
COLLEGE OF INFORMATION AND COMPUTER SCIENCE

The College of Information and Computer Science offers excellent degree programs that prepare students for expertise in computer technology and information management.

The College houses two divisions:

- The Computer Science/Management Engineering department
- The Palmer School of Library and Information Science.

By combining two divisions of study under one umbrella, students benefit from a wide range of diverse course offerings and faculty. Among the areas of expertise are digital libraries, information systems, project management and human-computer interface.

The Department of Computer Science/Management Engineering offers outstanding preparation for growing fields such as:

- Designing computer games
- Computer Forensics
- Technology Security
- Database Analyst
- Network Administrator
- Web Development

With a bachelor degree from the College of Information and Computer Science, your career opportunities will not be limited to high-tech corporations; your skills will be in demand by employers across the entire spectrum of private-sector corporations, government agencies, and not-for-profit organizations. Sports franchises, health care companies, as well as entertainment industries are always looking to employ well qualified persons with the skill sets of the College of Information and Computer Science graduates.

Web site: www.cwpost.liu.edu/cwpost/cics
Phone: (516) 299-3444
Fax: (516) 299-4168



Mary Westermann-Cicio
Dean, Pro Tem
mary.westermann-cicio@liu.edu

Patrick P. McGuire
Associate Dean
patrick.mcguire@liu.edu

COMPUTER SCIENCE/ MANAGEMENT ENGINEERING

Overview

The Computer Science / Management Engineering Department offers three distinguished undergraduate programs.

- B.S. degree in Computer Science
- B.S. degree in Information Systems
- B.S. degree in Information Management & Technology

The Department also offers two accelerated programs for eligible full-time students interested in earning both Bachelor's and Master's Degrees in less time than earning these degrees separately would require.

- B.S. degree in Information Systems with M.S. degree in Information Systems
- B.S. degree in Information Management & Technology with M.S. in Information Technology Education

In addition, there are three computer related minors available for students interested in learning about computer technology: Computer Science, Information Systems, and Computers for the Liberal Arts.

In addition to the specific requirements for each degree, all students must fulfill university requirements. These include completion of all core and competency requirements as well as at least 64 credits in the liberal arts and sciences. Note that the specific program requirements satisfy some of these university requirements. Consult with your academic counselor to be certain you meet all university requirements. Students should note that a double-major in any two of the three programs is not available as of publication of this Bulletin.

The department will accept for major credit all grades C and above. The grades of C- and D will carry general credit, but those courses will have to be repeated to meet prerequisite and graduation requirements for the major. For undergraduate work, the major GPA minimum is 2.75 and the general GPA minimum is 2.50.

The prospective student should be advised that due to the time required to create the Bulletin, there may have been changes in requirements and fees.

Phone: (516) 299-2293
Fax: (516) 299-3493
Email: cics@liu.edu

*The major GPA minimum is 2.75 and the general GPA minimum is 2.50.

FACULTY

James D. Basile
Professor of Computer Science
B.A. State University of New York at New Paltz;
M.A., Ph.D., State University of New York at Stony Brook
james.basile@liu.edu

Susan Fife Dorchak
Co-Chair, Computer Science/Management Engineering Department;
Professor of Computer Science/Management Engineering
S.B., Massachusetts Institute of Technology;
M.S., C.W. Post Campus, Long Island University;
Ph.D., Nova Southeastern University
susan.dorchak@liu.edu

Steven G. Heim
Associate Professor, Computer Science
B.A., M.S., Long Island University;
D.M.A., State University of New York at Stony Brook
sheim@liu.edu

Seth Magot
Co-Chair, Computer Science/Management Engineering Department;
Associate Professor of Computer Science
B.S., Ricker College;
M.L.S., Palmer School of Library Science, Long Island University;
M.S., M.Ph., Long Island University;
Ph.D., St. John's University
seth.magot@liu.edu

Christopher Malinowski
Associate Professor of Computer Science/Management Engineering
Director of Undergraduate Programs
B.S., John Jay College of Criminal Justice;
M.S., Long Island University
cmalinow@liu.edu

John J. Regazzi
Professor of Management Engineering
B.S., St. John's University
M.A., University of Iowa
M.S., Columbia University
Ph.D., Rutgers University
john.regazzi@liu.edu

David Rozenshtein
Associate Professor of Computer Science
B.A., Ph.D., State University of New York at Stony Brook
david.rozenshtein@liu.edu

Stephanie White
Professor of Computer Science/Management Engineering
B.S., Hunter College;
M.S., New York University;
Ph.D., Polytechnic University
stephanie.white@liu.edu

DEGREE REQUIREMENTS

Requirements for B.S. in Computer Science (CSC)

The mission of the B.S. degree in Computer Science is to provide the students with the knowledge and technical skills necessary to develop software systems. Upon completion of the program the students will be able to:

- Understand the theoretical and practical foundations of computer science,
- Use a variety of programming languages and software development tools, and
- Function in a variety of operating environments.

