Revised Graduate Degree / Revised Certificate Program

Office of Academic Affairs
Graduate College
Illinois Institute of Technology
10 W. 35th St., Suite 7D7-1
Chicago, IL 60616
gradcoll@iit.edu

G801

Effective Date (Next AY): Fall 2018

Check one:

- [X] Revise Degree
- [ ] New Specialization
- [ ] Revise Specialization
- [ ] Name Change Only
- [ ] Revise Certificate

☐ **Apply to the prior fall term.** The request may not be applied retroactively more than one academic year (AY). *Affected students may follow the current approved program rules or the revised program rules (when fully approved).* ***A Banner catalog year change for all affected students is requested.***

Academic Unit: Information Technology & Management Date: 9/21/17

Program Name (Current): Master of Cyber Forensics and Security

Program Name (New): (unchanged)

Program Director(s): C. Robert Carlson, Dean and Chair / Ray Trygstad, Associate Chair

A review of the Classification of Instructional Program (CIP) Code is required for each revision. Carefully review and select the code following the instructions below. A degree or certificate program is reported with a separate CIP Code, a specialization is not.

Select a CIP Code

The CIP code takes the following structure: **xx.xxxx** where each x is a number between 0 and 9.

This 6-digit code identifies, to the greatest specificity possible, an entire instructional program.The classification scheme seeks to comprehensively address all areas of study. Because of the dynamic nature of education, however, new CIP codes are frequently added to the list. Does the revision include a change to the CIP code? ☐ Yes [X] No

Current CIP code assignment may be obtained from the Office of the Registrar.

The first 2-digits are the first cut off of detail and describe the general discipline of the program. For example, any program with a CIP that starts with 14 is within the Engineering discipline; anything with a 22 is within the legal discipline.

The next 2 digits increase the level of detail, and the final 2-digits provide the highest level of detail.

Find CIP codes at *http://nces.ed.gov/ipeds/cipcode*

Enter CIP Code: 1 1 . 1 0 0 3

Required if a revised CERTIFICATE PROGRAM - select a SOC code

If this is a revised graduate certificate, a SOC code is required.
The SOC code takes the following structure: **xx-xxxx** where each x is a number between 0 and 9.
Does the revision include a change to the SOC code? ☐ Yes ☐ No

Find the SOC code at http://www.onetonline.org/crosswalk. Locate the "Education" search box and enter the CIP code, perform a search and enter the most appropriate job from the options presented.

Enter SOC Code: ☐☐ - ☐☐☐☐ . ☐☐

***Note: A change of the certificate name, CIP code or SOC code requires Higher Learning Commission and U.S. Department of Education notification and confirmation, which may take up to an additional 90 days after all internal IIT approvals are obtained.**

Approval Requirements:

Graduate Dean Approval Only

For course changes and minor curriculum revisions that do not substantially alter the program

Graduate Studies Approval Also Required

For revised certificate and revisions to a degree program that substantially alter the program

Approval Signatures	Approved	Not Approved			
1) Academic Unit Curriculum Committee Chair	X		R. E. Trygstad	Raymond E Trygstad	9/28/17
			Print	Sign	Date
2) Academic Unit Head	X		C. Robert Carlson	C Robert Carlson	9/28/17
			Print	Sign	Date
3) College Dean	X		C. Robert Carlson	C Robert Carlson	9/28/17
			Print	Sign	Date
4) Graduate Studies Committee Chair					
			Print	Sign	Date

Degree or certificate program elimination require additional approvals 5, 6 and 7:

5) Faculty Council Chair					
			Print	Sign	Date
6) Provost					
			Print	Sign	Date
7) Board of Trustees Confirmation					
			Print	Sign	Date

Certificate Change of Name, CIP Code, or the addition of 50% or more new (certificate exclusive) courses require additional approvals 8, 9 and 10:

8) Approved by the Higher Learning Commission Yes				
	Print	Sign	Date	
9) Submitted to IIT Office of Financial Aid for Title IV Eligiblity Consideration Yes				
	Print	Sign	Date	
10) Confirmation of Title IV eligiblity, by IIT Federal Financial Aid staff member Yes				
	Print	Sign	Date	

Master of Cyber Forensics and Security

1) Program Overview:

a) Program objectives are unchanged from the existing program, which reads :
"At the conclusion of their studies, graduates of this degree should be able to:

- Design and implement a comprehensive enterprise security program using both policy and technology to implement technical, operational and managerial controls
- Comprehensively investigate information security incidents and violation of law using computer resources in a manner such that all evidence is admissible in a court of law.
- Technically secure enterprise information assets and resources to deter, detect, and prevent the success of attacks and intrusions."

2) Program Justification:

a) With the shift of research focus to the simultaneously proposed Master of Science in Applied Cybersecurity and Digital Forensics (MSACDF), a research requirement for this degree is no longer necessary. In addition, LAW 273 and a LAW elective are replaced by ITMM 585, Legal and Ethical Issues in Information Technology and a new course, ITMS 583 Digital Evidence. Removal of the Law courses, which will be included in the M.S., will allow this professional masters degree to be offered entirely online.

3) Program Resources:

a) *Personnel:* No changes to personnel are immediately necessary to offer the degree as a result of these changes.
Faculty associated with this degree:

Full Time	**Adjunct**	
William Lidinsky	Sean Davis	Bonnie A. Goins
Ray Trygstad	Sean M. Hughes-Durkin	Thomas A. Johnson, Jr.
Yong Zheng	Hee Gyu "Hosea" Lee	Philip Matuszak
Dawid Broda (Research Associate)	Louis F. McHugh IV	Donald Nelson
	David Stacey	Kevin Vaccaro

A significant expansion of enrollment resulting from increased online enrollment will result in a significant need for additional faculty; some adjunct faculty already teaching in the deportment are prepared to teach courses in cybersecurity and additional potential faculty members have been identified.

b) *Facilities:* Potential expansion of enrollment will require significant additions to and expansions of RADISH, the Remotely-Accessible Dynamic Infrastructure for Students to Hack. RADISH allows ITM cybersecurity students to have full, unrestricted access to SAT Cyber Forensics and Security Laboratory (ForSec Lab) resources from any location and from nearly any Internet connected device. RADISH enables 24/7 access so students may work on their projects continuously with no logistic concern. RADISH was designed and developed by Illinois Tech faculty and student lab staff as an integral component of the ForSec Lab. A recent grant for $299,000 from the National Security Agency will enable us to significantly expand the capabilities, reach, and capacity of the RADISH system, which will in turn allow the department to significantly expand the number of online students in cybersecurity curricula.

