Information Systems (ISE)

Major and Minor in Information Systems

Department of Computer Science, College of Engineering and Applied Sciences

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Information Systems (ISE)

The Information Systems major, which is housed in the Department of Computer Science, prepares its graduates to design and build computerized data processing and decision support systems. The program is technically oriented, emphasizing the design and implementation aspects of large-scale information systems as well as the more traditional managerial and organizational issues, and it balances development of system engineering skills with learning to deliver reliable systems on time and within budget. Throughout the program, students are exposed to diverse application areas ranging from traditional business, finance, and accounting through telecommunications, networks, multimedia, and database management, to computer-aided design and industrial production management systems.

Requirements for the Major and Minor in Information Systems (ISE)

Acceptance into the Information Systems Major

Qualified freshman and transfer applicants may be accepted directly into the Information Systems major upon admission to the University. Currently enrolled students may apply for acceptance to the major after completing the following two courses with grades of C or higher and a grade point average of 2.80 or higher.

1. ISE 102 Introduction to Web Design and Programming
2. ISE 108 Introduction to Programming

Enrolling in ISE Courses

To enroll in ISE courses, students must have completed all prerequisites with a grade of C or higher (Pass/No Credit grades are not acceptable to meet prerequisites). For transfer students, official transfer credit evaluations must have been completed and approved.

Failure to satisfy the prerequisites or to attend the first class may result in deregistration. The Pass/No Credit option is not available to ISE majors for ISE courses.

Requirements for the Major

The major in Information Systems leads to the Bachelor of Science degree. At least two of the courses under requirement A.2. below must be completed at Stony Brook.

Completion of the major requires approximately 70 credits.

A. Information Systems Courses
1. ISE 102 Introduction to Web Design and Programming
ISE 108 Introduction to Programming
ISE 208 Intermediate Programming
ISE 215 Foundations of Computer Science
2. ISE 302 Professional Ethics for Computer Science
ISE 305 Database Design and Practice
ISE/CSE 308 Software Engineering
ISE 311 Systems Administration
ISE 320 Information Management
3. Three additional upper-division ISE courses, excluding ISE 475.

B. Mathematics Courses
1. AMS 151 Applied Calculus I (or MAT 131 or MAT 141 or MAT 125, 126)
2. AMS 201 Matrix Methods and Models or AMS 210 Applied Linear Algebra or MAT 211 Introduction to Linear Algebra
3. AMS 310 Survey of Probability and Statistics or ECO 320 Mathematical Statistics

C. Specializations

Students must complete a specialization in one of the application areas listed below, or else design a specialization of six to eight courses in another application area in consultation with the ISE undergraduate director before the courses for the specialization are completed.

D. Upper-Division Writing Requirement: ISE 300 Writing in Information Systems
All degree candidates must demonstrate technical writing skills at a level that would be acceptable in an industrial setting. To satisfy this requirement, students must pass ISE 300 Writing in Information Systems, a course that requires various writing assignments, including at least one significant technical paper.

EST 304 Communication for Engineers and Scientists may be taken in lieu of ISE 300 to fulfill the ISE upper-division writing requirement.

Grading

All courses taken to satisfy Requirements A through D must be taken for a letter grade and completed with a grade of C or higher. A grade of C or higher is required in prerequisite courses listed for all CSE and ISE courses.

Specialization in Business and Economics

Students may take a specialization in Business and Economics consisting of the following courses:

1. Core Courses
   a. BUS 111 Introduction to Business for Non-Business Majors
   b. ECO 108 Introduction to Economics
   c. BUS 210 Financial Accounting

2. One of the following:
   BUS 214 Managerial Accounting
   BUS 346 Operations Management
   BUS 349 Management Science
   BUS 355 Investment Analysis
   BUS 356 Financial Engineering
   ECO 348 Analysis for Managerial Decision Making
   ECO 368 Modern Portfolio Theory
   ECO 389 Corporate Finance
   EST 392 Engineering and Managerial Economics
   EST 393 Production and Operations Analysis

3. One of the following:
   BUS 347 Business Ethics
   BUS 348 Principles of Marketing
   ECO 326 Industrial Organization
   ECO 343 Transformation in Economic Systems
   ECO 345 Law and Economic Issues
   POL 319 Business Laws
   POL 359 Public Policy Analysis
   POL 364 Organizational Decision Making
   SOC 381 Sociology of Organizations

