

INFORMATION TECHNOLOGY (IT) 515

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General School Information

The School of Information Technology (IT) offers four degree programs: Computer Science, Cybersecurity, Information Systems, and Network and Telecommunications Management. All IT majors require substantial interpersonal written and verbal communication skills as well as technical computing skills. The curricula have a strong practical emphasis on the application of computing solutions to real world problems. Practical skills and applications are balanced with exposure to the theoretical knowledge base that underlies the field of computing.

All programs prepare a student for a computing career, but there are important differences in the context of the work to be performed, the types of problems to be solved, and the types of systems to be designed and built. Computer Science focuses on algorithm development and writing programs that others will use. Cybersecurity focuses on all aspects of information assurance, including protecting networks, servers, databases, and private information. Information Systems focuses on integrating hardware and software authored by others into a coherent system to fulfill a business purpose. Network and Telecommunications Management prepares students to build and optimize networks for best performance.

Starting positions for Computer Science and Information Systems include such job titles as programmer or programmer/analyst. Cybersecurity graduates will take jobs as security analysts, while Network and Telecommunications titles include network administrator and network technician.

Department minors are intended to help majors in other departments focus on specific skills and electives which are relevant for their career needs. Minors are available in Information Systems and in Computer Science.

Academic Requirements:

For any student who enrolls in a course in the School of Information Technology, a grade of

C or better is required in all prerequisite courses. For majors, only courses in which the student has received a grade of C or better may be counted toward the hours required in the major, including supporting requirements.

A student cannot pursue a double major in any two programs in the School of Information Technology. Also, a student cannot pursue both a major and a minor in Information Technology.

Admission Requirements:

A student may enter a major or minor in the School of Information Technology as a new freshman, a transfer student, or as a change of major at Illinois State University. Students should contact the Information Technology undergraduate advisor or University Admissions for minimum admission requirements.

Transfer Students:

Proficiency with the Java programming language is expected in 200- and 300-level Information Technology courses and is usually obtained by completing IT 168 and one of IT 178, 179 or 275.

HONORS IN INFORMATION TECHNOLOGY

The School offers honors work in all programs to highly qualified juniors and seniors. Candidates must have a 3.30 overall GPA and a 3.50 GPA in Information Technology. Honors requirements involve honors course work and the preparation of a substantial research paper or the completion of a significant project prepared under the guidance of a faculty advisor. Further details about the University Honors program are available at Honors.IllinoisState.edu.

PROFESSIONAL PRACTICE

Each degree program requires a practical experience that may be satisfied by a directed project or an internship. An internship experience is the usual way for students to satisfy this requirement. IT 191 (1 hour) is required and prepares students for fulfilling this requirement. It is recommended that IT 191 be taken no later than the sophomore year.

The six (6) hours of Professional Practice credit counted toward the major will be graded. Any additional Professional Practice credit will be earned on a CR/NC basis. A maximum of 16 hours of Professional Practice credit (IT 391,

164 Information Technology

398) may be applied toward graduation. Students may not register for IT 398 during the last semester of their studies.

MINOR IN COGNITIVE SCIENCE

The School of Information Technology participates in the Minor in Cognitive Science program. Several courses offered by the School contribute to the minor. For further information, please consult the School undergraduate advisor as well as the section entitled "Interdisciplinary Studies Programs" in this Undergraduate Catalog.

Computer Science Programs

Degree Offered: B.S.

MAJOR IN COMPUTER SCIENCE

This degree is designed for students who wish to pursue a comprehensive study of computer science that blends theory, abstraction, and design in a variety of traditional and current areas. The Computer Science major prepares students to solve modern computing problems by providing a strong background in theory, design, hardware, and systems along with significant software development experience in multiple languages on multiple operating systems. It would also prepare students to pursue graduate studies in Computer Science. The Computer Science major is accredited by the Computing Accreditation Commission of ABET, at www.abet.org.

General Computer Science Sequence

The General Computer Science sequence is designed for students who wish to pursue a broad education in computer science. A minor is not required.

—86-88 hours required.

—50 hours in Information Technology required.

—Required courses (35 hours): IT 168, 179, 191, 214, 225, 226, 261, 279, 327, 328, 378, 383.

—6 hours of IT 398.

—9 hours from: IT 244, 276, 326, 330, 340, 345, 351, 353, 355, 356, 367, 382, 384, 385, 388 (6 of the 9 hours must be from: IT 326, 340, 355, 356, 382, 384, 388).

—Supporting requirements (36-38 hours):

—Mathematics and Statistics (15-16 hours): MAT 145, 146, 260; 1 course from: MQM 100, MAT 350.