4) Program Description

a) *Changes to Degree Requirements:* This change removes a project course requirement for completion of the degree, although a project remains an option. It removes two LAW courses and replaces them with ITMM 585, Legal and Ethical Issues in Information Technology and a new course, ITMS 583 Digital Evidence.
b) *Changes to Admission Criteria:* There are no changes from the current prerequisites for program admission.

5) Identify Planned Revisions:

a) *Changes to Courses:*
   i. New course ITMS 583 Digital Evidence will replace LAW 273 Evidence. The course description and full course details are in the attached syllabus.
   ii. Existing course ITMS 585 Legal and Ethical Issues in Information Technology will replace a LAW elective.
   iii. The requirement to complete a research course, ITMS 549 or ITMS 539, is removed.
b) *Changes to Required Credit Hours:* There **no changes** to the required number of credit hours.
c) *Changes to the Degree Title:* There **no changes** to the Degree Title
d) *Changes to Specializations:* There are no specializations in this degree.

Graduate Program Type: Professional Masters Degree

Master of Cyber Forensics and Security Program Requirements:

1. Minimum credit hours (no ranges) **30**
2. Project course required? **Optional**
   - **a.** List specific details about the project option: **Students may select from Project courses:**
     ITMS 539 Stegonography
     ITMS 549 Cyber Security Technologies: Projects & Advanced Methods
     ITMT 594 Special Projects in Information Technology
     ITMT 597 Special Problems in Information Technology
     Specific course details are included in the attached Bulletin excerpt at the end of this document. Students electing a project option course must complete ITMS 548 Cyber Security Technologies in a live section with a project component. Registration in ITMS 548 for students in this degree will be by permit only to ensure the correct section for the selected option is taken.
3. Project report/review required? **Optional; however if a project is completed a project report is required.**
4. Comprehensive exam? **No**
5. Required specialization/concentration? **No**

Master of Cyber Forensics and Security Credit Hour Requirements:

1. Core course credit hours required: **18**
   - a. Core course credit hours rules: **See the attached Bulletin excerpt at the end of this document.**
   - b. Core Course Numbers: **The following core courses must be taken in this degree**.
     ITMM 585 Legal and Ethical Issues in Information Technology
     ITMS 538 Cyber Forensics
     ITMS 543 Vulnerability Analysis and Control
     ITMS 548 Cyber Security Technologies
     ITMS 578 Cyber Security Management
     ITMS 583 Digital Evidence
2. Seminar or colloquium (circle one) credit hours required: **0**
3. Project course credit hours (range allowed): **minimum 0 and maximum 9**
   - a. List project course number:
     ITMS 539 Stegonography
     ITMS 549 Cyber Security Technologies: Projects & Advanced Methods
     ITMT 594 Special Projects in Information Technology
     ITMT 597 Special Problems in Information Technology
     (All are optional electives)
4. Elective course credit hours (range allowed): **minimum 12 and maximum not specified**
5. List course numbers: **The following elective courses may be taken in this degree**.
   ITMM 586 Information Technology Auditing
   ITMO 556 Introduction to Open Source Software
   ITMS 518 Coding Security
   ITMS 528 Database Security
   ITMS 539 Steganography
   ITMS 549 Cyber Security Technologies: Projects & Advanced Methods
   ITMS 555 Mobile Device Forensics
   ITMS 557 Introduction to Cyber Warfare
   ITMS 558 Operating Systems Security
   ITMS 579 Topics in Information Security
   ITMS 584 Governance, Risk, and Compliance
   ITMS 588 Incident Response, Disaster Recovery, and Business Continuity
   ITMT 594 Special Projects in Information Technology
   ITMT 597 Special Problems in Information Technology
   - a. Elective course credit rules:
     i. 400 credit hour limit? **No; 400-level courses may not be applied to the degree.**
     ii. If yes, how many hours allowed? **N/A**
     iii. 500-600 level credit hour limits: **30 minimum and no specified maximum.**
     iv. 700 level credit hour maximum: **6 hours maximum may be substituted for 500-level coursework.**
6. List specialization/concentration credits hours required **0; there are no specializations.**

The Math: Core + Elective = 18 + 12 = 30

MASTER OF CYBER FORENSICS AND SECURITY

At the conclusion of their studies, graduates of the Master of Cyber Forensics and Security degree should be able to:

- Design and implement a comprehensive enterprise security program using both policy and technology to implement technical, operational, and managerial controls.
- Comprehensively investigate information security incidents and violation of law using computer resources in a manner such that all evidence is admissible in a court of law.
- Technically secure enterprise information assets and resources to deter, detect, and prevent the success of attacks and intrusions.

Illinois Institute of Technology has been designated as a National Center of Academic Excellence in Cyber Defense Education by the National Security Agency and the U.S. Department of Homeland Security. This designation results from meeting stringent Center of Academic Excellence criteria and mapping of information technology and management curricula to a core set of cyber defense knowledge units. Students attending Center of Academic Excellence in Cyber Defense Education institutions are eligible to apply for scholarships and grants through the Department of Defense Information Assurance Scholarship Program and the Federal Cyber Service Scholarship for Service Program. This designation reflects Illinois Institute of Technology's commitment to producing professionals with cyber defense expertise for the nation.

Curriculum

Required Core Courses			(18) [1]
ITMS 538	Cyber Forensics		3
ITMS 543	Vulnerability Analysis and Control		3
ITMS 548	Cyber Security Technologies		3
ITMS 578	Cyber Security Management		3
ITMS 583	Digital Evidence		3
ITMM 585	Legal and Ethical Issues in Information Technology		3
Elective Courses [2]			(12)
Select a minimum of 12 credit hours from the following:			12
Any 500-level ITMS course not listed in required courses above. [3]			
ITMM 586	Information Technology Auditing	3	
ITMO 556	Introduction to Open Source Software	3	
ITMT 594	Special Projects in Information Technology	3	
ITMT 597	Special Problems in Information Technology	3	

Minimum degree credits required: 30

1. Core course requirements 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 chair.
2. Students electing a research option course (ITMS 539, ITMS 549, ITMT 597) must complete ITMS 548 Cyber Security Technologies in a live section with a project component.
3. ITMS 579 may be taken more than once.