4. One of the following:
   BUS 340 Information Systems in Management
   BUS 343 Expert Systems in Business
   EST 302 Assessment of Computer-Based Technologies
   EST 305 Applications Software in Information Management
   EST 320 Communication Technology Systems
   EST 325 Technology in the Workplace

Specialization in Psychology

Students may take a specialization in Psychology consisting of the following courses:

1. Core Courses
   a. PSY103 Introduction to Psychology
   b. PSY 201 Statistical Methods in Psychology
   c. PSY 310 Research and Writing in Psychology

2. One of the following:
   PSY 220 Survey in Developmental Psychology
   PSY 230 Survey in Clinical Psychology
   PSY 240 Survey in Social Psychology
   PSY 250 Survey in Biopsychology
   PSY 260 Survey in Cognition and Perception

3. Two additional courses numbered 200 or higher other than PSY 273, 283, 310, 399, 447, 475, 476, 487, 488, 495, 496

Specialization in Technological Systems Management

Students may take a specialization in Technological Systems Management consisting of the following courses:

1. Four required courses:
   a. EST 202 Introduction to Science, Technology, and Society Studies
   b. EST 391 Technology Assessment
   c. EST 392 Engineering and Managerial Economics
   d. EST 393 Project Management

2. Two elective courses from the following:
   EST 310/ISE 340 Design of Computer Games
EST 320 Communication Technology Systems
EST/ISE 323 Human-Computer Interaction
EST 326 Management for Engineers
EST 327 Marketing for Engineers
EST 421 Starting the High-Technology Venture
Note: Courses cross-listed between ISE and EST may be taken either as ISE electives (Item A.3) or as TSM specialization electives (Item C).

Specialization in Other Application Areas
A student may design a specialization in another application area of information systems in consultation with the ISE undergraduate director before the courses for the specialization are completed.

Requirements for the Minor
The minor in Information Systems is open to all students not majoring in either Computer Science or Information Systems or minoring in Computer Science. To declare the minor in Information Systems, students must complete ISE 102 with a grade of C or higher. The minor requires seven courses totaling 21 credits as outlined below:
1. ISE 102 Introduction to Web Design and Programming
2. ISE 108 Introduction to Programming
3. ISE 208 Intermediate Programming
4. Four electives totaling at least twelve credits. Electives must include nine credits of upper-division courses and at least nine credits of ISE courses. Approved electives include most ISE courses, as well as other courses relevant to Information Systems; for details contact the Department of Computer Science Undergraduate Office.
Note: All courses above must be passed with a grade of C or higher

Sample Course Sequence for the Major in Information Systems

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<th>Freshman Fall</th>
<th>Credits</th>
<th>Spring</th>
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<td>AMS 151</td>
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<td>Specialization Course</td>
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<td>AMS 201</td>
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<td>ISE 320</td>
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<td>AMS 310 or ECO 320</td>
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ISE 102: Introduction to Web Design and Programming
An introduction to the design of Web pages, specifically the development of browser and device independent HTML, with an emphasis on the XHTML standards. Includes the use of style sheets (CSS) and tools for page layout and verification. HTML is presented as a mark-up language, exploring the rules of HTML elements and attributes. Students learn the separation of page viewing information from the HTML through CSS style sheets as well as the use of block layout without using HTML tables. Addresses HTML display properties including text, color, image, and graphic elements as well as approaches to HTML validation and techniques.
Advisory Prerequisite: CSE 101 or basic computer skills
3 credits

ISE 108: Introduction to Programming
Introduces computer programming at a level suitable for those with no prior programming experiences, including liberal arts and humanities majors. Programming exercises involve state-of-the-art visual applications. Topics include problem-solving techniques, object-oriented design, and programming concepts such as conditionals, iteration, arrays, and modularity.
3 credits

ISE 208: Intermediate Programming
Teaches programming and system design techniques with an emphasis on applications to business. Topics include object-oriented design techniques, testing and debugging, data structures, recursion, and exception-handling. Uses the Java programming language.
Prerequisite: ISE 108
3 credits

ISE 215: Foundations of Computer Science
Introduction to the logical and mathematical foundations of computer science. Topics include functions, relations, and sets; recursion and functional programming; elementary logic; and mathematical induction and other proof techniques.
Prerequisite: AMS 151 or MAT 125 or MAT 131
3 credits

ISE 300: Writing in Information Systems
See Requirements for the Information Systems Major, Upper-Division Writing Requirement.
Prerequisites: WRT 102; U3 or U4; ISE major 1 credit