—Communication (6 hours): COM 223, ENG 249.

—Lab Science (8 hours): 2 courses from: BSC 196, 197, CHE 140, 141, PHY 110, 111.

—Science and Math electives (7-8 hours): 2 additional courses from: BSC 196, 197, CHE 140, 141, MAT 175, PHY 110, 111, 112, 375, PSY 110.

Allowable Substitutions for Required Courses:

—Acceptable substitution for 3 hours of IT 398 is 3 hours of IT 391.

—Acceptable substitution for 6 hours of IT 398 is 3 hours of IT 391 and 3 additional hours from IT 244, 276, 326, 330, 340, 345, 351, 353, 355, 356, 367, 382, 384, 385, 388 (if not used to satisfy other requirements).

Web Computing Sequence

The Web Computing sequence is designed for students who wish to study computer science with special emphasis on Web, mobile, and cloud computing. A minor is not required.

—86-88 hours required.

—50 hours in Information Technology required.

—Required courses (44 hours): IT 168, 179, 191, 214, 225, 226, 261, 279, 327, 328, 353, 354, 358, 378, 383.

—6 hours of IT 398.

—Supporting requirements (36-38 hours):

—Mathematics and Statistics (15-16 hours): MAT 145, 146, 260; 1 course from: MQM 100, MAT 350.

—Communication (6 hours): COM 223, ENG 249.

—Lab Science (8 hours): 2 courses from: BSC 196, 197, CHE 140, 141, PHY 110, 111.

—Science and Math electives (7-8 hours): 2 additional courses from: BSC 196, 197, CHE 140, 141, MAT 175, PHY 110, 111, 112, 375, PSY 110.

Allowable Substitutions for Required Courses:

—Acceptable substitution for 3 hours of IT 398 is 3 hours of IT 391.

—Acceptable substitution for 6 hours of IT 398 is 3 hours of IT 391 and 3 additional hours from IT 244, 276, 326, 330, 340,

345, 351, 356, 367, 382, 384, 385, 388 (if not used to satisfy other requirements).

Preparation for Graduate Study:

The General Computer Science sequence of the Computer Science major should be selected by those students interested in traditional Computer Science graduate programs. Any student interested in graduate school should discuss options with faculty and an academic advisor during the junior year.

MINOR IN COMPUTER SCIENCE

This minor provides a solid foundation for using the computer as a tool in any discipline and may be of particular interest to majors in mathematics or the natural sciences. It provides an opportunity for students to gain knowledge in a specialized area such as graphics, parallel processing, or artificial intelligence.

—22 hours required.

—IT 168, 179, 225, 226, 261, 279.

—1 course from: IT 326, 327, 328, 340, 356, 384, 388.

Cybersecurity Program

Degree Offered: B.S.

MAJOR IN CYBERSECURITY

The Cybersecurity Major is designed to give students the knowledge and tools necessary for protecting information and information systems. The major provides education for protecting the confidentiality, availability, and integrity of information using technology, people, and policy. A minor is not required. Any student interested in graduate school should discuss options with faculty and an academic advisor during their junior year.

—80 total hours required.

—56 hours in Information Technology required.

—Required courses (44 hours): IT 168, 170 or 178 or 179, 191, 214, 225 or 254, 250, 261, 262, 276, 351, 357, 359, 360, 377, 378.

—Professional Practice (6 hours): IT 398.

—2 courses from: IT 330, 353, 355, 369, 370, 376, 381.

—Supporting requirements (24 hours):

— Mathematics and Statistics (11 hours): MAT 120 or 145; MAT 160; 1 course from: ECO 138; PSY 138; MQM 100.

— Communication and Organization (13

hours): COM 223; ECO 105; ENG 249; MQM 220.

Allowable Substitutions for Required Courses:

—Acceptable substitution for 3 hours of IT 398 is 3 hours of IT 391.

—Acceptable substitution for 6 hours of IT 398 is 3 hours of IT 391 and 3 hours from IT 330, 353, 355, 363, 369, 370, 376, 381 (if not used to satisfy other requirements).

Information Systems Programs

Degree Offered: B.S.

MAJOR IN INFORMATION SYSTEMS

The Information Systems (IS) Major is designed to prepare professionals in Information Systems including such areas as systems analysis and design. This degree focuses on the use of computer technology and information management methods to solve business problems. This requires an understanding of both the organizational context of the problem and the technologies, methodologies, and tools typically utilized. There are three sequences within this program: the Integration of Enterprise Systems Sequence, the Systems Development/Analyst Sequence, and the Web Application Development Sequence.

