an ITM programming course; the appropriate action will be based on their score on the exam.

Students who are not required to complete the Test of English as a Foreign Language (TOEFL) but have very low scores on the GRE Verbal (generally 10th percentile or lower) may be required to complete the IIT English Proficiency Review (EPR) Essay Examination. If students cannot pass this examination they will be required to enroll in ENG 053 and retake the EPR Essay Exam at course completion.

Center for Professional Development Graduate Honors Program

The Center for Professional Development Graduate Honors Program recognizes truly outstanding graduate students in the Information Technology & Management and Industrial Technology & Operations degree programs through enhanced opportunity for academic and professional development. Students accepted into the CPD Graduate Honors Program complete a major honors project as part of their graduate coursework, giving them the opportunity to do directed research in their field under the close mentorship of a faculty member. Graduate Honors Program students receive enhanced consideration for financial aid and assistanceships, and are recognized for completion of the Graduate Honors Program upon graduation.

All students applying for admission to graduate degree programs in the Center for Professional Development will be considered for an invitation to enter the Graduate Honors Program directly based on their undergraduate academic performance and GRE scores when applicable, but are under no obligation to accept the invitation. Students already in a degree program may apply for the Graduate Honors Program upon completion of 18 hours of graduate coursework; applicants must have a cumulative grade point average of 3.7 or better and obtain agreement of a faculty member to serve as their sponsor. Graduate Honors Program students must maintain a cumulative grade point average of 3.7 or better during their graduate studies.

Upon completion of the required 30 hours of graduate degree coursework, Graduate Honors Program students complete an additional 6 hours of honors studies and produce a major project, thesis or whitepaper reflecting research and mastery of a particular aspect of their chosen professional focus. They will have the opportunity to share their project in student colloquiums, at conferences and professional society conventions, and will have their work published in the CPD Honors Portfolio.

Graduates of the Illinois Institute of Technology Center for Professional Development Graduate Honors Program will be readily recognizable by academia and prospective employers as “the best of the best” in their field, enhancing opportunities for employment and advanced studies.

For more information about the IIT Center for Professional Development Graduate Honors Program contact the Program Coordinator, Valerie Scarlata, at 630.682.6005 or scarlata@iit.edu.

Master of Information Technology & Management

30 credit hours (Courses may be selected from 400- and 500-level courses: a minimum of 18 credit hours must be at the 500-level or higher.)
GPA of 3.0/4.0 or better

Students whose undergraduate degree is not in a computer-related area or who do not have significant experience or certifications in the information technology field will be required to complete core courses or demonstrate their knowledge through equivalent coursework, certification or experience. These core courses will ensure basic knowledge of networking concepts, protocols and methods (ITM 540); knowledge of the Internet, including the ability to build Web sites and deliver them on a server (ITM 461); and the ability to create and administer databases using a modern database management system (ITM 421). Students enrolled in undergraduate post-baccalaureate studies (see page 28) may take these courses as part of that program, but they will not then be applied to their graduate degree.

The following course groupings are meant to guide students in their course selection, allowing them to focus on a particular area of information technology, depending on their interests, background and career goals; alternative courses in each specialization may be available at the discretion of the student's advisor. Final determination of completion of a specialization will be made by a student's graduate adviser. Students are not required to choose a specialization for degree completion and can mix courses from different specializations; a general program of study is also available.

Core Courses (9 hours)

Required courses

ITM 421 Data Modeling and Applications
ITM 461 Internet Technologies & Web Design
ITM 540 Introduction to Data Networks and the Internet

Note: Core courses may be waived upon presentation of evidence of equivalent coursework, certification or experience. Approval of waivers will be made by the student's adviser or the ITM Associate Director

Computer and Information Security (18 hours)

Recommended courses (9 hours)

ITM 548 System and Network Security
ITM 578 Information Systems Security Management

AND 3 hours chosen from the following:

ITM 518 Coding Security
ITM 528 Database Security
ITM 538 Computer & Network Forensics
ITM 539 Steganography
ITM 543 Vulnerability Analysis and Control
ITM 549 System and Network Security: Projects & Advanced Methods
ITM 558 Operating System Security
ITM 588 Incident Response, Disaster Recovery and Business Continuity

Plus 9 hours chosen from the following:

ITM 518 Coding Security
ITM 528 Database Security
ITM 538 Computer & Network Forensics
ITM 539 Steganography
ITM 543 Vulnerability Analysis and Control
ITM 549 System and Network Security: Projects & Advanced Methods
ITM 551 Distributed Workstation System Administration

OR

ITM 552 Client-Server System Administration
ITM 558 Operating System Security
ITM 588 Incident Response, Disaster Recovery and Business Continuity

Voice and Data Communication Technology (18 hours)

Recommended courses (9 hours)

ITM 540 Introduction to Data Networks and the Internet
ITM 545 Telecommunications Technology
ITM 546 Voice Communications Over Data Networks

Plus 9 hours chosen from the following:

