

niques, an introduction to data structures, and recursion. It is strongly recommended that students without any prior programming experience complete C S 131 before enrolling in C S 141.

C S 201 **SYSTEM AND NETWORK ADMINISTRATION (3)** *Pre-requisite: C S 131 or 141.* Three hours lecture. Students experience a hands-on approach to system and network administration. General network and system administration is explored using two or more operating systems. Topics include system configuration, network planning, routine system maintenance, firewalls and security, Internet connectivity, system optimization, troubleshooting, and scripting languages.

C S 220 **BUSINESS COMPUTER PROGRAMMING AND FILE SYSTEMS (4)** *Prerequisite: C S 131 or 141.* Three hours lecture and two hours lab. The student studies a programming language appropriate for a business environment and uses this language to write programs that have applications to business and information systems. The student studies the creation and use of sequential, direct access, indexed, and indexed-sequential files.

C S 241-242 **DATA STRUCTURES AND ABSTRACTION I-II (3)** *Prerequisite: C S 142 for C S 241; C S 241 for C S 242.* Three hours lecture and two hours lab. These courses combine a study of data structures and data abstraction as they relate to the efficient storage and retrieval of data in digital computer systems. Topics may include lists and inverted lists, queues, stacks, trees, networks, hashing, various key structures, and the use of data structures to implement common file organizations, along with techniques of object-oriented analysis and programming.

C S 271 **COMPUTER ARCHITECTURE AND ASSEMBLY LANGUAGE PROGRAMMING (4)** *Prerequisite: C S 131, 141 or 220.* Three hours lecture and two hours lab. This course introduces the concepts of machine and assembly language programming and computer architecture. The student studies the syntax of assembly language and becomes proficient in writing programs in assembly language.

C S 298 **SPECIAL TOPICS IN COMPUTER SCIENCE (3)** Appropriate for freshman and sophomores, this course can focus on a wide variety of topics that provide detailed explorations of technologies of particular interest to computer science majors and minors. Topics will frequently incorporate preparation for professional certification.

C S 322 **PROGRAMMING LANGUAGES (3)** *Prerequisite: C S 142.* Three hours lecture. This course is a comparative study of modern high-level programming languages, their syntax, and acceptors. The student is expected to write programs in any of the languages studied which may include PASCAL, LISP, BASIC, FORTRAN, COBOL, ALGOL, ADA, APL, SNOBOL, PROLOG, and MODULA II.

C S 335 **COMPUTER NETWORKS (3)** *Prerequisite: C S 142.* Three hours lecture. This course is a study of the design, use, and analysis of computer networks. Topics include the major theoretical aspects of computer networks and the algorithms used in their implementation and the major networks currently in use. Students can experiment in a laboratory setting.

C S 343 **DESIGN AND ANALYSIS OF ALGORITHMS (3)** *Prerequisite: MATH 231 (or equivalent) and C S 142.* Three hours lecture. This course is an introduction to the design and analysis of problem-solving techniques. Students are required to compute the complexity of algorithms and implement those algorithms in a high-level language using the appropriate data structures.

C S 350 **SOFTWARE SYSTEMS ANALYSIS AND DESIGN (3)** *Prerequisite: C S 142 or 220.* Three hours lecture. This course involves the study and implementation of the strategies and techniques of structured software systems development. Topics include system specification and documentation. Data management systems, structures, and applications are also covered.

C S 360 **OPERATING SYSTEMS AND COMPUTER ORGANIZATION (3)** *Prerequisite: C S 142.* Three hours lecture. This course is a study of the hardware and software systems and subsystems that make the basic components of a computer system accessible to the managers and users of that system. Topics include processes, scheduling, resource allocation, protection, virtual mem-

ory, parallel processing, input/output processing, data encoding, accessing techniques, communications, compilers, and utilities.

C S 365 **GAME PROGRAMMING (3)** *Prerequisite: C S 241.* Three hours lecture. This course introduces the concepts of 3-D graphics and modeling and realtime interaction in an event-driven environment. Topics include geometric transformations, light models, texture mapping, special effects, 3-D sound, physics modeling, and graphics engines.

C S 370 **DATABASE MANAGEMENT SYSTEMS (3)** *Prerequisite: C S 142 or 220.* Three hours lecture. This course studies the fundamental principles and roles of database management systems. Database models covered include the relational, entity-relationship, hierarchical, and network models with primary emphasis on the relational model. Other topics include database design and physical storage management. Although database theory is an important part of this course, students are expected to become proficient in an actual DBMS.

C S 375 **PRINCIPLES OF DIGITAL SYSTEMS (4)** Three hours lecture and two hours lab. The principal concepts of digital systems and their applications to computer science are studied. Topics include number representations, codes, switching theory, sequential circuits, comparators, arithmetic circuits, counters, memory implementation, and integrated circuit logic families.

C S 380 **ARTIFICIAL INTELLIGENCE (3)** *Prerequisite: C S 241.* Three hours lecture. This course is a study of the theoretical issues and programming techniques involved in artificial intelligence. Core topics include search, knowledge representation, and reasoning. Additional topics may include game theory, planning, understanding, natural language processing, machine learning, neural networks, genetic algorithms, expert systems, and real-time systems. Students develop competence in a language widely used for A.I. programming, typically LISP or PROLOG.

C S 385 **INTERNET-BASED SYSTEMS (3)** *Prerequisite: C S 370.* Three hours lecture. In this course students develop an intermediate-level proficiency in the use of HTML, Access, Visual Basic, VBScript, and SQL as applied to accessing databases over the World Wide Web. The student uses these development tools together to develop interactive web-based applications that access databases. Applications developed in the course utilize graphic images, tables, forms, frames, ASP, CGI programming and database interfaces in an interactive GUI environment.

C S 391-392 **SPECIAL PROBLEMS IN COMPUTER SCIENCE (1-3)** *Prerequisite: C S 142.* Three hours lecture. This course is designed to give students the opportunity to pursue projects in certain computer science topics with the approval of a supervising faculty member. The student, with the help of the supervising faculty member, must produce a statement of purpose for the project and outline expected results the semester prior to registration.

C S 399 **INTERNSHIP IN COMPUTER SCIENCE (1-6)** *Prerequisites: Juniors or seniors with a 2.25 minimum QPA; approval of written proposal by internship coordinator, and supervising faculty prior to registration.* Internships occur in businesses or other institutions involved in computer science-related work. (See "Internships.")

C S 451-452 **SENIOR PROJECT (2,2)** *Prerequisite: C S 242 and senior standing.* This is a capstone course in which the student proposes and completes an independent research or development project. Research projects involve review of significant literature and the writing of a major technical paper, which may require design, implementation, and evaluation of experimental systems. Development projects require full system specifications, system design and analysis, user documentation, and complete, well documented source code.

C S 491-492-493-494 **SPECIAL TOPICS IN COMPUTER SCIENCE (3, 3, 3, 3)** *Prerequisite: Consent of instructor.* Course content varies from year to year and is dependent on the needs and interests of students. Topics may be selected from graph theory, artificial intelligence, information retrieval, computation theory, computer networks, and database management.