The Integration of Enterprise Systems Sequence is designed for students who wish to pursue both technical and practical skills in large-scale, multi-platform enterprise computing systems. The Systems Development/Analyst Sequence provides breadth and depth in analysis and design techniques preparing students to work in a variety of information technology environments, while the Web Application Development Sequence emphasizes the development of Web/Internet-based business information systems. The Information Systems program is accredited by the Computing Accreditation Commission of ABET, at www.abet.org.

Preparation for Graduate Study:

The Information Systems major offers excellent preparation for a number of computer and management information systems master's programs. Students interested in an MBA program may want to combine this major with a Business Administration minor. Any student interested in graduate school should discuss options with faculty and an academic advisor during their junior year.

Integration of Enterprise Systems Sequence

The Integration of Enterprise Systems Sequence is designed for students who are interested in the areas of software development, project management, and application integration using large enterprise computing systems. This sequence provides in-depth knowledge regarding the integration of business applications on a large enterprise computing system. A minor is not required.

- 81-82 total hours required.
- 44-49 hours in Information Technology required.
- Required courses (39 hours): IT 168, 178, 191, 214, 225 or 254; 261, 262, 272, 276, 330, 372, 378, 392.
- Professional Practice (6 hours): IT 398.
- 1 course from: IT 244, 250, 344, 345, 363, 367, 368.
- Supporting requirements (33 hours):
 - Mathematics and Statistics (11 hours): MAT 120 or 145; MAT 160; 1 course from ECO 138, PSY 138, MQM 100.
 - Communication and Organization (22 hours): ACC 131, COM 223, ECO 105 (4 hours), MQM 220; 1 course from COM 227, ENG 249; 2 courses from ACC 132, ECO 225 or 239 or 245, FIL 240, MKT 230.

Allowable Substitutions for Required Courses:

- Acceptable substitution for 3 hours of IT 398 is 3 hours of IT 391.
- Acceptable substitution for 6 hours of IT 398 is 3 hours of IT 391 and 3 hours from IT 244, 250, 344, 345, 363, 367, 368, (if not used to satisfy other requirements).

Systems Development/Analyst Sequence

The Systems Development/Analyst Sequence is designed for the student who will seek a position as an Information Systems professional developing business-oriented information systems. This sequence provides in-depth knowledge of analysis and design techniques along with electives in emerging technologies. A minor is not required.

- 82 total hours required.
- 49 hours in Information Technology required.

—Required courses (37 hours): IT 168, 178, 191, 214, 254, 261, 262, 272, 276, 363, 372, 378.

—Professional Practice (6 hours): IT 398.

—2 courses from: IT 244, 250, 330, 341, 344, 345, 353, 367, 368.

—Supporting requirements (33 hours):

—Mathematics and Statistics (11 hours): MAT 120 or 145; MAT 160; 1 course from ECO 138; PSY 138; MQM 100.

—Communication and Organization (22 hours): ACC 131; COM 223, ECO 105 (4 hours), MQM 220; 1 course from COM 227, ENG 249; 2 courses from ACC 132, ECO 225 or 239 or 245, FIL 240, MKT 230.

Allowable Substitutions for Required Courses:

- Acceptable substitution for 3 hours of IT 398 is 3 hours of IT 391.
- Acceptable substitution for 6 hours of IT 398 is 3 hours of IT 391 and 3 hours from IT 244, 250, 330, 341, 344, 345, 353, 367, 368 (if not used to satisfy other requirements).

Web Application Development Sequence

The Web Application Development Sequence is designed to give students a background for developing information systems in a Web/Internet-based environment. This sequence provides in-depth knowledge of Web development techniques and supporting technologies, along with related emerging technologies. A minor is not required.

- 80 total hours required.
- 47 hours in Information Technology required.
- Required courses (35 hours): IT 168, 178, 191, 214, 254, 261, 262, 276, 353, 354, 358, 378.

—Professional Practice (6 hours): IT 398.

—2 courses from: IT 244, 330, 341, 344, 345, 367, 368, 377.

—Supporting requirements (33 hours):

—Mathematics and Statistics (11 hours): MAT 120 or 145; MAT 160; 1 course from: ECO 138; PSY 138; MQM 100.

—Communication and Organization (22 hours): ACC 131; COM 223; ECO 105 (4 hours); MQM 220; 1 course from:

COM 227, ENG 249; and 2 courses from ACC 132, ECO 225 or 239 or 245, FIL 240, MKT 230.