Major Requirements:

CS 101, 106, 111, 116, 127, 133, 136, 233, 241, 263, 271 (33 credits), and 4 approved CS courses (12 credits) (45 credits total)

MTH 7, 8, 22 plus 3 credits of mathematics electives approved by the Department PHY 3, 4

Requirements for B.S. in Information Systems (INS)

The mission of the B.S. degree in Information Systems, based on the ACM Information Systems Curriculum, is to provide the students with the knowledge and technical skills necessary to serve the information needs of an organization. Upon completion of the program the students will be able to:

- Understand the theoretical and practical foundations of information systems,
- Analyze and specify information systems requirements,

- Design and build reliable, maintainable, and usable information systems using state-of-the-art technology, and
- Facilitate the integration of information systems into an organization.

Major Requirements:

CS 101, 106, 111, 125, 133, 136, 151, 229, 231, 237, 245, 248, 266 (39 credits), and 2 approved CS courses (6 credits) (45 credits total)
MTH 5, 6

Requirements for B.S. in Information Management & Technology (ITR)

The mission of the B.S. degree in Information Management & Technology is to provide the students with the knowledge and technical skills necessary to incorporate processed data into the corporate knowledge base as well as facilitate access to and dissemination of that body of knowledge. Upon completion of the program the students will be able to:

- Understand information theory and information-seeking behavior
- Analyze information needs and uses and help to design appropriate data systems
- Use information technologies to retrieve and present information

Major Requirements:

CS 101, 106, 133, 136, 229, ITR 151, 162, 172, 233, 245, 257, 262, 266 (39 credits), and 2 approved CS and ITR courses (6 credits) (45 credits total)
15 credits in an Area of Concentration

Areas of Concentration:

The area of concentration and appropriateness of courses must be approved by the Director of Undergraduate Programs or the Department Chair. Such areas might include technology areas such as Computer Forensics, Technology Security, or Network Administration; or other areas such as Business, English, Foreign Language, or Media Arts.

Students should note that courses that are taken to fulfill elective courses in the Information Management and Technology program cannot also be used as courses for the area of concentration.

Accelerated BS/MS Programs

Students intending to enroll in an accelerated program must do so by the spring semester of their junior year. The entrance requirements for these programs are:

- Overall GPA of 3.0
- Major GPA of 3.25

Students are reviewed periodically by the Computer Science / Management Engineering Department. Should they meet entrance requirements, they will begin taking graduate courses in their senior year and complete the graduate requirements in the fifth year. The typical course of action would be:

- Upon completion of the sophomore year, students electing to be considered for the accelerated program will have their grades reviewed by the department faculty.
- In the spring semester of the junior year admitted students will be evaluated by the department faculty for permission to register for graduate major courses in their senior year.
- Students must achieve a grade of B or better in each graduate course taken in senior year in order to continue in the program. This will be monitored at the conclusion of each semester.

Upon completion of all requirements, students will be awarded both the Bachelor's and Master's Degrees. Students who do not complete the entire program or who do not meet minimum standards in their graduate work may choose to apply appropriate graduate

credits toward the Bachelor's Degree. Such students who need to receive the Bachelor's Degree and have satisfied all requirements for it can apply for graduation, but they must then reapply for admission to the graduate program.

Information Systems with M.S. degree in Information Systems

Senior Year

Fall: CS 266, CS 602, CS 624
Spring: CS 245, CS 600, CS 625

Fifth Year

Fall: CS 616, CS 614, CS 634, CS 706
Spring: CS 636, CS 650, CS 710, CS 708

Information Management & Technology with M.S. in Information Technology Education

Senior Year

Fall: TR 233, CS 590, approved graduate elective
Spring: ITR 245, CS 508, approved graduate elective

Fifth Year

Fall: CS580, two approved graduate electives, ITR 706
Spring: three approved graduate electives, ITR 708



Minors

The minors in Computer Science and Information Systems provide the student with a firm foundation in technical areas stressed in the corresponding majors. The minor in Computers for the Liberal Arts provides exposure to the key areas of information technology from the end-user perspective, using computers as a problem solving and information processing tool.

