**COMPUTER INFORMATION SYSTEMS (CS)**

**CS 150 Introduction to Data and Information Management**  (3 credits)
*Pre-Req: IT 101 Note: A student can take either CS 150 or CS 160 but not both.*

The course introduces information management and relational databases; data collection, storage and retrieval; query/report design and generation; logical database structures; basic transaction architecture; and systems analysis for database design.

**CS 160 Data-Driven Decision Making**  (3 credits)
*Pre-Req: IT 101, Programming Intensive*

The primary objective of this course is to expose the student to the breadth, depth, versatility and usefulness of data and databases in problem solving. This course will develop the students' foundational competencies related to data management that allow them to critically analyze complex problems using a variety of data sources and tools and to effectively present their ideas to others.

The key learning objectives of this course are: 1. Understanding how data can support effective problem solving and decision making in specific problem contexts, 2. Understanding how data are stored, organized, managed, and how data can support effective problem solving and decision making in specific problem contexts, 3. Acquiring, cleaning, and structuring data for analysis and decision support, 4. Analyzing the data with relevant tools, and 5. Presenting the results of the analysis effectively to various stakeholder groups.

**CS 180 Programming Fundamentals**  (3 credits)
*Pre-Req: IT 101*

Students will develop basic programming and problem-solving skills through a variety of assignments that explore the use of fundamental control and data structures using the Java programming language. Students learn about the concepts of classes and objects without being exposed to the advanced principles of object orientation. Testing and debugging techniques, the development of sound programming logic, and the writing of well-structured code are also emphasized.

**CS 213 The World Wide Web**  (3 credits)
*Pre-Req: IT 101. This course may not be used toward the CS major.*

This course explores the World Wide Web as an educational resource. Emphasis is on the use of HTML and JavaScript as programming tools to develop web pages that include text, graphics, animation, internal and external linkages, frames, forms and, with JavaScript, alert boxes, remote windows, events and cookies. In addition, such concepts as the architecture of the web, the use of browsers, effective search strategies, multimedia and web security are addressed to familiarize students with the web as a business tool and resource. Teaches a contemporary IT technology by using a computer-based software package. Students are expected to perform operational exercises to gain experience and facility with the particular technology designated for this course section. Students have a broad choice of technology appropriate for those with some experience beyond IT 101.

**CS 230 Introduction to Programming with Python**  (3 credits)
*Pre-Req: IT 101*

This course introduces students to the fundamentals of programming and algorithmic thinking using the Python programming language. Students learn the fundamental constructs and key concepts that are common to all modern programming languages using this relatively straightforward, popular, and expressive language. Their understanding is reinforced throughout the course by the development of several standalone applications, in which the importance of writing efficient, clean, and well-structured code is also emphasized. This course is intended for any motivated student interested in learning how to program. No prior knowledge of Python or other programming languages is required.

**CS 240 Business Processing and Communications Infrastructure**  (3 credits)
*Pre-Req: IT 101*

A detailed overview of information technology infrastructure components used by modern organizations: underlying principles, concepts, and terminology of computer architecture and digital communication networks; organization of computer hardware, data representation, input/output, instruction sets, file and memory organization, and operating - enabling evaluation of the hardware capabilities and performance of a computer system; assembly, compilation and execution of computer programs will be addressed as the basic operations of a computer system at the machine level. Foundational technologies and fundamental principles of digital communication: ISO, IETF and IEEE standards, concepts relevant to physical, data link, and network layers of communication including analog and digital signaling, communications media, data representation, communications protocols and addressing.

**CS 280 Object-Oriented Application Development**  (3 credits)
*Pre-Req: CS 180*

This course teaches object-oriented programming and development using the Java programming language. Students will complete several programming assignments designed to reinforce their comprehension of object-oriented concepts, including encapsulation, class hierarchies and polymorphism. Developing both Java applications and applets will strengthen their understanding of abstract classes and interfaces, event-driven programming and exception handling. This course will include required lab sessions and regularly scheduled lab hours.