Allowable Substitutions for Required Courses:

- Acceptable substitution for 3 hours of IT 398 is 3 hours of IT 391.
- Acceptable substitution for 6 hours of IT 398 is 3 hours of IT 391 and 3 hours from IT 244, 330, 341, 344, 345, 367, 368, 377 (if not used to satisfy other requirements).

MINOR IN INFORMATION SYSTEMS

The Information Systems Minor is designed for people who will use computers as tools in their chosen profession or provide limited computer support for their work group.

- A minimum of 22 hours required.
- Required courses: IT 168, 178, 254, 261, 262.
- 1 course from: IT 250, 276, 341, 353, 367, 368, 378.
- 3-4 hours of an IT 200 or 300-level course.

Network and Telecommunications Management Program

Degree Offered: B.S.

MAJOR IN NETWORK AND TELECOMMUNICATIONS MANAGEMENT

Network and Telecommunications Management is concerned with network technology, information systems, computer technology, business practices, and policy issues involved in data, image, video and voice transmission. This program prepares undergraduate students to enter the industry in entry-level positions with adequate preparation to assume management positions once work experience is gained. Graduates will possess an in-depth technical understanding of computer networks and telecommunication systems as well as an appreciation of the economic and public policy issues that are important in the design and development of local and wide area networks, and national and multinational telecommunication systems. A minor is not required.

- 80 total hours required.
- 47 hours in Information Technology required.

—Required courses (35 hours): IT 168, 170 or 178, 191, 214, 254, 261, 262, 276, 373, 377, 379, 381.

- Professional Practice (6 hours): IT 398.
- Electives: 2 courses from: IT 250, 374, 376, 378, 380.
- Economic, Legal, Public Policy (10 hours): ECO 105 (4 hours), 235; 1 course from: FIL 311, 312; POL 318.
- Supporting requirements (23 hours):
 - Mathematics and Statistics (11 hours): MAT 120 or 145; MAT 146 or 160; 1 course from: ECO 138, PSY 138, MQM 100.
 - Communication and Organization (12 hours): ACC 131; COM 223; MQM 220; 1 course from COM 227, ENG 249.

Allowable Substitutions for Required Courses:

- Acceptable substitution for 3 hours of IT 398 is 3 hours of IT 391.
- Acceptable substitution for 6 hours of IT 398 is 3 hours of IT 391 and 3 hours from IT 374, 376, 378, 380 (if not used to satisfy other requirements).

Information Technology Courses

Most Information Technology courses are restricted to students with majors or minors within the School of Information Technology. Some Information Technology courses may not be offered every year. Contact the School of Information Technology undergraduate advisor for the current schedule of offerings.

115 REASONING ABOUT COMPLEX SYSTEMS QR

3 sem. hrs.

Systems theory applied to complex systems. Design, construction, uses, and analysis of simulations for complex systems. May not be taken under the P/NP option. Prerequisites: MAT 113, 120, 130, or 145.

140 INTERACTING IN A DIGITAL WORLD SMT

3 sem. hrs.

This course provides foundation concepts of computers and information technologies and their application in today's world. Lecture and lab. Not for credit IT Major or minor. Formerly *INTRODUCTION TO THE COMPUTER WORLD*. Prerequisites: COM 110 and ENG 101.

150 USING MICROCOMPUTER-PRODUCTIVITY TOOLS**3 sem. hrs.**

Introduction to typical microcomputer-based productivity tools such as word processing, spreadsheets, databases, and presentation graphics. Lecture and lab. Not for credit IT major or minor, or if had BE 125.

164 INTRODUCTION TO PROBLEM SOLVING USING THE COMPUTER**3 sem. hrs.**

Use of pseudocode, charts, and Python to develop the analytical and algorithmic thinking necessary to succeeding in programming courses.

165 COMPUTER PROGRAMMING FOR SCIENTISTS**4 sem. hrs.**

Introduction to computer programming emphasizing numerical algorithms for scientific applications. Problem analysis and operating system concepts included. Not for credit IT major or minor. Lecture and lab. Prerequisite: Grade of C or better in MAT 145.

166 PYTHON PROGRAMMING FOR SCIENCE AND DATA ANALYSIS**4 sem. hrs.**

Introduction to computer programming in Python emphasizing algorithms for scientific applications and data analysis. Prerequisites: Grade of C or better in MAT 121 or 145 or GEO 238 or consent of the school advisor.

168 STRUCTURED PROBLEM-SOLVING USING THE COMPUTER**4 sem. hrs.**

Introduction to the development of algorithms for computer systems processing. Emphasis on structured problem solving and the design of problem solutions. Recommended as one of the first courses in the Computer Science major. Lecture and lab. Prerequisite: MAT 104 or high school equivalent.