Computer Science (18 credits)
CS 101, 106, 111, 116, 127, and one approved CS elective

Information Systems (18 credits)
CS 101, 106, 133, 136, 229, and one approved CS elective

Computers for the Liberal Arts (18 credits)
CLA 6, 11, 13, 25, 29, and 31

Internship Courses

The requirements for receiving credit for an internship course (CS 289 or ITR 289) are as follows:

- Major GPA: 3.0 or better.
 - Overall GPA: 3.0 or better.
 - Students must be registering for junior or senior year.
 - Students must be placed in the internship job through the Office of Professional Experience and Career Planning.
 - The job placement must relate to the student's major and must be approved by the department prior to registering for the course. This approval must be obtained before starting the internship.
 - The department will assign the student to a faculty supervisor.
 - Students must complete the academic requirements of the course as well as earn a satisfactory rating from their supervisor on the job to receive a passing grade for the course.
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Courses

CLA 6 Computer Literacy

This is a survey course of computer concepts designed for non-majors (satisfies the Computer Competency requirement). Topics include: fundamentals of hardware and software, uses and capabilities of personal computers, the Internet, and social implications of computers. This course includes substantial laboratory experiences with productivity software such as MS Office.

For non-majors
Laboratory fee
Every Semester, 3 credits

CLA 11 Computer Technology

This is a survey of technical topics relating to computer systems and computer environments.

For non-majors
Prerequisite: Either CS 101, CS 2, or CLA 6.
Laboratory fee
Fall Semester, 3 credits

CLA 13 Computer Problem Solving

This course covers the use of spreadsheets and Visual Basic to solve practical problems. It is an introduction to elementary programming concepts and visual programming environments.

For non-majors
Prerequisite: CS 2 or CLA 6.
Laboratory fee
Fall Semester, 3 credits

CLA 15 Organizing and Presenting Information

This course covers desktop publishing and presentation graphics to integrate information provided by application packages such as word processing packages, spreadsheets and database management systems. Topics include the principles and techniques of typesetting, design, page layout and slide show production.

Not for major credit
Prerequisite: Either CS 101, CS 2, or CLA 6.
Laboratory fee
On Occasion, 3 credits

CLA 25 Network Fundamentals

This course covers the technologies underlying the Internet. Topics include: creation of web pages, linking of web pages into a web site, inclusion of graphics, web-based form design, internet communication protocols, internet basic services, and markup languages.

For non-majors
Prerequisite: CLA 6 or CS 2.
Laboratory fee
Spring Semester, 3 credits

CLA 29 Structuring and Managing Data

This course covers the design and use of practical databases. Fundamental definitions, data modeling, graphical form design, user interaction, queries and reports are examined along with the role of databases in contemporary application systems.

For non-majors
Prerequisite: Either CS 101, CS 2, or CLA 6.
Laboratory fee
Spring Semester, 3 credits

CLA 31 Elements of Systems Analysis

This course covers the stages in the information system life cycle and the role of information systems in the workplace. Topics include: information system planning, including analysis of system requirements; formulation of requirements into recommendations; development of a framework for evaluating system alternatives, both hardware and software, that implement these recommendations; and methodologies for system design.

For non-majors
Prerequisites 9 credits of CLA courses or departmental permission.
Spring Semester, 3 credits

CS 01 Preparatory Computer Science

This course is designed for students transferring credits from other institutions or with life experience, where certain selected topics in our regular courses were not covered by the student's prior work. The student is taught the missing topics by means of faculty supervised independent study and laboratory work. Satisfactory completion permits the granting of full credit and advanced standing for prior work. This course may be taken more than once when required for completion of requirements in different courses.

Prerequisite: Permission of the department chair.
Special fee equal to tuition fee for one credit
Every Semester, No college credit

CS 2 Introduction to Computing

This course is a survey of computer topics in which the student will learn the fundamentals of computers, including such topics as developmental history, elementary hardware and software concepts, current state of computers and the effect on the way we live, algorithmic methods, Visual Basic programming, and future trends.