ISE 301 - H: History of Computing
A study of the history of computational devices from the early ages through the end of the 20th century. Topics include needs for computation in ancient times, development of computational models and devices through the 1800's and early 1900's, World War II and the development of the first modern computer, and early uses in business. Creation of programming languages and the microchip. Societal changes in computer usage due to the microcomputer, emergence of the Internet, the World Wide Web, and mobile computing. Legal and social impacts of modern computing. Cannot be used as a technical elective for the CSE major or minor. This course is offered as both CSE 301 and ISE 301.
Prerequisite: U2 standing or higher
Advisory Prerequisite: one course in computing
3 credits

ISE 302: Professional Ethics for Computer Science
Familiarizes students with professional practice in Information Technology. Enables them to identify ethical conflicts, their responsibilities and options, and to think through the implications of possible solutions to ethical conflicts.
Prerequisites: CSE 219 or CSE 260 or ISE 305
1 credit

ISE 305: Database Design and Practice
The design of database applications including Entity-Relationship data modeling, the relational data model, the SQL database query language, application development, and database administration. Students will complete a project that includes designing a database application and implementing it using database development tools.
Prerequisite: ISE 208 or CSE 214 or CSE 230
3 credits

ISE 308: Software Engineering
Introduces the basic concepts and modern tools and techniques of software engineering. Emphasizes the development of reliable and maintainable software via system requirements and specifications, software design methodologies including object-oriented design, implementation, integration, and testing; software project management; life-cycle documentation; software maintenance; and consideration of human factor issues. This course is offered as both CSE 308 and ISE 308.
Prerequisite: CSE 219 or ISE 305
3 credits

ISE 311: Systems Administration
This course covers practical techniques to manage information systems, also known as IT Systems Administration. Students will learn how to install computers for assorted hardware and software platforms (Windows, Unix/Linux, OS-X). Install networking equipment and configure it. Install server software on several systems (e.g. web, database, mail) and configure it. Secure the network, hosts, and services, and apply system patches. Set up redundant computing services, virtual machines/services, and hardware so that services can survive some hardware/software failures. Evaluate the performance, reliability, and security of the overall system.
Prerequisites: CSE 214 or CSE 230 or CSE 260 or ISE 208
3 credits

ISE 315: Database Transaction Processing Systems
Theory and practice of design for applications involving transactional access to a database. Transaction design, schema design, restart and recovery, journaling, concurrency control, distributed databases. Student groups perform design and implementation of significant database application. This course is offered as both CSE 315 and ISE 315.
Prerequisite: CSE or ISE 305
3 credits

ISE 320: Information Management
The course presents the relationship between information technology and the systems that use the technology. The emphasis is on business systems with a high information technology components (e.g. software developments, communications, financial management, etc.). Topics include infrastructure management, information management, security, and communications. Emphasis is given to case studies relating to information management.
Prerequisite: U2 Standing
3 credits

ISE 323: Human-Computer Interaction
A survey course designed to introduce students to Human-Computer Interaction and prepare them for further study in the specialized topics of their choice. Students will have the
opportunity to delve deeper in the course through a course project, and through a two-three week special topic selected at the instructor's discretion.

**Prerequisites:** CSE 214 or CSE 230 or CSE 260

3 credits

**ISE 325: Computers and Sculpture**

This multidisciplinary class surveys how computer science and computer technology are used in sculpture. Case studies with slides, videos, and software demonstrations illustrate a range of approaches of sculptors incorporating computers in their creative process. Various state-of-the-art fabrication technologies are studied (with site visits if available on campus). Mathematical foundations are emphasized so students can recognize them when analyzing sculpture and choose the right tool when designing. In the weekly laboratory, these ideas are reinforced with projects using a range of available software and inexpensive construction materials, e.g., paper, cardboard, and foamcore. Prerequisites: CSE 110 or permission of instructor 3 credits

**Prerequisite:** CSE 110 or permission of instructor

3 credits

**ISE 332: Introduction to Visualization**

Visualization of scientific, engineering, medical, and business data sets. Mechanisms to acquire sampled, computed, or synthetic data and methods to transform symbolic into the visual. Topics include classic visualization process; visual perception; volume and surface visualization; methods for visualizing sampled, simulated, and geometric objects; and visualization systems. Emphasis on applications and case studies. This course is offered as both CSE 332 and ISE 332.