ITM 541 Network Administration and Operations
ITM 542 Wireless Technologies and Applications
ITM 543 Vulnerability Analysis and Control
ITM 547 Voice Communications Over Data Networks: Projects & Advanced Methods
ITM 548 System and Network Security
ITM 549 System and Network Security: Projects & Advanced Methods
ITM 571 Project Management for Information Technology Management
ITM 575 Networking and Telecommunications Management

IT Management and Entrepreneurship (18 hours)

Recommended courses (9 hours)

ITM 571 Project Management for Information Technology Management
ITM 574 Strategic Information Technology Management
ITM 581 IT Entrepreneurship

Plus 9 hours chosen from the following:

ITM 531 Object Oriented System Analysis, Modeling and Design
ITM 532 UML Based Software Development
ITM 572 Process Engineering for Information Technology Managers
ITM 573 Building & Leading Effective Teams
ITM 575 Networking and Telecommunications Management
ITM 578 Information Systems Security Management
ITM 582 Business Innovation
ITM 585 Legal and Ethical Issues in Information Technology
INTM 511 Industrial Leadership
INTM 515 Advanced Project Management
INTM 522 Computers in Industry
INTM 534 Resource Management
INTM 543 Purchasing

Data Management (18 hours)

Recommended courses (9 hours)

ITM 421 Data Modeling and Applications
ITM 422 Advanced Database Management
ITM 528 Database Security

Plus 9 hours chosen from the following:

ITM 423 Advanced Database Management II
ITM 521 Client Server Technologies and Applications
ITM 526 Data Warehousing
ITM 527 Data Financials
ITM 531 Object Oriented System Analysis, Modeling and Design
ITM 574 Strategic Information Technology Management
ITM 578 Information Systems Security Management
ITM 594 Special Project in Data Management

Internet Development and Electronic Commerce (18 hours)

Recommended courses (9 hours)

ITM 461 Internet Technologies & Web Design
ITM 562 Web Application Development
ITM 571 Project Management for Information Technology Management

Plus 9 hours chosen from the following:

ITM 411 Intermediate Software Development
ITM 414 Visual Programming Environments
ITM 515 Advanced Software Development
ITM 541 Network Administration and Operations
ITM 563 Internet Application Development
ITM 564 Electronic Commerce Applications and Management
ITM 565 Dynamic Web Page Development
ITM 566 Web Services & Service-Oriented Architectures
ITM 567 Enterprise Web Application Development
COM 525 Research and Usability Testing

Systems Analysis (18 hours)

Recommended courses (9 hours)

ITM 531 Object Oriented System Analysis, Modeling and Design
ITM 571 Project Management for Information Technology
ITM 572 Process Engineering for Information Technology Managers

Plus 9 hours chosen from the following:

ITM 511 Application Development Methodologies
ITM 532 UML Based Software Development
ITM 534 Human Computer Interaction
ITM 535 Systems Architecture
ITM 536 Software Testing and Maintenance
ITM 574 Strategic Information Technology Management
ITM 575 Networking and Telecommunications Management
ITM 578 Information Systems Security Management
INTM 522 Computers in Industry

Software Development (18 hours)

Recommended courses (9 hours)

ITM 521 Client Server Technologies and Applications
ITM 532 UML Based Software Development
ITM 571 Project Management for Information Technology Management

Plus 9 hours chosen from the following:

ITM 411 Intermediate Software Development
ITM 412 Advanced Structured and Object Oriented Programming
ITM 515 Advanced Software Development
ITM 511 Application Development Methodologies
ITM 518 Coding Security
ITM 531 Object Oriented System Analysis, Modeling and Design
ITM 534 Human Computer Interaction
ITM 536 Software Testing and Maintenance
ITM 567 Enterprise Web Application Development
ITM 572 Process Engineering for Information Technology Managers

Systems Administration (18 hours)

Recommended courses (9 hours)

ITM 541 Network Administration and Operations
ITM 551 Distributed Workstation System Administration
OR
ITM 552 Client-Server System Administration

Plus 9 hours chosen from the following:

ITM 456 Introduction to Open Source Operating Systems
ITM 551 Distributed Workstation System Administration
OR
ITM 552 Client-Server System Administration
ITM 554 Operating System Virtualization
ITM 558 Operating System Security
ITM 571 Project Management for Information Technology Management
ITM 574 Strategic Information Technology Management
ITM 575 Networking and Telecommunications Management

Management Information Systems (18 hours)

Recommended courses (9 hours)

ITM 421 Data Modeling and Applications
ITM 422 Advanced Database Management I
ITM 571 Project Management for Information Technology

Plus 9 hours chosen from the following:

ITM 423 Advanced Database Management II
ITM 526 Data Warehousing
ITM 527 Data Financials
ITM 528 Database Security
ITM 531 Object Oriented System Analysis, Modeling and Design
ITM 532 UML Based Software Development
ITM 554 Operating System Virtualization
ITM 572 Process Engineering for Information Technology Managers
INTM 515 Advanced Project Management
INTM 522 Computers in Industry