INFORMATION TECHNOLOGY AND MANAGEMENT

Perlstein Hall
10 W. 33rd Street, Room 223
Chicago, IL 60616
appliedtech.iit.edu/information-technology-and-management

Daniel F. and Ada L. Rice Campus
201 E. Loop Road
Wheaton, IL 60189

Dean and Chair
C. Robert Carlson

Faculty with Research Interests
For more information regarding faculty visit the Department of Information Technology and Management website.

The mission of the Department of Information Technology and Management is to educate and inform students to prepare them to assume technical and managerial leadership in the information technology and cybersecurity fields. The information technology and management degrees apply a hands-on, reality-based approach to education that allows students to apply what they learn in class to solve real-life problems. Additional courses may be taken from the Chicago-Kent College of Law curriculum to give cybersecurity and forensics practitioners a thorough grounding in legal issues and compliance. 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 Master of Information Technology and Management degree online.

Laboratories and Research Centers

The School of Applied Technology operates and administers over 400 computers and servers at the Mies and Rice campuses to support teaching, learning and research. Ten laboratories include a networking/network security and computer forensics facility, and a dedicated Real-Time Communications (RTC) facility which includes an entire CISCO VoIP LAN as well as video and mesh wireless capabilities. The security/forensics and RTC laboratories as well as the general-use laboratories provide additional facilities for student projects and applied research, some of which is undertaken in conjunction with industry partners. Some laboratories are available for student use outside of class hours, and one or more laboratories are available for student use weekdays between 10 a.m. and 10 p.m. 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.

The Center for Cyber Security and Forensics Education

The Center for Cyber Security and Forensics Education (C^2SAFE) is a multi-disciplinary center within the School of Applied Technology. The objectives of the Center for Cyber Security and Forensics Education are to:

- Develop, promote and support education and research in cyber security technologies and management, information assurance, and digital forensics across all academic disciplines at Illinois Institute of Technology.
- Engage with business and industry, government, professional associations, and community colleges to enhance knowledge, awareness, and education in cyber security and digital forensics and improve practices in information assurance.
- Coordinate the designation of Illinois Institute of Technology as a National Center of Academic Excellence in Cyber Defense Education by the National Security Agency and the Department of Homeland Security.
- Maintain resources for education and research in cyber security and digital forensics, publish student and faculty research in the field, and sponsor, organize, and conduct conferences and other events to promote and advance cyber security and forensics education.
- Support university academic departments in the delivery of the highest caliber of cyber security and digital forensics education.

The center plans, organizes and conducts the annual ForenSecure conference in the spring of each year, as well as additional activities and student competitions that advance the mission of the center.

The center actively cooperates and coordinates activities with agencies of the federal government and with professional organizations and programs such as the Information Systems Security Association (ISSA), the Information Systems Audit and Control Association (ISACA), the Association of Information Technology Professionals (AITP), the Association for Computing Machinery (ACM), the Institute of Electrical and Electronic Engineers (IEEE), UNIFORUM, CompTIA, Infragard, and others. The center makes every effort to engage in joint activities with these organizations and to encourage them to engage with the center whenever possible.

Resources for education and research as well as published student and faculty research in the form of technical reports and white papers are available on the center's website at ccsafe.iit.edu/.

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 contemporary 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; 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 low scores on the GRE verbal may be required to complete an English evaluation. If students cannot pass the examination or evaluation they will be required to enroll in an appropriate PESL course and demonstrate proficiency at course completion.

Accelerated Courses

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

Accelerated courses provide an opportunity for degree-seeking students at the university 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.

Admission Requirements

Applicants for admission to a professional masters degree must have earned a four-year bachelor's 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 300 (combined quantitative and verbal), 151 quantitative, and 3.0 analytical writing and may be required to submit a TOEFL score (see Graduate Admission). Applicants for admission to a master of science degree should hold a four-year bachelor's degree in a computing or computing-related engineering discipline from an accredited institution with a minimum cumulative undergraduate GPA of 3.0/4.0 and minimum GRE score of 305 (combined quantitative and verbal), 151 quantitative, and 3.0 analytical writing; International applicants may be required to submit a TOEFL score (see Graduate Admission). Applicants admitted to a master of science degree who do not hold a four-year bachelor's degree in a computing or computing-related engineering discipline may be required to complete up to one year of prerequisite courses prior to beginning formal graduate studies. 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 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 Illinois Institute of Technology. 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.

Current prerequisites for the Master of Information Technology and Management include computer hardware and operating system literacy (ITM 301 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); basic knowledge of HTML, CSS, and JavaScript (ITMD 361); and the ability to create and administer databases using a modern database management system (ITMD 421). Students enrolled in undergraduate post-baccalaureate studies (see Graduate Admission) may take these courses as part of that program.

Current prerequisites for the Master of Cyber Forensics and Security include computer hardware and operating system literacy (ITM 301 or equivalent coursework, certification, or experience); an ability to program at a competent level using a contemporary programming language (ITMD 411 or ITMD 510); basic knowledge of networking concepts, protocols, methods, and the Internet (ITMO 440 or ITMO 540); and the ability to create and administer databases using a modern database management system (ITMD 421).

Current prerequisites for the Master of Science in Applied Cybersecurity and Digital Forensics include computer hardware and operating system literacy (ITM 301 or equivalent coursework, certification, or experience); an ability to program at a competent level using a contemporary programming language (ITMD 411 or ITMD 510); basic knowledge of networking concepts, protocols, methods, and the Internet (ITMO 440 or ITMO 540); the ability to create and administer databases using a modern database management system (ITMD 421); and completion of a program of mathematics culminating in a calculus-based course in probability and statistics (MATH 474).