170 SCRIPTING LANGUAGES AND AUTOMATION**3 sem. hrs.**

Fundamentals of scripting languages for automation of tasks and general programming. Emphasis on portability, text processing and system administration. Prerequisite: Grade of C or better in IT 168 or consent of the school advisor.

178 COMPUTER APPLICATION PROGRAMMING**3 sem. hrs.**

The design, development, and implementation of computer application systems, including files and GUI. Prerequisite: Grade of C or better in IT 168 or consent of the school advisor.

179 INTRODUCTION TO DATA STRUCTURES**3 sem. hrs.**

Intermediate computer programming, including elementary data structures such as linked lists, stacks, queues, binary trees. Prerequisite: Grade of C or better in IT 168 or consent of the school advisor.

191 INTRODUCTION TO PROFESSIONAL PRACTICE**1 sem. hr.**

Researching available positions, interpreting job descriptions, interview skills, preparing a resume, benefits of a Professional Practice experience. Prerequisites: Grade of C or better in IT 168. Major only.

214 SOCIAL, LEGAL, AND ETHICAL ISSUES IN INFORMATION TECHNOLOGY SMT**3 sem. hrs.**

Study of personal, societal, legal, and ethical issues raised by the effects of information technology. Prerequisites: COM 110 and ENG 101.

225 COMPUTER ORGANIZATION**3 sem. hrs.**

Introduction to computer organization, internal representation of instructions and data, and interaction between software and hardware components. Prerequisites: Grade of C or better in IT 178 or 179. Major or minor only or consent of the school advisor.

226 ADVANCED PRACTICAL APPLICATION DEVELOPMENT**3 sem. hrs.**

Practical programming tools and techniques, including event-driven programming, design patterns, testing, source-code control, software maintenance. Introduction to C++ and UNIX. Prerequisites: Grade of C or better in IT 179. Major or minor only or consent of the school advisor.

244 INTRODUCTION TO BUSINESS INTELLIGENCE**3 sem. hrs.**

This course enables students to learn about Business Intelligence and explore the relevant technology from a multi-disciplinary perspective. Prerequisites: IT 150 or equivalent; MQM 100 or consent of the instructor.

250 FUNDAMENTALS OF INFORMATION ASSURANCE AND SECURITY

3 sem. hrs.

Fundamental concepts in information assurance and security including planning, risk management, cryptography, network security, hardening, people, and physical security. Formerly IT 350. Prerequisites: Grade of C or better in IT 170 or 178 or 179 and 276 or concurrent registration. Major or minor only or consent of the school advisor.

254 HARDWARE AND SOFTWARE CONCEPTS

3 sem. hrs.

Overview of nature and interrelationships of computer architectures, hardware, operating systems, data types, microcontrollers, virtualization, storage technologies, and filesystems. Prerequisites: Grade of C or better in IT 168. Major or minor only or consent of the school advisor.

261 SYSTEMS DEVELOPMENT I

3 sem. hrs.

Information systems development, development methodologies, analysis and design techniques and tools, relational database concepts. Prerequisites: Grade of C or better in IT 170, 178, or 179 and IT 254 or 225 or concurrent registration. Major or minor only or consent of the school advisor.

262 INFORMATION TECHNOLOGY PROJECT MANAGEMENT

3 sem. hrs.

The processes, methods, techniques, and tools in managing information technology projects including scope, time, cost, quality, and risk management. Prerequisites: IT 261 or concurrent registration. Major or minor only or consent of the school advisor.

272 COBOL AS A SECOND LANGUAGE

4 sem. hrs.

COBOL language for students with substantial programming experience in another language. Emphasizes structured problem-solving and programming. Prerequisites: Grade of C or better in IT 168. Major or minor only or consent of the school advisor.

275 JAVA AS A SECOND LANGUAGE

4 sem. hrs.

Intensive study of the Java programming language for students with previous programming experience. Prerequisites: 2-semester sequence in a high-level programming language required. Major or minor only or consent of the school advisor.

276 DATA COMMUNICATIONS

3 sem. hrs.

Hardware and software used in data communications and networking. Network types, architectures, protocols and standards. Local area and packet networks. Formerly IT 375. Prerequisites: Grade of C or better in IT 168 and (IT 225 or 254 or concurrent registration). Major or minor only or consent of the school advisor.

279 ALGORITHMS AND DATA STRUCTURES

3 sem. hrs.

Data structures, algorithms, mathematical foundations of computer science. Topics include lists, trees, graphs, sorting, searching, correctness, computational complexity, algorithm design. Prerequisites: Grade of C or better in IT 226; MAT 160 or 260 or concurrent registration in MAT 260. Major or minor only or consent of the school advisor.