Prerequisite: Intermediate Algebra or MTH 3.
Fall, 3 credits

CS 56 Computers, Technology, and Society

This course links computers, automation, engineering, and technology, historical development and its effects on science, industry, labor, government, and the public. This course cannot be used for science core credit. May not be taken for major credit by majors or minors.

Same course as SOC 56
On Occasion, 3 credits

CS 101 Introduction to Computers and Programming

This course is an introduction to computer technology and programming with practical exercises. Technology topics include: fundamental computer architecture, programming languages, system software and operating systems, and information technology and systems. Fundamentals of computer-based problem solving will be emphasized with a rapid application development (RAD) environment.

Laboratory fee
Every Semester, 3 credits

CS 106 Graphical User Interface Programming

This course covers Graphical User Interface (GUI) programming with practical exercises. GUI design principles will be applied to the development of: forms, controls, data types, and events. Programming topics will extend the work begun in CS 101 utilizing a rapid application development (RAD) environment.

Prerequisite: CS 101.
Laboratory fee
Every Semester, 3 credits

CS 111 Computer Program Development I

This course introduces object-oriented programming techniques using a production level language. The course begins with a review of elementary language topics, and proceeds through other topics such as: foundations of data structures, class based programming, inheritance, and polymorphism. Students will be required to produce program specification and testing documentation for each project. Discipline dependent projects will be assigned.

Prerequisites: CS 106, and either MTH 5 (INS) or MTH 7 (CS).
Co-requisite: CS 133, and either MTH 6 (INS) or MTH 8 (CS)
Laboratory fee
Fall Semester, 3 credits

CS 116 Computer Program Development II

This course applies and extends the programming concepts of CS 111. The student will design and build programs of increased complexity and size, including the use of various data structures. Students will be required to produce program specification and testing documentation for each project.

Prerequisite: CS 111.
Laboratory fee
Spring Semester, 3 credits

CS 125 Systems and Environments

This course presents a survey of computer systems and environments for information systems majors. Topics include: comparative operating systems, computer architectures and organization, and an overview of hardware and peripherals.

Prerequisite: Either CS 101, CS 2, or CLA 6.
Laboratory fee
Spring Semester, 3 credits

CS 127 Introduction to Game Design

This course presents the software development life cycle from the perspective of game design. Topics include: rule based scenarios, story boarding, virtual environments, interaction design, and prototyping.

Pre/Co-requisite: CS 111, CS 133.
Every Semester, 3 credits

CS 133 Analysis and Logical Design

This course examines the system development and modification process. It covers structured and object-oriented analysis and design, use of modeling tools, adherence to methodological life cycle and project management standards. The course emphasizes the factors for effective communication and integration with users and user systems. It encourages inter-personal skill development with clients, users, team members, and others associated with development, operation, and maintenance of the system.

Pre/Co-requisite: CS 101.
Every Semester, 3 credits

CS 136 Data Communications and Computer Networks

This course covers a detailed foundation of networking including: computer communications architectures; LANs and WANs; physical network media and their characteristics; data transmission modes and data encoding; communication protocols; gateways and message routing schemes; circuit switching and packet switching; and architecture of the Internet.

Pre/Co-requisite: CS 101.
Laboratory fee
Spring Semester, 3 credits

CS 151 Enterprise COBOL

This course covers data processing techniques using the COBOL language. It examines the data processing environment; sequential, random and direct access methods; file I/O and introduces related data structures in an applications environment.

Prerequisite: CS 111.
Laboratory fee
Fall Semester, 3 credits

CS 153 Application Software - C Language

Application software implementation using C language. Topics include: functional decomposition, separate implementation code compilation, static and dynamic data structures, input/output, preprocessor facilities and the C Library.

Prerequisite: CS 116.
Laboratory fee
On Occasion, 3 credits

CS 214 Computer Architecture

This course is a study of hardware and software concepts and their interrelationships. Topics include: storage codes and conversions, principals of digital logic, machine language programming, assembly language programming, storage of data, memory and registers, microcode, instruction set architecture, addressing schemes, indirect addressing, indexing, stacks, subprograms and subprogram linkage, I/O. Other topics are access to operating system facilities, calling assembly language routines from high-level languages.

Prerequisite: CS 116.
On Occasion, 3 credits

CS 229 Foundations of Information Systems

This course covers the relationship of information systems (IS) to an organization. Topics include: types of information systems, decision support, IS strategies, and quality concerns for both product and process.