Degrees Offered

- Master of Cyber Forensics and Security
- Master of Information Technology and Management
- Master of Science in Applied Cybersecurity and Digital Forensics

Certificate Programs

- Advanced Software Development
- Cyber Security Management
- Cyber Security Technologies
- Data Center Operations and Management
- Data Management and Analytics
- Digital Voice and Data Communication Technologies
- Information Technology Innovation, Leadership, and Entrepreneurship
- System Administration
- Systems Analysis
- Web Design and Application Development

Course Descriptions

ITMD 510
Object-Oriented Application 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 clientinterfaces. Software engineering topics of packaging and deployment are covered as well. Strong emphasis is placed on the creation of applications providing solutions for defined business problems. Hands-on exercises reinforce concepts taught throughout the course.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 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(s): [(ITMD 510)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 512
Structured and Systems Programming
Structured programming with advanced concepts including strings, arrays, pointers, data structures, file manipulation, and dynamic memory management. Students create 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 including the philosophy of OOP, classes and objects, inheritance, template classes, and making use of class libraries. Strong emphasis is placed on the creation of applications providing solutions for defined business problems or specific operating system issues.
Prerequisite(s): [(ITM 312)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 513
Open Source Programming
Contemporary open-source programming languages and frameworks are presented. The student considers design and development topics in system, graphical user interface, network and web programming. Dynamic scripting languages are covered using object-oriented, concurrent and functional programming paradigms. Concepts gained throughout the course are reinforced with numerous exercises which will culminate in an open-source programming project.
Prerequisite(s): [(ITMD 510)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 515
Advanced Software Programming
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(s): [(ITMD 510)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 519
Topics in Software Development
This course will cover a particular topic in software development varying from semester to semester in which there is particular student or staff interest. The course may be taken more than once but only 9 hours of ITMD 419/519 credit may be applied to a degree.
Credit: Variable

ITMD 521
Client/Server Technologies and Applications
This course covers both concepts and practical applications of distributed data paradigms. This provides a comparison between SQL and MapReduce. The course focuses on how to treat and prepare unstructured data to be used in the MapReduce framework in a parallel fashion. Students will be tasked with learning and demonstrating the MapReduce framework through implementing the Hadoop framework and associated Java technology.
Prerequisite(s): [(ITMD 510)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 523
Advanced Topics in Data Management
Advanced topics in database management and programming including client server application development are introduced. Students will learn the use of Structured Query Language in a variety of application and operating system environments. Expands knowledge of data modeling concepts and introduces object-oriented data modeling techniques with specific attention to the use of database management systems in response to defined business problems.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 525
Topics in Data Science and Management
This course will cover a particular topic in databases, data science, data management, or data analytics, varying from semester to semester, in which there is particular student or staff interest.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 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 demonstrated in detail.
Prerequisite(s): [(ITMD 523)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 527
Data Analytics
This is a hands-on course that focuses on the creation, maintenance, and analysis of large informatics databases. Concepts such as data modeling, probability, linear regression, and statistical data analysis are covered in depth. In addition, this course will use large simulated equities, healthcare, insurance, and banking database systems. The student is expected to have a working understanding of relational database concepts as well as SQL.
Prerequisite(s): [(ITMD 523)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 529
Advanced Data Analytics
Informatics is the application of information technology to solve problems in other fields. Informaticists use technology and information to build intelligent systems used to bridge the gaps between information, technology, and the people who use it. The study of informatics is about blending applied mathematics with technology while understanding the broader consequences of computing on society and the problem being solved. It is important for any student to develop a broad perspective of technology and the people it serves. This course builds upon the student's knowledge of mathematical concepts of predictive modeling of samples and populations with an emphasis on applying technology to solve real world problems.
Prerequisite(s): [(ITMD 527)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 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(s): [(ITMD 510) OR (ITMD 512) OR (ITMD 515)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 534
Human and 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.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 535
Human-Computer Interaction Design
Advanced study in human-computer interaction with a particular focus on the design of application and web interfaces.
Prerequisite(s): [(ITMD 534)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 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.
Prerequisite(s): [(ITMD 510)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 545
Web Real-Time Communications
This course covers a set of protocols, architectures, and APIs designed to enable browser-to-browser real-time communication of voice, video, and data. Students will learn to apply basic technologies including WebSockets, HTTP, HTML5, Web Sockets, NAT, STUN, TURN, and ICE to ensure two-way real-time communication is established using the WebRTC API's and architectures. Students will use JavaScript and development environments to create basic data and media applications based on the WebRTC technologies and will record the impact of their applications on the performance and behavior of the networks that carry them.
Prerequisite(s): [(ITMD 510, ITMO 540, and ITMO 556)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 553
Enterprise Intelligent Device Applications
Intelligent device application development is covered with proprietary enterprise and open-source technologies on media device, mobile, and robotic platforms. Utilizing contemporary toolkits, the student considers design and development on simulated and real "smart" devices including smart phones, tablets, sensors, actuators, drones, and robots. Numerous exercises reinforce concepts gained throughout the course. A term project will integrate course topics into a comprehensive intelligent device application.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 554
Mass-Market Intelligent Device Applications
Intelligent device application development is covered with leading mass-market and open-source technologies on media device, mobile, and robotic platforms. Utilizing contemporary toolkits, the student considers design and development on simulated and real "smart" devices including smart phones, tablets, sensors, actuators, drones, and robots. Numerous exercises reinforce concepts gained throughout the course. A term project will integrate course topics into a comprehensive intelligent device application.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 555
Open-Source Intelligent Device Applications
Intelligent device application development is covered with various technologies on mobile and robotic platforms. Utilizing contemporary toolkits, the student considers design and development on emulated and real "smart" devices including smart phones, personal digital assistants, sensors, actuators, and robots. Numerous exercises reinforce concepts gained throughout the course. A term project will integrate course topics into a comprehensive intelligent device application.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 556
Intelligent Device Projects
Students create projects that exercise and expand their understanding of intelligent device application development. Instructional materials and lectures are provided as needed to support projects. 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 application when applicable, create a written description of the work, and may deliver a formal presentation to an audience appropriate to the scope and scale of the work completed. This course may be taken more than once but only 6 hours of ITMD 556 credit may be applied to a degree.
Prerequisite(s): [(ITMD 553) OR (ITMD 554) OR (ITMD 555)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 562
Web Site Application Development
Programming the Common Gateway Interface (CGI) for Web pages is introduced with emphasis on creation of interfaces to handle HTML 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 Web site including basic CGI programs with Web interfaces and process data flows from online forms with basic database structures.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 563
Intermediate Web 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.
Prerequisite(s): [(ITMD 510)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 564
Advanced Web Application Development
Strategies for management of electronic commerce allow students to learn to re-engineering 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(s): [(ITMD 563)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 565
Rich Internet Applications
Students learn to create interactive rich Internet applications using Web development frameworks, applications, and techniques that primarily operate on the client-side. These applications often exhibit the same characteristics as desktop applications and are typically delivered through a standards-based Web browser, via a browser plug-in, or independently via sandboxes or virtual machines. Current software frameworks used to download, update, verify and execute these applications are addressed as well as writing applications for deployment in these frameworks.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 566
Service-Oriented Architectures
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(s): [(ITMD 510)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMD 567
Web Systems Integration
In this project-based course, student teams will build an enterprise-grade website and web infrastructure integrating server-side applications, databases, and client-side rich internet applications as a solution to a defined business problem.
Prerequisite(s): [(ITMD 562 and ITMD 565)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 569
Topics in Application Development
This course will cover a particular topic in application development, varying from semester to semester, in which there is a particular student or staff interest. This course may be taken more than once but only 9 hours of ITMD 569 credit may be applied to a degree.
Credit: Variable