326 PRINCIPLES OF SOFTWARE ENGINEERING

3 sem. hrs.

Fundamentals of software engineering. Topics include specification models, metrics, design fundamentals, interface design, quality assurance, and automated tools. Offered alternate years. Prerequisites: Grade of C or better in IT 179 and 261. Major or minor only or consent of the school advisor, or graduate standing.

327 CONCEPTS OF PROGRAMMING LANGUAGES

3 sem. hrs.

Survey of pragmatic, syntactic and semantic structure of programming languages. Procedural, logic-oriented, object-oriented and other contemporary languages included. Prerequisites: Grade of C or better in IT 179. Major or minor only or consent of the school advisor, or graduate standing.

328 INTRODUCTION TO THE THEORY OF COMPUTATION

3 sem. hrs.

Basic concepts in computing theory. Topics include recursive definitions, regular expressions, transition graphs, automata, nondeterminism, grammars, parsing, decidability, Turing machines. Prerequisites: Grade of C or better in IT 279. Major or minor only or consent of the school advisor, or graduate standing.

330 INTRODUCTION TO ENTERPRISE COMPUTING SYSTEMS**3 sem. hrs.**

Introduction to the mainframe enterprise computing systems, organizations, architectures, operating systems, networking, hardware and software utilities, and applications. Prerequisites: Grade of C or better in IT 225 or 254. Major or minor only or consent of the school advisor, or graduate standing.

340 INTRODUCTION TO ARTIFICIAL INTELLIGENCE**3 sem. hrs.**

Foundations of artificial intelligence including heuristic search and knowledge representation with a survey of several artificial intelligence research areas. Prerequisites: Grade of C or better in IT 279. Major or minor only or consent of the school advisor, or graduate standing.

341 OBJECT-ORIENTED SYSTEM DEVELOPMENT**3 sem. hrs.**

Main concepts of object-oriented technology and a comprehensive methodology for system development. Object-oriented analysis, design, and implementation including object-oriented databases. Prerequisites: Grade of C or better in IT 261. Major or minor only or consent of the school advisor, or graduate standing.

344 APPLIED DATA MINING**3 sem. hrs.**

This course enables students to extract knowledge from big datasets by applying supervised and unsupervised data mining methods using software tools. Prerequisite: IT 244 or equivalent.

345 ADVANCED BUSINESS INTELLIGENCE AND DATA WAREHOUSING**3 sem. hrs.**

Topics covered include data warehousing, Big Data, data governance, and the future of the business intelligence field. Prerequisite: Grade of C or better in IT 378, or graduate standing.

351 PRACTICAL CRYPTOGRAPHY AND TRUSTED SYSTEMS**3 sem. hrs.**

Practical cryptography and its applications, authentication protocols, access controls and trusted systems. Formerly *ADVANCED INFORMATION ASSURANCE AND APPLIED CRYPTOGRAPHY*. Prerequisites: Grade of C or better in IT 250 or 226 and 276. Major or minor only or consent of the school advisor, or graduate standing.

353 WEB DEVELOPMENT TECHNOLOGIES**3 sem. hrs.**

Web concepts, infrastructure, development technologies, multi-tiered program design and implementation, and current issues and trends. Prerequisites: Grade of C or better in 261. Major or minor only or consent of the school advisor, or graduate standing.

354 ADVANCED WEB APPLICATION DEVELOPMENT**3 sem. hrs.**

Theory and practice of state-of-the-art technologies for application development for the Web including service-oriented and mobile systems. Prerequisites: Grade of C or better in IT 353. Major or minor only or consent of the school advisor, or graduate standing.

355 SECURE SOFTWARE DEVELOPMENT**3 sem. hrs.**

Ensuring software is secure through architecture and development techniques. Prerequisites: Grade of C or better in IT 178 or 179 and 261.

356 INTRODUCTION TO COMPUTER GRAPHICS**3 sem. hrs.**

Graphics software and hardware, pipeline model of rendering. 2D/3D modeling, transformations. Algorithms: polygons, lighting, textures, visibility. Prerequisites: IT 279. Major or minor only or consent of the school advisor, or graduate standing.

357 TOOLS AND TECHNIQUES IN DEFENSIVE SECURITY**3 sem. hrs.**

Application of current tools and techniques in preventative information assurance and security including monitoring and defensive countermeasures. Formerly *TOOLS AND TECHNIQUES IN INFORMATION ASSURANCE AND SECURITY*. Prerequisites: Grade of C or better in IT 250 and 276, or graduate standing.