Cannot be taken for major credit by Computer Science majors.
Prerequisite: CS 133.

Laboratory fee
Spring Semester, 3 credits

CS 231 Database Fundamentals

This course covers fundamentals of modern database design and use. Specific topics include: introduction to entity-relationship modeling; relational database design; dependency theory and normal forms; SQL; physical design, access methods and indices; query optimization; concurrency control; backup and recovery; security and authorization; database design for client-server systems; introduction to distributed databases.

Prerequisite: CS 116 or 229.
Laboratory fee
Spring Semester, 3 credits

CS 232 Advanced Database Programming using SQL

This course covers key technologies required to construct reliable and usable information systems such as advanced Entity-Relationship modeling; interactive, embedded and dynamic SQL;

client-server system design for relational databases; advanced features of SQL; physical and logical query optimization; SQL solutions to common business problems.

Prerequisite: CS 231.

Laboratory fee

On Occasion, 3 credits

CS 233 Operating Systems and Systems Programming

This course covers fundamental operating systems concepts, including: overview of operating systems architecture and functionality; comparison of current operating systems; processes, inter-process communication, process synchronization, scheduling and deadlocks; physical and virtual memory management; file systems; introduction to network operating systems; in a laboratory setting, UNIX as a case study, shell programming and UNIX tools.

Prerequisite: CS 116.

Laboratory fee

Spring Semester, 3 credits

CS 234 Windows Programming

This course reviews object oriented concepts. Topics include: the Windows operating environment, foundation classes, graphical user interfaces, and applications to specific problem types.

Prerequisite: CS 111.

Laboratory fee

On Occasion, 3 credits

CS 237 Human-Computer Interaction

This course discusses human factors concepts as applied to human-computer interface (HCI) design. The three generations of HCI paradigms are examined in relation to the historical evolution of hardware and software. Design issues such as user help facilities and error information handling are discussed. The course leads up to programming graphical user interfaces using current tools and technology.

Prerequisite: Junior/Senior major status.

Laboratory fee

Spring Semester, 3 credits

CS 241 Software Systems Engineering

This course uses a team approach to software development. Students analyze and design a system based on a case study. Topics include: an overview of the software development life cycle, systems analysis and systems thinking, writing requirements, different analysis modeling paradigms, object-oriented design, and software quality. Discipline dependent projects will be assigned.

Prerequisite: Senior CS status.

Spring Semester, 3 credits

CS 245 Working in the Team Environment

This course examines the effective participation of information specialists, programmers, systems analysts, and other professionals in vertical, horizontal, and cross-functional teams; techniques for communicating; tools for project management; metrics for benchmarking and continuous improvement; and the demands of various quality standards. The role of the information specialist in striving for world-class quality is emphasized. Experiential learning through team projects occurs in a laboratory setting. (Same as ITR 245)

Prerequisites: Senior Major Status.

Spring Semester, 3 credits

CS 246 Computer Security

This course explores security relating to systems and applications software, network operating systems, topology, and hardware. Discussions will range from physical security of systems and networks to ethical issues.

Prerequisites: Either CS 125, 233 or 261, and CS 136.

On Occasion, 3 credits

CS 248 Web Development 1

This course covers web site architecture and page design. Topics include: markup languages, scripting languages, style sheets, forms, and cross platform development. Discipline dependent projects will be assigned.

Prerequisite: CS 116 or 229.

Fall Semester, 3 credits

CS 251 Programming Languages

Conceptual foundations for high-level programming language design and implementation are examined. Detailed attention is paid to alternative models and constructs for scope and binding, activation records, memory allocation, parameter passing, and data abstraction. In laboratory work, alternative programming paradigms (functional, object-oriented, axiomatic) are explored.

Prerequisites: CS 116.

Laboratory fee

Fall Semester, 3 credits

CS 252 Compiler Theory and Design

This course includes: structure of compilers; review of basic concepts and terminology in programming analysis; finite state machines, state diagrams and graphs, state equivalence; Turing machines, finite automata; lexical analysis, regular expressions, and finite-state techniques; context-free grammars; parsing methodologies; intermediate code generation and optimization.

Prerequisite: CS 251.