ITMM 537
Service Level Agreements
Management of service level agreements (SLAs) at an enterprise level is presented from both a client and service provider perspective. Fundamental structure and issues of contract law are introduced and various models for management of service level agreements are presented. The role of SLAs in enterprise architecture and planning is addressed, and service level definitions, quality of service, and performance metrics are examined.
Prerequisite(s): [(ITMM 570)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 570
Fundamentals of Management for Technology Professionals
This course explores fundamentals of management for professionals in high-technology fields. It addresses the challenges of the following: managing technical professionals and technology assets; human resource management; budgeting and managerial accounting; management of services, infrastructure, outsourcing, and vendor relationships; technology governance and strategy; and resource planning.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 571
Project Manangement 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.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 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(s): [(ITMM 570)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 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(s): [(ITMM 570)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 574
Information Technology Management Frameworks
This course will examine the application of industry standard frameworks to the management of information technology infrastructure, development and operations. Frameworks including the Information Technology Infrastructure Library (ITIL), Control Objectives for Information and related Technology (COBIT), and others will be covered. Students will learn to use these frameworks to tailor a set of concepts and policies to necessary manage IT in a specific enterprise.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 575
Networking and Telecommunications Management
This course address the design, implementation, and management of computer networks and enterprise telecommunications 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.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 576
Data Center Management
This course is an in-depth examination of best practices in the management of enterprise data centers. Topics include data center consolidation; data center maintenance; server and network management methods and tools; budget and finance; service-level agreements; managing data center personnel and staff; and disaster recovery.
Prerequisite(s): [(ITMT 535)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 577
Case Studies in Management of Information Technology
This course examines approaches and models for the management of information technology at an enterprise level through the use of case studies in the field.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 581
Information Technology 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.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 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 requires that innovation becomes a leading tool for developing a competitive edge. Innovation has been considered a competency of educated, design engineering, and a selected few employees that has become insufficient today. Corporations and organizations need innovation to develop customer-specific solutions in almost real time.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 584
Information Technology at C-Level
The issues, competencies, challenges and rewards of managing information technology in major enterprises at the Chief Information Officer/Chief Technology Officer level are examined in depth. The course will equip students with a fundamental awareness of what the enterprise and the profession expects from the highest levels of IT management. Readings, case studies and guided discussions will be supplemented by a series of guest lectures from-and discussions with-Chicago-area IT professional currently employed in these roles.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 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.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 586
Information Technology Auditing
Industry standard practices and standards in the auditing of information technology in an organization are addressed, with a particular emphasis on examination of IT governance, assets, controls, and control techniques. Specific areas covered will include the audit process, IT governance, systems and infrastructure life cycle management, IT service delivery and support, protection of information assets, and business continuity and disaster recovery. Students will examine case studies and complete hands-on exercises.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 517
Shell Scripting for System Administration
Focuses on preparation of shell scripts to enhance and streamline system administration tasks in all contemporary server operating systems. Scripting will be taught in both native and portable environments. The course will address shell programming, regular expressions, common and system-specific shell utilities and built-in commands, user defined and shell variables, flow control structures, shell functions, and the creation and execution of shell scripts. Homework and hands-on exercises will provide practical experience in contemporary server environments. Same as ITMO 417.
Prerequisite(s): [(ITMO 556)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 533
Enterprise Server Administration
Students learn to set up, maintain, and administer X86-based servers and associated networks using a contemporary industry-standard proprietary operating system. Topics include hardware requirements; software compatibility; system installation, configuration, and options and post-installation topics; administrative and technical practices required for system security; process management; performance monitoring and tuning; storage management; back-up and restoration of data; and disaster recovery and prevention. Also addressed is configuration and administration of common network and server services such as DNS, DHCP, remote access, email, basic virtualization, web and web services, and more.
Prerequisite(s): [(ITMO 540)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 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, 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.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 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 workgroups and domains: file and printer sharing, remote access, and Windows networking are addressed. A research paper in the above topic areas is required.
Prerequisite(s): [(ITMO 540)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 542
Wireless Technologies and Applications
This course will provide students with the knowledge of wireless communication technologies. The course will focus on the 3G and 4G wireless networks such as UMTS, LTE, and WiMAX. Students will have the opportunity to study the different wireless networks architectures and major network elements including devices, base stations, base station controller, and core networks. Major topics of the course include air interfaces, protocols, session management, QoS, security, mobility, and handoff.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 544
Cloud Computing Technologies
Computing applications hosted on dynamically-scaled, virtual resources available as services are considered. Collaborative and non-collaborative "cloud-resident" applications are analyzed with respect to cost, device/location independence, scalability, reliability, security, and sustainability. Commercial and local cloud architectures are examined. A group-based integration of course topics will result in a project employing various cloud computing technologies.
Prerequisite(s): [(ITMD 510 and ITMO 556)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 545
Telecommunications Technology
This course introduces technologies underlying telecommunications and real-time communications systems and services. Topics will include: wire-line and fiber systems including those associated with the public switched telephone networks and cable service providers; wireless systems including cellular, WiFi and WiMAX. Methods and architectures for delivery of signaling, voice and video are introduced; analog telephone systems, digital telephone systems on circuit switched networks both wire-line and cellular; digital telecommunications on packet switched networks. Codecs and transformation of voice and video into digital formats are introduced. Physical and data-link layer protocols are studied with emphasis on how they carry voice and video. Channelization and multiple-access methods are introduced. Switching methods studied include circuit switching, virtual circuit switching and packet switching.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 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 to PSATN 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.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 547
Telecommunications Over Data Networks: Projects and Advanced Methods
Mentored projects focused on real-time media applications, systems and services. HTTP-based and SIP-based systems are studied; reference is made to RTCWeb, W3C and IETF specifications and initiatives. Topics may include web-based real-time media applications; web-conferencing and distributed class-room applications; communications systems using SIP and Web technologies; standards-based systems supporting emergency calls over IP backbone networks; metrics for performance characteristics of real-time systems; security of streaming media; interoperability/conformance testing of real-time applications and services. Students present/demonstrate projects in a public meeting. Students should have previous or concurrent experience with one or more of the following: SIP, HTTP, HTML, and scripting or coding languages.
Prerequisite(s): [(ITMO 546)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 550
Enterprise End-User System Administration
Students learn to set up, configure, and maintain end-user desktop and portable computers and devices in an enterprise environment using a contemporary proprietary operating system, including the actual installation of the operating system in a networked client-server environment. User account management, security, printing, disk configuration, and backup procedures are addressed with particular attention to coverage of networked applications. System installation, configuration, and administration issues as well as network file systems, network access, and compatibility with other operating systems are also addressed. Administration of central server resources associated with management and provisioning of end-user systems in workgroups, domains, or forests is also addressed.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 553
Open Source System Administration
Students learn to set up, configure, and administer an industry-standard open source server operating system including integration with client systems using a variety of operating systems in a mixed environment. Topics include hardware requirements; software compatibility; administrative and technical practices required for system security; process management; performance monitoring and tuning; storage management; back-up and restoration of data; and disaster recovery and prevention. Also addressed are configuration and administration of common network and server services such as DNS, DHCP, firewall, proxy, remote access, file and printer sharing, email, web, and web services as well as support issues for open source software.
Prerequisite(s): [(ITMO 540 and ITMO 556)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 554
Operating Systems 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 first-hand experience of this technology.
Prerequisite(s): [(ITMO 556)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 556
Introduction to Open Source Software
This course will cover the fundamental concepts and philosophy behind free and open source software (FOSS). The course will discuss open source and free software licensing; open source business strategies and impact; FOSS utilization in the enterprise; and development methodologies. Students will learn to set up and configure an industry-standard open source operating system, including system installation, and basic system administration; system architecture; package management; command?line commands; devices, filesystems, and the filesystem hierarchy standard. Also addressed are applications, shells, scripting and data management; user interfaces and desktops; administrative tasks; essential system services; networking fundamentals; and security, as well as support issues for open source software. Multiple distributions are covered with emphasis on the two leading major distribution forks.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 557
Storage Technologies
Modern enterprise data storage technologies and architectures are examined in depth. Topics include storage devices, file systems, storage networks, virtual storage, RAID, NAS, SAN, and other current enterprise-level storage models. Storage management, replication, deduplication, storage tiers, backups as well as fundamentals of business continuity, application workload, system integration, and storage/system administration are addressed. Specific knowledge and skills required to configure networked storage to include archive, backup, and restoration technologies are covered.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 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's ability to develop secure code. Homework assignments and projects will reinforce theories taught.
Prerequisite(s): [(ITMD 510) OR (ITMD 512) OR (ITMD 515)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 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.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 538
Cyber 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.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMS 539
Steganography
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(s): [(ITMS 538) OR (ITMS 548)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMS 543
Vulnerability Analysis and Control
This course addresses hands-on ethical hacking, penetration testing, and 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 the use of open source and freeware tools; students will learn in a closed environment to probe, penetrate and hack other networks.
Prerequisite(s): [(ITMO 540)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMS 548
Cyber Security Technologies
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 he extended into a full operational security system in a follow-course,
Prerequisite(s): [(ITMO 540)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMS 549
Cyber Security Technologies: Projects & Advanced Methods
Prepares students for a role as a network security analyst and developer and gives the student experience in developing a production security system. 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 design and development of secure networks. This course includes a significant real world team project that results in an fully operational security system. Students should have previous experience with object-oriented and/or scripting languages.
Prerequisite(s): [(ITMS 539)]AND[(ITMS 548)]
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMS 555
Mobile Device Forensics
This course will address methods for recovering digital data or evidence and conducting forensic analysis of mobile devices such as smart phones and tablets. Various devices will be compared including iPhone, Android, and Blackberry. A brief review of Linux and related forensic tools. ANAND technology and mobile file systems will be discussed. Students will learn how to unlock and root mobile devices and recover data from actual mobile devices.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMS 557
Introduction to Cyber Warfare
Cyber warfare is defined as "warfare waged in cyberspace," which can include defending information and computer networks and deterring information attacks as well as denying an adversary's ability to do the same. It can include offensive information operations mounted against an adversary or even dominating information on the battlefield. Students participating in this discussion-based course will explore the current state of cyber security from national and international perspectives and consider cyber-based operations through the lens of a government pursuing strategic goals. How might their actions impact the industry's ability to conduct business operations? What does the current threat environment look like? The course will include extensive discussions and student presentations.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 558
Operating Systems 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.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMS 578
Cyber 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.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 579
Topics in Information Security
This course will cover a particular topic in Information Security, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITMS 579 credit may be applied to a degree.
Credit: Variable