Digital Systems Technology (18 hours)

Recommended courses (9 hours)

ITM 533 Operating System Design Implementation
ITM 555 Handheld Device Technologies
ITM 593 Embedded Systems

Plus 9 hours chosen from the following:

ITM 492 Embedded Systems and Reconfigurable Logic Design
ITM 511 Application Development Methodologies
ITM 535 Systems Architecture
ITM 540 Introduction to Data Networks and the Internet
ITM 541 Network Administration and Operations
ITM 542 Wireless Technologies and Applications
ITM 545 Telecommunications Technology
ITM 546 Voice Communications Over Data Networks
INTM 522 Computers in Industry

Healthcare Information Technology (18.6 hours)

HM courses are offered through the Stuart Graduate School of Business and are scheduled on a quarter rather than a semester basis; HM course start dates may be different than other courses and each course runs for 10 weeks.

Recommended courses (9.6 hours)

HM 500 Management of Healthcare
HM 510 Healthcare Systems and Technology
HM 520 Health Informatics
HM 530 Organization, Policy and Strategic Health Systems

Plus 9 hours chosen from the following:

ITM 495 Bioinformatics
ITM 521 Client Server Technologies and Applications
ITM 531 Object Oriented System Analysis, Modeling and Design
ITM 571 Project Management for Information Technology Management
ITM 574 Strategic Information Technology Management
ITM 578 Information Systems Security Management

Master of Information Technology & Management: General Course of Study

These are selected groupings of courses allowing students enrolled in the Master of Information Technology & Management degree to develop a broad overview knowledge of information technology. Suggested courses in each area are marked with an asterisk (*) with one alternative course listed for each area; more alternatives may be possible at the discretion of the student's advisor.

Internet Development and Electronic Commerce

* ITM 461 Internet Technologies & Web Design
ITM 562 Web Site Application Development
ITM 574 Strategic Information Technology Management

Data Management

* ITM 421 Data Modeling and Applications
* ITM 531 Object Oriented System Analysis, Modeling and Design
ITM 521 Client Server Technologies and Applications

Networking and Communications

* ITM 540 Introduction to Data Networks and the Internet
* ITM 548 System and Network Security
ITM 541 Network Administration and Operations

Systems Administration

* ITM 551 Distributed Workstation System Administration

OR

* ITM 552 Client-Server System Administration

Software Development

* ITM 411 Intermediate Software Development
* ITM 571 Project Management for Information Technology Management
ITM 532 UML Based Software Development

Computer & Information Security

* ITM 578 Information Systems Security Management
ITM 528 Database Security
ITM 548 System and Network Security

Certificate Programs

Certificate programs offer working professionals an opportunity to increase their knowledge and skills in the specific areas of information technology. A certificate representing proven academic performance is presented after the required coursework is completed with a GPA of 3.0/4.0. Courses taken may be later applied toward a degree program. Applicants should have a bachelor's degree from an accredited college or university; the degree need not be in an information technology or computer related field.

Computer and Network Security Technologies Certificate

This program is designed for students seeking knowledge that will prepare them for careers in computer and network security and to deal with the challenging computer and network security problems facing society. All courses may be later applied toward the Master of Information Technology and Management degree for those who apply and are accepted to the degree program.

Students in this program must select nine hours of coursework from the following:

ITM 540 Introduction to Data Networks and the Internet

OR

ITM 421 Data Modeling and Applications

and any two of the following ten courses

ITM 518 Coding Security
ITM 528 Database Security
ITM 538 Computer & Network Forensics
ITM 539 Steganography
ITM 543 Vulnerability Analysis and Control
ITM 548 System and Network Security
ITM 549 System and Network Security: Projects & Advanced Methods
ITM 558 Operating System Security
ITM 578 Information System Security Management
ITM 588 Incident Response, Disaster Recovery and Business Continuity

Students who have already completed coursework, training, or certification equivalent to ITM 540 and/or ITM 421 may substitute a third course from the above list.

Accelerated Courses

The program may offer accelerated courses for credit in several areas of information technology & management. (Students should see the definition of accelerated courses on page 41.)

Accelerated courses provide an opportunity for degree-seeking students at IIT to complete graduate degree requirements in a shorter time period. If taken by non-degree seeking students, all courses may be later applied toward the Master of Information Technology and Management degree for those who apply and are accepted to the degree program

Course Descriptions

Numbers in parentheses indicate class, lab and credit hours, respectively.