Laboratory fee

On Occasion, 3 credits

CS 254 Fundamentals of Artificial Intelligence

This course examines the definition of heuristic versus algorithmic methods; rationale of heuristic approach, description of cognitive processes and approaches to list processing languages; the mind-brain problem and the nature of intelligence.

Prerequisite: CS 116.

Laboratory fee

On Occasion, 3 credits

CS 255 Technical Communication:

Systems and Software Documentation This course involves the documentation techniques covering the entire life cycle of the system development process. Human communication problems are examined in relation to their impact on quality software development. Assignments include practical applications in oral and written technical communications.

(Same as ITR 255)

Prerequisites: ENG 2, CS 106.

On Occasion, 3 credits

CS 256 Systems Performance Analysis

This course provides an introduction to queuing theory via performance evaluation. Topics include: probability theory, Markov processes, properties of Poisson processes, birth and death process models, analysis of transient and steady state behavior, and estimation of system parameters and validation.

Prerequisite: CS 116.

Laboratory fee

On Occasion, 3 credits

CS 257 Computer Graphics

This course provides the student with knowledge of the basic principals employed in the design of graphic systems and the ability to create algorithms for displaying and manipulating graphics primitives. Two and three dimensional transformations, windows and viewports, segments and animation, curves and surfaces, color and interactive graphics are covered. If time permits, some special topics such as fractal geometry and ray-tracing will be introduced.

Prerequisite: CS 116.

Laboratory fee

On Occasion, 3 credits

CS 261 Computer Architecture and Operating Systems

This course integrates operating systems and computer architecture. Discussion centers on computer organization and

management and operating systems architecture and functionality. Detailed topics include: principles of digital logic, memory management, machine and assembly language, input/output processing and control, communication internal to the computer, process scheduling, and file management.

Prerequisite: CS 116.

Laboratory fee

Spring Semester, 3 credits

CS 263 Advanced Data Structures for Game Based Applications

This course continues the study of data structures and algorithms begun in CS 116. It covers the general concepts of modularity, abstract data types, inheritance, dynamic memory allocation, recursion, backtracking, polymorphism, templates, and complexity of algorithms. Topics also include specific data structures, algorithms and techniques, including multi-dimensional arrays, stacks, queues, single and double linked lists, general and binary trees (including B-trees), a variety of sorting algorithms, graphs and a selection of graph algorithms.

Prerequisite: CS 116.

Laboratory fee

Fall Semester, 3 credit

CS 264 Enterprise Resource Planning

This course centers on enterprise resource planning systems. Topics include enterprise data integration, inventory and control, protection of vital and legal records, and business process best practices.

Prerequisite: CS 231.

Spring Semester, 3 credits

CS 265 Interfacing with Legacy Applications

This course covers the development of an interface for legacy programs originally developed for a mainframe environment. Students will be introduced to an appropriate legacy programming language and will use that knowledge to build a GUI front end to the program.

Prerequisite: CS 248.

On Occasion, 3 credits

CS 266 Web Development 2

This course covers the programming environments that enable e-commerce and enterprise transactions. The course will emphasize: web services and interoperability.

Prerequisite: CS 248.

Laboratory fee

Fall Semester, 3 credits

CS 267 Scientific Foundations for Games

This course applies physical and mathematical properties to the programming of graphical game environments.

Prerequisites: CS 127, CS 263, PHY 3.

Laboratory fee

On Occasion, 3 credits

CS 271 Advanced Game Programming

This course provides a comparative study of various API libraries utilized in game programs. Appropriate programming languages will be used to develop game components unique to particular applications.

Prerequisite: CS 267.

Laboratory fee

Fall Semester, 3 credits

CS 275 Network Coding

This course examines the basics of systems style coding as it pertains to networking. Examination of programming sockets in C/C++ and the modification of standard tools for open "homegrown" solutions will be presented.

Prerequisite: CS 136, CS 263.

Laboratory fee

On Occasion, 3 credits

CS 276 Forensic Coding

This course discusses the basics of forensic coding. Students will emulate capabilities of existing forensic software suites, and will deal with those system structures required to uncover and display system states or a file system.

Prerequisite: CS 263.

Laboratory fee

On Occasion, 3 credits

CS 281 Computer Project I

Each student is expected to prepare a paper for an oral and/or written presentation on work done, under faculty supervision, dealing with computer science or information systems. Prospective students must present an outline of what they propose to a department faculty sponsor, at least three weeks prior to registration.

Prerequisite: Permission of Chair.