ITMS 583
Digital Evidence
In this course, students learn the fundamental principles and concepts in the conduct of investigations in the digital realm. Students will learn the process and methods of obtaining, preserving and presenting digital information for use as evidence in civil, criminal, or administrative cases. Topics include legal concepts and terminology, ethics, computer crime, investigative procedures, chain of custody, digital evidence controls, processing crime and incident scenes, data acquisition, e-mail investigations, applicable case law, and appearance as an expert witness in a judicial or administrative proceeding.
Prerequisites: ITMS 538 Cyber Forensics
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 584
Governance, Risk, and Compliance
This course is an in-depth examination of topics in information technology/information security governance, risk, and compliance including information assurance policies, standards, and compliance as well as the examination of security risk analysis and the performance of systems certification and accreditation.
Prerequisite(s): [(ITMS 578)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 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; and business continuity plans. Reporting, response planning and budgeting are all addressed. Students working in reams will prepare an incident response, disaster recovery, or business continuity plan for a real-world organizations such as a business or a government body or agency.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMT 514
Enterprise Application Architecture
This course examines current enterprise application architectures from the perspective of senior technology planners and managers. Topics such as models and patterns of enterprise application architecture, application virtualization, cloud application architectures, integration of custom application infrastructure with major vendor products, and full systems integration issues will be addressed.
Prerequisite(s): [(ITMD 510)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMT 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.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMT 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 learn about operation systems design to practical implementation by modifying and extending the MINIX Operating System. MS Windows and LINUX are briefly discussed as case studies.
Prerequisite(s): [(ITMD 512)]
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMT 535
Data Center Architecture
The course deals with building integrated data center information infrastructures, including facility, hardware, software, and network components as solutions to particular enterprise information management needs and requirements. Students will learn critical elements of modern data center design including physical plant construction; network infrastructure; data storage technologies; power provisioning and conditioning; environmental controls and HVAC; system and physical security; modular component use; and planning for growth.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMT 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.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMT 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.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMT 594
Special Projects in Information Technology
Special projects.
Credit: Variable