ITM 411 Intermediate Software Development
This course covers a broad spectrum of object-oriented programming concepts and application programming interfaces. The student considers the details of object-oriented development in topics of multi-threading, data structure collections, stream I/O and client interfaces. Software engineering topics of packaging and deployment are covered as well. Hands-on exercises reinforce concepts taught throughout the course. Prerequisite: ITM 311 (2-2-3)

ITM 412 Advanced Structured and Systems Programming
Structured programming continues with advanced concepts including strings, arrays, pointers, data structures, file manipulation, and dynamic memory management. Students create more complex applications that work with user input, manipulate user supplied text or text obtained from a file, apply standard library routines for working with literal text, use pointers to store complex structures within arrays, and read and write data from files, the console, and the terminal. The object-oriented programming (OOP) paradigm is covered in depth includeing the philosophy of OOP, classes and objects, inheritance, template classes, and making use of class libraries. Prerequisite: ITM 312 (2-2-3)

ITM 414 Visual Programming Environments
Students will study the fundamental problems associated with man-machine interfaces. Students will learn to apply several GUI techniques to design, lay out and implement screen controls, menus and graphical objects using techniques such as logic flow and input validation. GUI programming elements of contemporary visual programming languages are introduced. Prerequisites: ITM 311, 312 (2-2-3)

ITM 421 Data Modeling and Applications
Basic data modeling concepts are introduced. Hands-on database design, implementation, and administration of single-user and shared multi-user database applications using a contemporary relational database management system. (2-2-3)

ITM 422 Advanced Database Management
Advanced topics in database management and programming including client server application development are introduced. Expands knowledge of data modeling concepts and introduces object-oriented data modeling techniques. Students will learn the use of Structured Query Language in a variety of application and operating system environments. Prerequisite: ITM 421 (3-0-3)

ITM 423 Advanced Database Management II
Students will learn how to design and develop Client/Server database applications for various business solutions, incorporating Client/Server application design. Business system planning, analysis, development and implementation are discussed. Students will learn how to design event-driven applications utilizing application management tools as well as use of graphical user interface design to create user-friendly applications. Prerequisite: ITM 422 (3-0-3)

ITM 456 Introduction to Open Source Operating Systems
Students learn to set up and configure an industry-standard open source operating system, including the actual installation of the operating system on the student workstation. Also addressed are applications and graphical user interfaces as well as support issues for open source software. Prerequisite: ITM 302 or permission of instructor (2-2-3)

ITM 460 Fundamentals of Multimedia
Students are introduced to computer-based multimedia theory, concepts and applications. Topics include desktop publishing, hypermedia, presentation graphics, graphic images, animation, sound, video, multimedia on the World Wide Web and integrated multimedia authoring techniques. (2-2-3)

ITM 461 Internet Technologies & Web Design
This course will cover how the Internet is organized, addressing, routing, DNS, protocols, TCP/IP, SMTP, the use of Internet applications, and the creation of Web pages using HTML and graphical applications. Networked multimedia distribution technologies are also explored. The design of effective Web site including page layout, user interface design, graphic design, content flow and site structure as well as management of Web site resources including intranet management and design considerations are addressed. Students design and create a major Web site with multiple pages and cross-linked structures. (2-2-3)

ITM 466 XML Technologies and Web Services
The course is a broad survey of XML and Web Services technologies. The student considers these technologies in the development of narrative-centric and data-centric applications within an open-standard, message-based enterprise framework. Web feeds, aggregators, mashups and XML application servers are also treated. A final project will consider best practices in utilizing XML technologies and web services for enterprise web applications. Prerequisites: ITM 411 and ITM 461 (3-0-3)

ITM 492 Embedded Systems and Reconfigurable Logic Design
This course covers embedded system design as well as reconfigurable logic design using a hardware description language (VHDL). Students will discover hardware, software and firmware design trade-offs as well as best practices in current embedded systems development. Real-time operating system (RTOS) topics will be considered to further emphasize embedded hardware-software impacts. A final project will integrate course topics into a System On a Chip (SOC) design including intellectual property (IP) implemented in a Field-programmable Gate Array (FPGA) and driven by application code loaded from either the development platform or from on-board firmware. Prerequisite: Knowledge of digital logic and C or instructor consent. (4-4-6)

ITM 495 Topics in Information Technology
This course will cover a particular topic, varying from semester to semester, in which there is particular student or staff interest. Prerequisite: consent of instructor (Credit: variable)

ITM 511 Application Development Methodologies
Students learn concepts in a systematic approach to the analysis, design, implementation and maintenance of software. Includes studies of the various models of the software life-cycle, Software Development project management, system requirements analysis, and methodologies for practical application of these models to Software Development, including the use of CASE (Computer Aided Software Engineering) tools. Students apply these principles in projects to improve the quality of their development process and final products. Prerequisite: ITM 412 or significant Software Development experience (2-2-3)

ITM 515 Advanced Software Development
This course considers Web container application development for enterprise systems. The primary focus is on database connectivity (JDBC) integration with Web application programming using an enterprise-level application framework. A Web application term project considers the design and implementation of a database instance that serves as the information tier in a contemporary 3-tier enterprise solution. Prerequisite: ITM 411 (2-2-3)