**CS 290 Data Driven Decision Making**  (3 credits)
*Pre-Req: IT 101*

**CS 299 Experimental Course in CS**  (3 credits)
*Pre-Req: CS 298*

Experimental courses explore curriculum development with specific content intended for evolution into a permanent course. A topic may be offered twice before it becomes a permanent course. Students may repeat experimental courses with a different topic for credit.

**CS 350 Database Management Systems**  (3 credits)
*Pre-Req: CS 150 or (AC 340 for AIS or ISAC major) or (MA 346 for DA/D T students)*

This course is a comprehensive introduction to data management in organizations. It establishes the data management foundation in the computing and AIS majors. Topics include conceptual and logical data modeling, entity relationship and relational data modeling, and database design and implementation using the SQL programming language. Students will complete exercises in database modeling, design and programming.
CS 360 Business Systems Analysis and Modeling  (3 credits)
*Pre-Req: CS 150 or (AC 340 and AIS or ISAC major)*
This course begins with business functional analysis and ends with object-oriented information systems design. Students are introduced to tools and techniques enabling effective analysis, design and documentation of an information system. Students learn formal methodologies that form the basis of object-oriented systems engineering practices. Models that focus on the articulation of business functions, integrating process, data and behavioral abstractions form the core of formal methods in systems development using the Unified Modeling Language (UML).

CS 380 Multi-Tiered Application Development  (3 credits)
*Pre-Req: CS 150 and (CS 180 or CS 213)*
This class provides a hands-on introduction to a number of tools and technologies that are utilized to develop e-business applications and considers the impact of these technologies on e-business solutions. It assumes the student has basic proficiency in programming (e.g., JavaScript or Java) and basic Web-site use and introduces tools to develop dynamic, data-driven Web applications. The primary objective of the course is to learn how to develop database driven web applications that enable businesses to interact with their customers, employees and suppliers. This will be a hands-on course and numerous programming assignments and related project work will be expected.

CS 401 Directed Study in Computer Systems  (3 credits)
Permits superior students to study special topics. Allows repetition for credit.

CS 402 Advanced Computing Topics Seminar  (3 credits)
*Pre-Req: CS 213 or CS 180*
Discusses current topics in computing based on readings in the professional literature, guest speakers, and field and individual research projects.

CS 421 Internship in Computer Systems  (3 credits)
*Pre-Req: Computer science major, (CS 350 or CS 360), at least 66 completed and in progress credits, and internship coordinator permission*
Provides an opportunity to develop an extensive project relating computer systems concepts to a specific organization in combination with a work assignment. Involves both full-time employment with an organization and close work with a faculty member.

CS 440 Advanced Net-Centric Computing  (3 credits)
*Pre-Req: CS 180 and CS 240*
Building on the foundation of CS240, Advanced Net-Centric Computing provides students with an in-depth understanding of the planning, design, implementation, and operation of organizational information technology infrastructures. It covers network and transport layer protocols and related addressing and routing issues at a detailed level. The course focuses on network and systems architecture design for the entire enterprise at the campus, metropolitan area, and wide area network levels. It helps students understand issues related to ensuring business continuity, including network and IT systems security and management. It pays special attention to the integration of processing, storage and communication capabilities, and the continuing convergence of telecommunications and networking technologies in the enterprise context.

CS 460 Applied Software Project Management  (3 credits)
*Pre-Req: CS 360*
Students learn and experience the process of information systems development through managing team dynamics and performing software engineering project management. Specific topics discussed include the value of different software development life cycles, project management tools and techniques, software process management practices and software quality management practices. This course fuses students’ prior IT and business education, preparing them to launch their professional IT careers.

CS 480 Advanced Application Development Technology  (3 credits)
*Pre-Req: CS 280*
This course gives CIS majors the opportunity to explore emerging application development technologies. The instructor will choose a particular development technology to present or students will be assigned emerging technologies in the commercial arena to investigate.