ITMT 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.
Credit: Variable

ITMT 596
Graduate Honors Studies in Information Technology
Graduate honors project, thesis or whitepaper. Prerequisites: Graduate honors status and consent of the instructor.
Credit: Variable

ITMT 597
Special Problems in Information Technology
Independent study and project.
Credit: Variable

TECH 565
Introduction to Social Commerce
Provides an introduction and basic knowledge of social commerce to help students develop a practical understanding of the design, construction, market readiness, and synergistic integration of a business mobile application. The course will provide a practitioner focus that will benefit students in a start-up or company/corporate setting.
Lecture: 3 **Lab:** 0 **Credits:** 3

TECH 580
Topics in the Management of Technology
This course will cover a particular topic, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of TECH 580 credit may be applied to a degree.
Credit: Variable

TECH 581
Consulting for Technical Professionals
This course explores the application of technology and technical management skills to working with business, industry, or various professions in solving specific problems for an organization as an internal or external consultant. Students learn how to involve clients in all phases of problem identification and solution with the goal that, at the end of a consulting assignment, the clients are able
to sustain the necessary changes in their organization. Particular attention is paid to managing expectations among change agents, managers, executives, technical professionals, and other members of the organization. The course will cover the most critical, high- level, functional frameworks used by top consulting firms today as well as the tools commonly used by consulting professionals.
Lecture: 3 **Lab:** 0 **Credits:** 3

TECH 597
Special Problems in Technology
Independent study and projects in applied technology that are multi/ cross-disciplinary not tied to a specific department.
Credit: Variable

ITMS 583 Digital Evidence
Spring 2018

Professor Shawn Davis

Professor: **Shawn Davis**
Address: Department of Information Technology & Management, 10 W. 33rd St., Chicago, IL 60616
Telephone: 312.248.3454
Email: sdavis17@iit.edu
Office: Perlstein Hall Suite 225, 10 W. 33rd St.
Office Hours: By appointment in person, or online via *GoogleHangout* (username *sdavis17@iit.edu*) or by telephone to 312.248.3454

Course Catalog Description: In this course, students learn the fundamental principles and concepts in the conduct of investigations in the digital realm. Students will learn the process and methods of obtaining, preserving and presenting digital information for use as evidence in civil, criminal, or administrative cases. Topics include legal concepts and terminology, ethics, computer crime, investigative procedures, chain of custody, digital evidence controls, processing crime and incident scenes, data acquisition, e-mail investigations, applicable case law, and appearance as an expert witness in a judicial or administrative proceeding. **Prerequisites:** ITMS 538 Cyber Forensics **Credit:** 3-0-3 Semester Hours

Lecture Day, Time & Place: Day TBD, 6:25pm-9:05pm, room TBD, or online via IIT Online.

Course Objectives: Each successful student will demonstrate foundation knowledge and application of digital evidence and e-discovery concepts as they apply to the investigation of computer crimes and cyber security incidents in a large organizational environment. Students will describe and identify policy frameworks, legal and moral implications, and best practices in the collection, processing and presentation of digital evidence. Students will be able to conduct digital investigations in full compliance with applicable law, policy, and regulations, and present the investigative results as an expert witness.

Schedule of Topics/Readings: ***You should do all readings prior to class.***

Session	Week of	General Topic	Reading
1	January 8	Introduction to Legal Concepts and Terminology	Online
2	January 15	Introduction to Digital Evidence	Chapter 1
3	January 22	History and Ethics of E-discovery and Digital Evidence	Chapter 2
4	January 29	Planning and Tools	Chapter 3
5	February 5	Experts in Digital Evidence and E-Discovery *Research paper outline due*	Chapter 4
6	February 12	Cybercrime, Evidence, and the Law	Online
7	February 19	Digital Evidence Case Flow	Chapter 5
8	February 26	Technical Evidence Collection Procedures and Dos & Don'ts *Research paper bibliography due*	Online
9	March 4	Case Study: From Beginning to Trial	Chapter 6
10	March 12	**NO CLASS: Spring Break**	
11	March 19	Information Governance and Litigation Preparedness	Chapter 7
12	March 22	Project Definition and Parameters	Online
13	April 2	Presenting Digital Evidence in Court *Research papers due*	Online
14	April 9	Digital Evidence Case Law	Chapter 8
15	April 16	The Future of Digital Evidence/Exam Review	Chapter 9
16	April 23	Project Class Presentations	
Exam	Week of April 30	Final Examination as per IIT Final Exam Schedule	

Textbook: The textbook for this course is **mandatory.** Previous editions are not acceptable.
Phillips, Amelia; Godfrey, Ronald; Steuart, Christopher; Brown, Christine: *E-discovery: An Introduction to Digital Evidence*, Course Technology Incorporated, 2014, ISBN 9781111310646; an eBook version is available at https://www.vitalsource.com/referral?term=9781285961286

Readings: Readings for the class will be assigned from the textbook as well as in the form of handouts or online reading. It is essential that you do all readings before coming to class on the assigned date. Readings are a necessary and integral part of the class and will form the basis for any class discussions on the topic. Specific readings are assigned by topic above. Online resources will be linked from Blackboard or will be posted on Blackboard.