**Prerequisites:** CSE 219; MAT 211 or AMS 210

3 credits

**ISE 334: Introduction to Multimedia Systems**

Survey of technologies available for user interfaces. Discussion of hypertext; voice, music, and video together with tools and models for capturing, editing, presenting, and combining them. Capabilities and characteristics of a range of peripheral devices including devices based on posture, gesture, head movement, and touch. Case studies of academic and commercial multimedia systems including virtual reality systems. Students participate in laboratory exercises and build a multimedia project. This course is offered as both CSE 334 and ISE 334.

**Prerequisites:** CSE or ISE major

3 credits

**ISE 340: Design of Computer Games**

Fundamental ideas underlying the design of games, which occurs before the programming stage. How games function to create experiences, including rule design, play mechanics, game balancing, social game interaction and the integration of visual, audio, tactile and textual elements into the total game experience. Game design documentation and play testing. Students will design their own game during the semester.

**Advisory Prerequisite:** Basic Computer Skills

3 credits

**ISE 364: Advanced Multimedia Techniques**

Digital media production techniques for high-bandwidth applications such as electronic magazine illustration, broadcast television, and motion picture special effects. Students explore techniques such as 3D modeling and character animation, video compositing, and high-resolution image processing in a state-of-the-art multimedia computing laboratory. High-capacity multimedia storage, high-speed networks, and new technologies such as DVD, HDTV, and broadband will be reviewed. This course is offered as both CSE 364 and ISE 364.

**Prerequisites:** CSE/ISE 334 and permission of the instructor

3 credits

**ISE 377: Introduction to Medical Imaging**

An introduction to the mathematical, physical, and computational principles underlying modern medical imaging systems. Covers fundamentals of X-ray computer tomography, ultrasonic imaging, nuclear imaging, and magnetic resonance imaging (MRI), as well as more general concepts required for these, such as linear systems theory and the Fourier transform. Popular techniques for the visualization, segmentation, and analysis of medical image data are discussed, as well as applications of medical imaging, such as image-guided intervention. The course is appropriate for computer science, biomedical engineering, and electrical engineering majors.

**Prerequisites:** AMS 161 or MAT 127 or 132 or 142; AMS 210 or MAT 211

3 credits

**ISE 378: Introduction to Robotics**

Introduces basic concepts in robotics including coordinate transformation, kinematics, dynamics, Laplace transforms, equations of motion, feedback and feedforward control, and trajectory planning. Covers simple and complex sensors (such as cameras), hybrid and behavior based control and path planning. Concepts are illustrated through laboratories using the LEGO Robot Kit.

**Prerequisites:** AMS 161 or MAT 127 or 132 or 142; AMS 210 or MAT 211 or MEC 262

3 credits

**ISE 390: Special Topics in Information Systems**

Lecture or seminar course on a current topic in information systems. Semester supplements to this Bulletin contain specific description when course is offered. May be repeated as the topic changes, but cannot be used more than twice to satisfy ISE major requirements.

**Prerequisites:** ISE or CSE major; U3 or U4 standing

3 credits

**ISE 391: Special Topics in Information Systems**

Lecture or seminar course on a current topic in information systems. Semester supplements to this Bulletin contain specific description when course is offered. May be repeated as the topic changes, but cannot be used more than twice to satisfy ISE major requirements.

3 credits

**ISE 475: Undergraduate Teaching Practicum**

Students assist faculty by conducting a recitation or laboratory section that supplements a lecture course. The student receives regularly scheduled supervision from the faculty advisor. May be used as an open elective only and repeated once.

**Prerequisites:** U4 standing as an undergraduate CEAS major; a minimum g.p.a. of 3.00 in all Stony Brook courses; grade of B or better in the course in which the student is to assist; or permission of department

3 credits

**ISE 487: Research in Information Systems**

An independent research project with faculty supervision. Only three credits of research electives (AMS 487, BME 499, CSE 487, ESE 499, ESM 499, EST 499, ISE 487, MEC 499) may be counted toward technical elective requirements. May not be taken for more than six credits.

**Prerequisites:** Permission of instructor and department

0-6 credits
ISE 488: Information Systems Internship

Participation in local, state, national, or international private enterprises, public agencies, or nonprofit institutions. Students are required to submit a written proposal, progress reports, and a final report on their experience to the client and to the department. May be repeated up to a limit of 12 credits but only 3 credits of CSE or ISE 488 may be used as an elective to satisfy ISE major requirements.

Prerequisites: ISE major; U3 or U4 standing; permission of faculty sponsor and department

3 credits, S/U grading