Every Semester, 1-3 credits

CS 282 Computer Project II

Permission to register for this course is given only to those students or teams of students who have elected a project, which, in the opinion of the department faculty, requires an extra semester to complete.

Prerequisite: Permission of Chair.

Every Semester, 1-3 credits

CS 283 Special Topics in Computer Science and Information Systems

When offered, the specific content to be covered in that semester and the prerequisites, for that semester, are announced in advance of registration. Students may take this course more than once as topics change.

Prerequisite: As Announced.

Laboratory fee

On Occasion, 3 credits

CS 289 Internship

This course is a combination of classroom instruction and field work. Students are placed in the field through the Office of Professional Experience and Career Planning into major-related positions that take up no more than 5-6 hours per week during the semester.

Academic requirements include a term paper relating the experience to the student's major field of study, and attending and participating in weekly seminar discussions. Topics include comparative working environments, interpersonal relations, and application of academic knowledge to the working world.

Pre/Co-requisites: Junior/Senior status major; Overall and major GPAs must be 3.0 or better.

Every Semester, 3 credits

ITR 151 Information Technology and Services

This course provides an overview of the relationship of technology and services associated with information management. Discussion includes fundamentals of computer systems and environments, current and emerging information technologies, the use of various information systems as organizational tools, and the management of information as a method of increasing organizational effectiveness. (Formerly ITR 1)

Fall Semester, 3 credits

ITR 162 Multimedia Information Management

This course examines the tools and methods of creating, processing, storing, organizing and accessing non-text based information; e.g. visual and audio formats. (Formerly ITR 24)

Prerequisite: ITR 151.

Spring Semester, 3 credits

ITR 172 Database Design and Use

This course examines the design and practical use of databases for the purpose of managing, accessing, and retrieving information. Emphasis is on the development of databases that address the information needs of its users.

(Formerly ITR 8)
 Prerequisite: ITR 151.
 Pre/Co-requisites: CS 106
 Spring Semester, 3 credits

ITR 227 Information and Society

This course introduces the uses and flow of information in society at large and ways that information is used in decision-making by groups such as governments, businesses, and social agencies, locally, nationally, and globally. It also examines information policies and trans-border data flow as they impact various sectors; e.g. finance, humanities, the arts, business, libraries and education.

(Formerly ITR 21)
 Prerequisite: ITR 151.
 On Occasion, 3 credits

ITR 233 Knowledge Management

Knowledge management involves capturing, organizing, locating, evaluating, disseminating, and storing knowledge. The course will explore the technology that supports the information flow within a group or institution and the methods and procedures involved in the implementation of a knowledge management system. It will cover documented knowledge management case studies. Students will develop a prototype knowledge management system.

(Formerly ITR 2)
 Prerequisite: ITR 172.
 Fall Semester, 3 credits

ITR 242 Design Problem

This course covers the framework for evaluating system alternatives, both hardware and software. Implementation of these recommendations is examined along with methodologies for system design. Software design and implementation of systems will also be discussed.

(Formerly ITR 11)
 Prerequisite: CS 133, senior status
 On Occasion, 3 credits

ITR 245 Working in a Team Environment

This course examines the effective participation of information specialists, programmers, systems analysts, and other professionals in vertical, horizontal, and cross-functional teams; techniques for communicating; tools for project management; metrics for benchmarking and continuous improvement; and the demands of various quality standards. The role of the information specialist in striving for world-class quality is emphasized. Experiential learning through team projects occurs in a laboratory setting.

(Same as CS 245)
 Prerequisite: Senior Major Status.
 Spring Semester, 3 credits

ITR 255 Technical Communication:

System and Software Documentation
 This course involves the documentation techniques covering the entire life cycle of the system development process. Human communication problems are examined in relation to their impact on quality software development. Assignments include practical applications in oral and written technical communications.

(Same as CS 255)
 Prerequisites: ENG 2, CS 106.
 On Occasion, 3 credits

ITR 257 User Support and Services

This course will cover interview techniques, verbal information gathering, help-desk software, help-desk management and design.

(Formerly ITR 14)
 Pre/Co-requisites: CS 136, ITR 172.
 Fall Semester, 3 credits

ITR 262 Information Visualization & Productivity Tools

This course explores the use of various productivity tools for the display and organization of information. Students will study the various ways information can be presented in static and dynamic media, such as charts, diagrams, illustrations, animations, video, and web site design.