ITM 518 Coding Security
This course examines security architecture elements within modern object-oriented programming languages that create the framework for secure programming. Analysis of components and services with their inherent strength and weaknesses give rise to common coding security challenges. An exploration of identity management, encryption services and common hacking techniques will enable the student to evaluate the level of a systems data exposure. Coding Standards, best practices, guidelines and style will further enhance the student's ability to develop secure code. Homework assignments and a final project will reinforce the theories taught. A final project involves design and implementation of a secure product. Prerequisite: ITM 411 (3-0-3)

ITM 521 Client/ Server Technologies and Applications
This course covers both concepts and practical applications of client server systems, a common form of distributed system in which software is split between server tasks and client tasks. Both central and distributed server models will be studied, with particular focus on middleware, systems planning, and data access. The course includes hands-on development of client-server applications in database systems. Prerequisite: ITM 421 (2-2-3)

ITM 526 Data Warehousing
This class will introduce the student to concepts needed for successfully designing, building and implementing a data warehouse. The class will provide the technological and managerial knowledge base for data modeling approaches such as the star schema and database de-normalization issues. Topics such as loading the warehouse, performance considerations, and other concepts unique to the data warehouse environment will be discussed and demonstrated in detail. Prerequisite: ITM 421 (3-0-3)

ITM 527 Data Financials
This is a hands on course that focuses on the creation, maintenance, and analysis of large financial databases. Concepts such as simulated equities, insurance, and banking database systems. The student is expected to have a working understanding of relational database concepts as well as SQL. Prerequisite: ITM 422 or permission of instructor (3-0-3)

ITM 528 Database Security
Students will engage in an in-depth examination of topics in data security including security considerations in applications & systems development, encryption methods, cryptography law and security architecture & models. Prerequisite: ITM 421 (3-0-3)

ITM 531 Object-Oriented System Analysis, Modeling and Design
This course will cover object oriented approaches to system analysis, data modeling and design that combine both process and data views of systems. Emphasis is given to practical problems and the techniques needed to create solutions in systems design. (3-0-3)

ITM 532 UML-Based Software Development
Study of Software Development using the Unified Modeling Language (UML). Covers architecture-driven and component based techniques for modeling object-oriented applications. Particular emphasis is placed on the hands on application of tools and components used for object oriented systems modeling. Prerequisite: ITM 412 or significant object-oriented programming experience (3-0-3)

ITM 533 Operating System Design Implementation
This course introduces students to the fundamental principles of operating systems design, and gives them hands-on experience with real operating systems installation, design and implementation. The students apply what they learned about operating systems design to practical implementation, by modifying and extending the MINIX Operating System, MS Windows XP and LINUX are briefly discussed as case studies. (3-0-3)

ITM 534 Human/Computer Interaction
Introduction to human-computer interaction, a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use. Emphasis is given to the structure of communication between people and computers, capabilities of people to use computers, concerns that arise in designing and building interfaces, design trade-offs, and the process of specification, design, and implementation of user interfaces. Particular emphasis is placed on practical design and usability of computer system user interfaces. (3-0-3)

ITM 535 Systems Architectures
The course deals with building integrated information infrastructures, including both hardware, software and network components, as a solutions to particular information management needs and requirements. Students should be able to recognize major architectural styles in existing systems, understand how architecture influences long-term system evolution, describe and document an architecture effectively, and design suitable architectural solutions for a problem. Software integration and security issues are addressed. Prerequisite: ITM 531 (3-0-3)

ITM 536 Software Testing and Maintenance
This course covers the basic concepts of software testing and maintenance. The Testing Maturity Model provides a framework for developing a more mature test process. Testing techniques, test metrics and test plan management concepts are described within this framework. Prerequisites: ITM 471 or ITM 571. (3-0-3)

ITM 537 Instructional Technologies
In this course students will create, assess, and deploy current technologies used for K-College instruction and corporate training environments. Topics covered include developing training materials, courses, individualized instruction, websites, multimedia projects, and on-line instruction in educational settings. Focus will be given to modern programming environments and models for developing instructional materials. (3-0-3)

ITM 538 Computer & Network Forensics
This course will address methods to properly conduct a computer and/or network forensics investigation including digital evidence collection and evaluation and legal issues involved in network forensics. Technical issues in acquiring court-admissible chains-of-evidence using various forensic tools that reconstruct criminally liable actions at the physical and logical levels are also addressed. Technical topics covered include detailed analysis of hard disks, files systems (including FAT, NTFS and EXT) and removable storage media; mechanisms for hiding and detecting hidden information; and the hands-on use of powerful forensic analysis tools. (2-2-3)

ITM 539 Stegnography
Digital steganography is the science of hiding covert information in otherwise innocent carrier files so that the observer is unaware that hidden information exists. This course studies both digital steganography and digital steganalysis (the science of discovering the existence of and extracting the covert information). In addition to understanding the science and the pathologies of specific carriers and hiding algorithms, students will have hands-on experience with tools to both hide and extract information. Carrier files such as image, audio and video files will be investigated. Prerequisite: ITM 538 (2-2-3)