ITMS 583 Digital Evidence
Spring 2018

Professor Shawn Davis

Course Outcomes: When you complete this course, you should be able to:

- Acquire, process, preserve, evaluate, and present digital evidence in a forensically and legally sound manner.
- Recall and describe law, theories, techniques, and practices that apply to digital forensic investigations.
- Identify and describe types of computer and Internet crimes.
- Preserve and process a crime scene involving digital evidence.
- Explain the legal procedures and standards in the collection and analysis of digital evidence.
- Prepare a report of a digital investigation for appropriate stakeholders and defend your findings.
- Present an analysis of digital evidence in a legal or administrative proceeding as an expert witness.

Course Notes: Copies of the course lecture notes in the form of a PDF of the PowerPoint presentation accompanying each lecture will be provided for each student on Blackboard. This should be useful if you must miss a class. You should be aware that note taking is encouraged and should help your understanding of the material.

Course Web Site: http://blackboard.iit.edu/

Blackboard: The course will make intensive use of Blackboard (http://blackboard.iit.edu/) for communications, assignment submissions, group project coordination, providing online resources and administering examinations. All remote students will view the course lectures online via Blackboard, and online readings will be found on Blackboard.

Guest Speakers: Guest speakers may be featured as part of course topics. When a guest speaker is expected you should make an extra effort to be seated and ready prior to class time. A question & answer/discussion period will be held at the end of each speaker's presentation.

Attendance: If you are in a live section of the class (-01) and will not be able to attend class, please notify me via email or by text message to 312.248.3454 prior to class time. Live section students who miss a class should always watch the lecture online.

Assignments: There will be two assignments for this class.

Assignment 1: A research paper addressing a topic in digital evidence and e-discovery. The paper can be a solution to a problem in digital evidence, a discussion of an e-discovery strategy or a case study. The paper will be fifteen to twenty pages long (double-spaced) and will meet standards expected of a paper submitted for journal publication. Instructions for submission of the paper will be included with the assignment on Blackboard. You must fully attribute all material directly quoted and you must document all sources used in the preparation of the paper using complete, APA-style bibliographic entries. *Failure to format your bibliography entries in APA style will result in an automatic reduction of one letter grade for this assignment.* No more than thirty-three percent of material included in any paper may be direct quotes. No more than sixty percent of the resources cited may be from online. However, online ebooks that have a corresponding print version and PDF files located online count as—and should be cited as—print sources. *Wikipedia* may not be cited. Submission of the paper for actual publication is highly encouraged. A basic outline for your paper—which should be at least three pages in length—will be due the week of February 5; a preliminary bibliography will be due the week of February 26. The paper will be due the week of April 2.

Note for Assignment 1: I will not provide topics for research papers. Topic selection is an important part of the research process. There is an enormous and expansive variety of topics in this field and with a little work on your part arriving at a topic should not be difficult at all. Topics should be very specific as you will be covering it in a relatively short amount of writing and you want to reflect an in-depth coverage of your topic which you can not do with a very broad topic.
TL;DR: Pick your own research paper topic. Broad topic = <u>bad</u>; specific, narrow topic = <u>good</u>.

Assignment 2: A digital evidence project conducted in teams, to be defined and assigned via a Blackboard entry. The project will be due the week of April 23.

Quizzes: I may give quizzes at my discretion and may use them for verification that you have completed assigned reading. As they are discretionary, the weight of quizzes in grading is also left to my discretion and will be included in your class participation grade. Quizzes will be online via Blackboard.

Examinations: The final examination will consist of a take-home essay section and an in-class multiple choice examination measuring course outcomes as discussed above. Internet students will arrange for examination proctoring through IIT Online.

Academic Honesty: All work you submit in this course **must be your own.**

Plagiarism: You must fully attribute **all** material directly quoted in papers and you must document all sources used in the preparation of the paper using complete, APA-style bibliographic entries. Including directly quoted material in an assignment without attribution is always plagiarism and will always be treated as such by me. No more than thirty-three percent of material included in any paper may be direct quotes. If you submit plagiarized material you **WILL** receive a grade of **ZERO** for the assignment, an Academic Honesty Violation Report will be filed, and it may result in your expulsion from the course with a failing grade as per the IIT and ITM academic honesty policies. **There is no excuse for not understanding this policy** and if you do not understand it please let me know and I will be happy to discuss it with you until you do.

Collaboration: Students may only collaborate on assignments or projects that are explicitly designated as group assignments or projects. Students submitting work that is identical or in some cases even substantively the same will be asked to discuss the assignment with me. If one student admits to having copied the work, or if there is clear evidence who is guilty, the guilty student will be assigned a grade of zero. If no one admits to the offense or a reasonable determination of guilt cannot be made, each student involved will be assigned a grade of zero. In either case, an Academic Honesty Violation Report will be filed, and it may result in your expulsion from the course with a failing grade as per the IIT and ITM academic honesty policies.

Grading: Grading criteria for ITMS 583 students will be as follows:

A	*Outstanding work reflecting substantial effort*	90-100%
B	*Adequate work fully meeting that expected of a graduate student*	80-89.99%
C	*Weak but marginally satisfactory work not fully meeting expectations*	65-79.99%
E	*Unsatisfactory work*	0-64.99%

The final grade for the class will be calculated as follows:

Assignment 1	**30%**
Assignment 2	**30%**
Final Exam	**30%**
Quizzes/Class Participation	**10%**

Other Class Resources: Online readings and other class resources may be found at on Blackboard.

Our Contract: This syllabus is my contract with you as to what I will deliver and what I expect from you. If I change the syllabus, I will issue a revised version of the syllabus; the latest version will always be available on Blackboard. Revisions to readings and assignments will be communicated via Blackboard.

Disabilities: Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources and make an appointment to speak with me as soon as possible. My office hours are listed on the first page of the syllabus. The Center for Disability Resources (CDR) is located in 3424 S. State St., room 1C3-2 (on the first floor), telephone 312 567.5744 or disabilities@iit.edu.