(Formerly ITR 13)
 Prerequisites: ITR 151, ITR 162.
 Fall Semester, 3 credits

ITR 264 Enterprise Records Management

This course centers on the organization and management of an enterprise's information. Topics include data integration using enterprise resource planning systems, inventory and control, and protection of vital and legal records.

(Formerly ITR 23)
 Prerequisite: ITR 172.
 Spring Semester, 3 credits

ITR 266 Policy, Legal, and Ethical Issues in Information Technology

This course covers current and emerging issues policy formulation and conflict, roles and perspectives of major actors in the policy making process; privacy, freedom of information, intellectual property rights, information dissemination and access; security classification and restriction, computer crime, professional conduct, ethics.

(Formerly ITR 7)
 Pre/Co-requisite: ITR 257.
 Spring Semester, 3 credits

ITR 279 Information Access & Retrieval

This course covers access and retrieval of information from private and public databases. Topics include the creation of database queries using SQL, QBE, and QBE, as well as an examination of specialized collections and databases.

(Formerly ITR 27)
 Prerequisite: ITR 172.
 On Occasion, 3 credits

ITR 281 Information Management & Technology Project

This course is by special arrangement with the faculty and program director.

(Formerly ITR 99)
 Every Semester, 1, 2 or 3 credits

ITR 283 Special Topics in Information Management and Technology

This course is a presentation of special topics as determined and approved by the Director of the Information Management and Technology program.

(Formerly ITR 100)
 Prerequisite: Variable, depending on topic.
 On Occasion, 3 credits

ITR 289 Internship

This course is a combination of classroom instruction and field work. Students are placed in the field through the Office of Professional Experience and Career Planning into major-related positions that take up no more than 5-6 hours per week during the semester.

Academic requirements include a term paper relating the experience to the student's major field of study, and attending and participating in weekly seminar discussions. Topics include comparative working environments, interpersonal relations, and application of academic knowledge to the working world.

Pre/Co-requisites: Junior/Senior status major; Overall and major GPAs must be 3.0 or better.

Every Semester, 3 credits

TEL 100 Introduction to Network Security

This course provides the fundamentals of security related concepts particular to networks, and examines vulnerabilities of networked systems.

Prerequisite: CS 136.
 Fall Semester, 3 credits

TEL 120 Fundamentals of Network Administration

This course examines the role and functions of a network administrator within a networked environment. Topics include: installation and administration of services on both Windows and Linux plat-

forms; tools and techniques used by administrators in performing routine tasks, and the processing of 'bulk data' using standard office suite tools and manipulation of data.

Prerequisite: CS 136.

Spring Semester, 3 credits

TEL 211 Introduction to Computer Forensics and Incident Response

This course discusses the basics of computer forensics as a discipline, and the background of the discipline from a technical, ethical, and legal perspective.

Basic data recovery and a demonstration of analysis will provide the student with an appreciation of the specialist's role in responding to security and disaster related incidents.

On Occasion, 3 credits

TEL 213 Introduction to Network Forensics and Incident Response

This course deals with responding to network-based incidents. "Live system" forensics and the analysis of data will be discussed. A scripting language, such as Perl, will be introduced. Students are expected to be conversant with network basics and the manipulation of data using MS Excel and/or MS Access.

Prerequisite: CS 136.

On Occasion, 3 credits

TEL 221 Intermediate Computer Forensics

This course focuses on the analysis of seized media as well as data recovery. Issues such as the registry analysis and data carving are presented. Students are required to recover data from a "challenge" disk. A prime consideration will be on reporting on the results of these efforts.

Prerequisite: TEL 211.

On Occasion, 3 credits

TEL 223 Intermediate Network Administration

This course discusses the configuration of Windows and Linux servers. Students will set up and administer IIS servers, including services such as WWW and FTP. Linux setups will include the installation of an Apache web server. Support for web services, such as Perl / PHP, will be demonstrated. SNMP, DNS, and DHCP will be covered. Routing support for a networked environment will be discussed, as well as monitoring of network statistics.

Prerequisite: TEL 120.

On Occasion, 3 credits

TEL 283 Special Topics in Technology Security and Forensics

When offered, the specific content to be covered in that semester and the prerequisites, for that semester, are announced in advance of registration. Students may take this course more than once as topics change.

Prerequisite: As Announced.

On Occasion, 3 credits