358 MOBILE AND CLOUD COMPUTING**3 sem. hrs.**

Develop, deploy, and troubleshoot mobile and cloud computing applications. Prerequisite: Grade of C or better in IT 353, or consent of the school advisor, or graduate standing.

359 TOOLS AND TECHNIQUES IN PENETRATION TESTING**3 sem. hrs.**

Penetration testing and offensive security software and methodologies, with emphasis on ethical hacking. Lecture and lab. Prerequisites: Grade of C or better in IT 250 and 276.

360 SECURITY INCIDENT AND EVENT MANAGEMENT AND FORENSICS**3 sem. hrs.**

Detecting, responding to, and investigating information security incidents. Prerequisites: Grade of C or better in IT 250 and 276.

363 SYSTEMS DEVELOPMENT II**4 sem. hrs.**

Emphasis on analysis and design techniques and tools, project communication, systems development methodologies, interface design. Systems development team project. Prerequisites: Grade of C or better in IT 261 and 262. Grade of C or better in COM 223. Major or minor only or consent of the school advisor.

367 DESIGNING THE USER INTERFACE**3 sem. hrs.**

Human factors issues in developing information systems: task analysis, user interface design guidelines, psychological principles, prototyping interfaces, and user evaluation. Prerequisites: Grade of C or better in IT 261. Major or minor only or consent of the school advisor, or graduate standing.

368 TOPICS IN INFORMATION SYSTEMS**3 sem. hrs.**

Advanced topics in information systems, including systems analysis, design, systems development and Web development. Multiple enrollments are allowed if content is different. Prerequisites: Major or minor only or consent of the school advisor, or graduate standing. Prerequisites vary with topic chosen.

368A10 WEBSITE DEVELOPMENT USING ASP.NET**3 sem. hrs.**

Website development using ASP.Net. This course will focus on the practical application of ASP.Net to build comprehensive websites. Internet Information Services (IIS) and Visual Studio.Net will be covered to facilitate the complete integration of ASP.Net within the web environment. Prerequisite: IT 261.

368A16 MANAGING IT SERVICES**3 sem. hrs.**

The Information Technology Infrastructure Library (ITIL) service lifecycle, consisting of five interrelated phases, is introduced and narrated with real-world scenarios and case studies. Prerequisite: Information Systems or Computer Science major or minor only or consent of the department advisor, or graduate standing.

368A17 ENTERPRISE RESOURCE PLANNING**3 sem. hrs.**

This course provides students with a comprehensive evaluation of Enterprise Resource Planning (ERP) from managerial and technical aspects. Prerequisites: Major or minor only or consent of the department advisor. A grade of C or better in IT 261 and COM 223 or consent of the graduate advisor, or graduate standing.

369 TOPICS IN CYBERSECURITY**3 sem. hrs.**

Advanced topics in cybersecurity, including cryptography, information assurance, and computer security. Multiple enrollments are allowed if content is different. Prerequisites: Major or minor only or consent of the school advisor.

370 SERVER MANAGEMENT**3 sem. hrs.**

Build, manage and troubleshoot server hardware and software. Prerequisite: Grade of C or better in IT 377, or consent of the school advisor, or graduate standing.

372 EXTERNAL DATA STRUCTURES**3 sem. hrs.**

External file design, VSAM, IBM utilities and sort/merge, basic concepts of IBM/MVS operating systems, and extensive study of JCL. Prerequisites: Grade of C or better in IT 254 and 272. Major or minor only or consent of the school advisor, or graduate standing.

373 WIDE AREA NETWORK INFRASTRUCTURES**3 sem. hrs.**

Design, configure, operate, and use Wide Area Networks and network applications. Emphasizes hands-on use of network design tools. Prerequisites: Grade of C or better in IT 276. Major or minor only or consent of the school advisor.

374 TOPICS IN**TELECOMMUNICATIONS****3 sem. hrs.**

In-depth study of a topic in telecommunications such as emerging technologies, network administration, network management architectures, and wireless communications. Multiple enrollments are allowed if content is different. Prerequisites: Major or minor only or consent of the school advisor, or graduate standing. Prerequisites vary with topic chosen.

376 WIRELESS AND MOBILE**NETWORK SECURITY****3 sem. hrs.**

Overview of fundamental principles and security algorithms of security in wireless networks. Emphasis is on application, design, and analysis. Prerequisites: Grade of C or better in IT 276. Major or minor only or consent of the school advisor, or graduate standing.