ITM 540 Introduction to Data Networks and the Internet
This course covers current and evolving data network technologies, protocols, network components, and the networks that use them, focusing on the Internet and related LANs. The state of worldwide networking and its evolution will be discussed. This course covers the Internet architecture, organization, and protocols including Ethernet, 802.11, routing, the TCP/UDP/IP suite, DNS, Bluetooth, SNMP, DHCP, and more. Students will be presented with Internet-specific networking tools for searching, testing, debugging, and configuring networks and network-connected host computers. There will be opportunities for network configuration and hands-on use of tools. (2-2-3)

ITM 541 Network Administration and Operations
Students learn the details, use, and configuration of network applications. Currently protocols and application technologies considered include SNMP, SMTP, IMAP, POP, MIME, BOOTP, DHCP, SAMBA, NFS, AFS, X, HTTP, DNS, NetBIOS, and CIFS/SMB. Windows 2000 workgroups and domains: file and printer sharing, remote access, and the Windows Network Neighborhood are addressed. A research paper in the above topic areas is required. Prerequisite: ITM 440 or ITM 540 (2-2-3)

ITM 542 Wireless Technologies and Applications
This course will present the foundation of wireless technologies and examine state-of-the-art wireless systems and services, including digital cellular systems (DCS), wireless asynchronous transfer mode (ATM), infrared data transfer (IrDA), wireless local area network technologies including 802.11a/b/g (wireless Ethernet) and Bluetooth, and third-generation (3G) systems such as wireless code division multiple access (W-CDMA) and cdma2000. Security for wireless systems including encryption and authentication issues will also be addressed. Prerequisite: ITM 441 or ITM 541 (3-0-3)

ITM 543 Vulnerability Analysis and Control
This course addresses hands-on ethical hacking, penetration testing, detection of malicious probes and their prevention. It provides students with in-depth theoretical and practical knowledge of the vulnerabilities of networks of computers including the networks themselves, operating systems and important applications. Integrated with the lectures are laboratories focusing on use of open source and freeware tools; students will learn in a closed environment to probe, penetrate and hack other net-works. Prerequisite: ITM 440 (2-2-3)

ITM 545 Telecommunications Technology
Introduction to voice and data communications infrastructure design and implementation. Current infrastructure including components of voice networks (such as carrier switches, PBXs, SS7, T1 trunks, and switched versus dedicated circuits), the Public Switched Telephone Network (PSTN), communications industry structure, telephone-data system interfaces and interaction, and convergence of voice and data communications systems will be examined, along with possible alternative approaches. Also examined will be components of data networks such as modems, multiplexers, virtual circuits, hubs, bridges, and routers and their relationships to voice communication systems. Future directions in the evolution of voice and data communications technology will be highlighted. (3-0-3)

ITM 546 Telecommunications Over Data Networks
This course covers a suite of application protocols known as Voice over IP (VoIP). It describes important protocols within that suite including RTP, SDP, MGCP and SIP and the architecture of various VoIP installations including on-net to on-net, on-net to PSTN and Inter-domain scenarios. The functions of the Network Elements that play significant roles in this architecture will be defined. Examples of network elements that are currently available as products will be examined. Prerequisite: ITM 440 or ITM 540 (3-0-3)

ITM 547 Telecommunications Over Data Networks: Projects & Advanced Methods
Students create projects that exercise and expand their understanding of digital voice communication protocols, features and architectures. Instructional materials and lectures are provided as needed to support projects. These projects will develop a digital voice application or feature, or test a current digital voice product and architecture. Scope and deliverables will be determined through joint decision of the instructor and students. Students will describe requirements, create test plans as needed, demonstrate the operation when applicable, create a written description of the work and deliver a formal presentation to an audience appropriate to the scope and scale of the work completed. Prerequisite: ITM 546 (3-0-3)

ITM 548 System and Network Security
Prepares students for a role as a network security administrator and analyst. Topics include viruses, worms, other attack mechanisms, vulnerabilities and countermeasures, network security protocols, encryption, identity and authentication, scanning, firewalls, security tools, and organizations addressing security. A component of this course is a self-contained team project that, if the student wishes, can be extended into a fully operational security system in a follow-on course. Prerequisite: ITM 440 or ITM 540 (2-2-3)

ITM 549 System and Network Security: Projects & Advanced Methods
Prepares students for a role as a net-work security analyst and developer and give the student experience in developing a production security sys-tem. Topics may include computer and network forensics, advances in cryptography and security protocols and systems; operating system security, analysis of recent security attacks, vulnerability and intrusion detection, incident analysis, and the design and development of secure networks. This course includes a significant real world team project the results in a fully operational security system. Students should have previous experience with object-oriented and/or scripting languages. Prerequisite: ITM 448 or ITM 548 (2-2-3)