377 PRACTICAL**TELECOMMUNICATIONS****NETWORKING****3 sem. hrs.**

Design, configure, operate and use local area networks, network applications, and wide area network concepts. Emphasizes hands-on use of a network operating system. Prerequisites: Grade of C or better in IT 276. Major or minor only or consent of the school advisor, or graduate standing.

378 DATABASE PROCESSING**3 sem. hrs.**

Database concepts, emphasis on relational databases, SQL, data modeling, database design, DBMS functions, database application programming, current trends, design project. Prerequisites: Grade of C or better in IT 261. Major or minor only or consent of the school advisor, or graduate standing.

379 ADVANCED COMPUTER**NETWORKS****3 sem. hrs.**

Explore the latest advances in networking with emphasis on practical hands-on learning. Formerly *TELECOMMUNICATIONS NETWORK OPERATIONS AND MANAGEMENT*. Prerequisite: Grade of C or better in IT 377, or consent of the school advisor, or graduate standing.

380 WIRELESS COMMUNICATION SYSTEMS**3 sem. hrs.**

The theory and practice of wireless telecommunications systems. Emphasis is on application, design, and analysis of wireless systems. Prerequisites: Grade of C or better in IT 276. Major or minor only or consent of the school advisor, or graduate standing.

381 NETWORK DESIGN AND ANALYSIS**3 sem. hrs.**

Analyze user internetworking requirements; design and implement a network infrastructure that can meet the user requirements. Prerequisites: Grade of C or better in IT 377 or consent of the school advisor, or graduate standing.

382 DISTRIBUTED SYSTEMS**3 sem. hrs.**

Overview of distributed systems including system architectures, models, distributed operating systems, distributed algorithms, distributed databases, distributed objects, issues and trends. Offered alternate years. Prerequisites: Grade of C or better in IT 179, 225 and 261. Major or minor only or consent of the school advisor, or graduate standing.

383 PRINCIPLES OF OPERATING SYSTEMS**3 sem. hrs.**

Functional criteria for operating system design. Job management, task management, data management, resource allocation and dump and trace facilities. Prerequisites: Grade of C or better in IT 225 and 226. Major or minor only or consent of the school advisor, or graduate standing.

385 TOPICS IN COMPUTER SCIENCE**3 sem. hrs.**

In-depth study of a topic such as compiler design, artificial intelligence, programming language and digital logic design. Multiple enrollments are allowed if content different. Offered alternate years. Prerequisite: Major or minor only or consent of the school advisor, or graduate standing.

Prerequisites vary with topic chosen.

385A11 LAN SECURITY**3 sem. hrs.**

This course will teach students practical aspects of LAN security. Prerequisite: Consent of school advisor.

385A15 MACHINE LEARNING**3 sem. hrs.**

Survey of machine learning, including statistical, connectionist, and rule-based approaches to supervised, unsupervised, and semi-supervised settings. Prerequisite: IT 279.

388 INTRODUCTION TO PARALLEL PROCESSING**3 sem. hrs.**

Study of parallel processors and their software environments. Students will write programs for several parallel computers. Offered alternate years. Prerequisites: Grade of C or better in IT 225; concurrent registration in IT 279. Major or minor only or consent of the school advisor, or graduate standing.

391 DIRECTED PROJECT IN INFORMATION TECHNOLOGY**3 sem. hrs.**

Team design and/or implementation of a modest-sized computer-based system in a live environment under faculty supervision. Prerequisites: A minimum of 90 hours completed and a grade of C or better in IT 191 and 377 or 378 or 383. Major only.

392 ENTERPRISE SYSTEMS INTEGRATION AND APPLICATION DEVELOPMENT**3 sem. hrs.**

Capstone course including business applications, systems integration, enterprise business decisions, systems administration, and the systems deployment life cycle. Prerequisites: Grade of C or better in IT 272 and 330. Major or minor only or consent of the school advisor, or graduate standing.

398 PROFESSIONAL PRACTICE: IN INFORMATION TECHNOLOGY**1-6 sem. hrs.**

Multiple enrollments are allowed. Maximum 16 hours credit in Professional Practice. Prerequisites: Grade of C or better in IT 191. By application and prior approval of IT Professional Practice Advisor only. Major only.

398A50 PROFESSIONAL PRACTICE: COOP I IN INFORMATION TECHNOLOGY**1-6 sem. hrs.**

Multiple enrollments are allowed; maximum 6 hours. Prerequisite: Major only.

398A60 PROFESSIONAL PRACTICE: COOP II IN INFORMATION TECHNOLOGY**1-8 sem. hrs.**

CR/NC basis only. Multiple enrollments are allowed. Prerequisites: Concurrent registration in IT 398A50. Major only.