ITM 551 Distributed Workstation System Administration
Students learn to set up and maintain PC workstations and servers and to administer PC servers and networks.. Topics include hardware requirements; software compatibility; and system installation, configuration and options and post-installation topics; administrative practices required for file system security; process management; performance monitoring and tuning; storage management; back-up and restoration of data; and disaster recovery and prevention. A group project or research paper will demonstrate mastery of the subject. Prerequisite: ITM 301 (4-4-6)

ITM 552 Client-Server System Administration
Students learn to setup and configure a contemporary operating system, including the actual installation of the operating system on the student workstation, in a networked client-server environment. User account management, security, printing, disk configuration, and backup procedures are addressed, with particular attention to coverage of TCP/IP and TCP/IP applications. System installation, configuration and administration issues as well as network file systems, network access and compatibility with other operating systems are also addressed. A group project or research paper will demonstrate mastery of the subject. Prerequisite: ITM 302 (4-4-6)

ITM 554 Operating System Virtualization
This course will cover technologies allowing multiple instances of operating systems to be run on a single physical system. Concepts addressed will include hypervisors, virtual machines, paravirtualization and virtual appliances. Both server and desktop virtualization will be examined in detail, with brief coverage of storage virtualization and application virtualization. Business benefits, business cases and security implications of virtualization will be discussed. Extensive hands-on assignments and a group project will allow students to gain firsthand experience of this technology. Prerequisite: ITM 301 or ITM 302 or permission of instructor. (2-2-3)

ITM 555 Handheld Device Technologies
An in-depth introduction to contemporary handheld device technologies such as personal digital assistants (PDA), handheld computers, network analysis/security devices and wireless telephone/pager technologies including i-mode and wireless access protocol (WAP). Fundamentals of programming and security considerations for handheld device technology are introduced. Prerequisites: ITM 412, ITM 421, and ITM 461, or a working knowledge of object-oriented programming, database fundamentals, and Web authoring languages. (2-2-3)

ITM 558 Operating System Security
This course will address theoretical concepts of operating system security, security architectures of current operating systems, and details of security implementation using best practices to configure operating systems to industry security standards. Server configuration, system-level firewalls, file system security, logging, anti-virus and anti-spyware measures and other operating system security strategies will be examined. Prerequisite: ITM 301 or ITM 302 (2-2-3)

ITM 562 Web Site Application Development
Programming the Common Gateway Interface (CGI) for Web pages is introduced with emphasis on creation of interfaces to handle Web-based form data. CGI programming is taught in multiple languages. Security of Web sites is covered with an emphasis on controlled access sites. Setup, administration and customization of content management systems including blog and portal sites is introduced. Students design and create a major Web site with including basic CGI programs with Web interfaces and process data flows from online forms with basic database structures. Prerequisite: ITM 461 (2-2-3)

ITM 563 Internet Application Development
In-depth examination of the concepts involved in the development of Internet applications. Students will learn the differences and similarities between Internet applications and traditional client/server applications. A discussion of the technologies involved in creating these Internet applications is included, and students will learn to use these technologies to create robust server-side applications. Also addressed is the role of the Application Service Provider (ASP) in enterprise information technology management. Prerequisite: ITM 411 (2-2-3)

ITM 564 Electronic Commerce Applications and Management
Strategies for management of electronic commerce allow students to learn to re-engineer established business processes to increase enterprise competitive advantage, provide better customer service, reduce operating costs, and achieve a better return on investment. Students will learn to evaluate, use, and deploy state-of-the-art tools and techniques needed to develop a reliable e-commerce offering on the Web. The course will cover state-of-the-art programming and development tools. This class will provide students with hands-on exposure needed to design and build a fully functional e-commerce Web site. Prerequisite: ITM 563 (2-2-3)

ITM 565 Dynamic Web Page Development
Students will learn the W3C and major vendors' Document Object Models (DOM) and how to use scripting syntax and techniques to make use of the DOM in the preparation of dynamic web pages. The role of Cascading Style Sheets in dynamic pages will also be covered in detail. Prerequisite: ITM 461 (2-2-3)

ITM 566 Service-Oriented Architecture and Enterprise Service Bus
This course covers IT enterprise systems employing web services technologies in SOA and ESB architectural patterns. The student considers SOA which defines and provisions IT infrastructure and allows for a loosely -coupled data exchange over disparate applications participating in business processes. The simplification of integration and flexible reuse of business components within SOA is greatly furthered by ESB. Lab exercises using contemporary toolkits are utilized to reinforce platform-agnostic course topics. Prerequisite: ITM 466 (2-2-3)

ITM 567 Enterprise Web Application Development
Students learn how to construct large-scale enterprise applications using current technologies by basing those applications on standardized, modular components and by providing a complete set of services to those components. A final project will integrate and extrapolate best practices for enterprise applications treated throughout the course. Prerequisite: ITM 415 or permission of instructor (2-2-3)

ITM 571
Project Management for Information Technology Management
Basic principles of project management are taught. Includes Software Development concepts of requirements analysis, object modeling and design and software testing. Management of application development and major Web development projects will also be addressed. (3-0-3)

ITM 572 Process Engineering for Information Technology Managers
This course will provide students with the knowledge and skills to define, model, measure and improve business processes. The course will focus on re-engineering processes through the application of technology to achieve significant and measurable improvement. The course will explore the latest industry standards and students will use state-of-the-art software tools for hands-on experiential learning. Prerequisite: ITM 471 or ITM 571
(3-0-3)

ITM 573 Building and Leading Effective Teams
This course will prepare students to be effective IT managers. Students will be introduced to the general challenges of management as well as the challenges unique to leading teams of technology professionals. The course will explore the skills necessary to excel as a leader including dealing with conflict, developing leadership skills, recruiting and developing employees, and leading remote and virtual teams. Students will explore case studies and execute team exercises to enrich their learning experience. Prerequisite: ITM 471 or ITM 571 (3-0-3)

ITM 574 Strategic Information Technology Management
This course defines information technology management strategies, explores the possible information technology strategies of an organization, and provides conceptual frameworks for the development and evaluation of information technology management strategies. It also examines concepts of strategic information technology systems, approaches for analyzing strategic applications, and systems planning as it relates to information technology management strategy and the interface with organizational strategies. (3-0-3)

ITM 575 Networking and Telecommunications Management
This course addresses the design, implementation, and management of computer networks and enterprise telecommunication systems. Design issues in wide area networks and telecommunications with emphasis on Internet connectivity are also addressed. Tools for supporting the distribution and sharing of system resources and information are discussed, along with tools to support network design and management. Prerequisite: ITM 541 (3-0-3)

ITM 578 Information System Security Management
In-depth examination of topics in the management of information technology security including access control systems & methodology, business continuity & disaster recovery planning, legal issues in information system security, ethics, computer operations security, physical security and security architecture & models using current standards and models. (3-0-3)

ITM 581 IT Entrepreneurship
This course prepares students to become leaders in information technology and to build ITM companies. Students design and develop a prototype ITM product and prepare a business plan and venture proposal presentation. (3-0-3)

ITM 582 Business Innovation
This course is designed to teach innovative thinking through theory, methods, and practice of innovation. The course incorporates Einstein's thinking, and Edison's method to establish the innovation process that can be applied in current business environment. Current economic conditions and global sourcing require that innovation become a leading tool for developing a competitive edge. Innovation has been considered a competency of educated design engineering, and the selected few employees possessing this skill has become insufficient today. Corporations and organizations need innovation to develop customer-specific solutions in almost real time. (3-0-3)

ITM 585 Legal and Ethical Issues in Information Technology
Current legal issues in information technology are addressed including elements of contracting, payment systems and digital signatures, privacy concerns, intellectual property, business torts and criminal liability including hacking, computer trespass and fraud. Examination of ethical issues including privacy, system abuse, and ethical practices in information technology equip students to make sound ethical choices and resolve legal and moral issues that arise in information technology. (3-0-3)

ITM 588 Incident Response, Disaster Recovery and Business Continuity
Students learn to design and manage key business information security functions including incident response plans and incident response teams; disaster recovery plans; business continuity plans; and crisis management teams and plans. Reporting, response planning and budgeting are all addressed. Students working in teams will prepare an incident response, disaster recovery, business continuity, or crisis management plan for a real-world organization such as a business or a government body or agency. (3-0-3)

ITM 593 Embedded Systems
This course introduces embedded systems concepts and technology, illustrates the trade-offs which occur as part of embedded systems design, as well as providing practical applications of embedded systems technology. Particular emphasis is given to embedded systems hardware, software and development tools. The course labs include hands-on development of several stand-alone embedded applications using development tools such as compilers, simulators and evaluation boards. Prerequisite: ITM 301 or equivalent computer architecture course; C/C++ programming experience. (2-2-3)

ITM 594 Special Projects in Information Technology
Capstone project. Prerequisite: written consent of instructor (Credit: 1 to 6)

ITM 595 Topics in Information Technology
This course will cover a particular topic, varying from semester to semester, in which there is particular student or staff interest. Prerequisite: consent of instructor (Credit: variable)

ITM 596 Graduate Honors Studies in Information Technology
Graduate honors project, thesis or whitepaper. Prerequisites: Graduate Honors status and consent of instructor (0-12-6)

ITM 597 Special Problems in Information Technology
Independent study and project. Prerequisite: Consent of instructor. (Credit: variable)

Undergraduate Courses Available to Graduate Students in Information Technology & Management as Prerequisites Only

ITM 301 (as a prerequisite only)
Introduction to Contemporary Operating Systems and Hardware I

ITM 302 (as a prerequisite only)
Introduction to Contemporary Operating Systems II

ITM 311 (as a prerequisite only)
Introduction to Software Development

ITM 312 (as a prerequisite only)
Introduction to Systems Software Programming