Department of Computer Science

CIS 106 End-User Computing (A). Develops students' acumen in key end-user computing technologies, to a level that will allow students to utilize technology successfully in the workplace and to meet the contemporary expectations of employers. Includes topics such as word processing, operating systems, spreadsheets, office presentation, network applications, and databases. Requires extensive lab work. 3 Cr. Every Semester.

CIS 202 Fundamentals of Information Systems (A). Prerequisite: CSC 104 or CIS 106. Introduces the use of information systems and information technology in organizations. Considers concepts of information management, systems theory, quality, enhanced decision making, and added value in products and services. Stresses information technology, including computing and telecommunications systems. Teaches students to analyze requirements, define an information system, and develop custom solutions to enhance productivity. 3 Cr.

CIS 206 Information Technology Tools (A). Prerequisite: CSC 104 or CIS 106. Develops intermediate level proficiency in key office productivity and information technology tools. Includes these topics: operating systems, graphical user interfaces, word processing, desktop publishing, grammar and style checkers, office presentations, multimedia documents, spreadsheets and advanced applications, business charts, Internet and intranet, e-mail, World Wide Web, search engines, and Web publishing. Requires extensive hands-on laboratory exercises. 1 Cr. Every Semester. 1 Cr. Every Semester.

CIS 295 Topics in Computer Information Systems (A). Prerequisite: Published prior to registration each semester. Addresses current topics in the field at an introductory level. Each offering of the course is motivated by the expertise of the instructor and by students' interests. Descriptions and prerequisites are published prior to the registration period for the course. Example topic: information technology hardware and software laboratory. 1-3 Cr.

CIS 303 Information Technology Hardware and Software (A). Prerequisite: CSC 202, CSC 209 and MTH 281. Covers both hardware and software components of computer systems. Includes these topics: basic elements of a computer system, data representation, digital logic, CPU architecture, memory, buses, instruction sets, assembly language, magnetic and optical disks, backup storage, video displays, I/O devices, networks, multi-user and multi-tasking operating systems, process, file, and memory management. 3 Cr. Every Semester.

CIS 305 Web Design and Publication (A). Provides a general introduction to Web development and design tools for publishing. Focuses on HTML coding and current design software used for the creation of static and dynamic pages, containing optimized vector and bitmap graphic formats, sound and video, forms, navigation bars/links, scripting, CSS formats, and a variety of current web tools and features. Incorporates W3C and accessibility guidelines. 3 Cr. Every Semester.

CIS 317 Analysis and Logical Design of Information Systems (A). Prerequisite: CIS 202, CSC 203 and CIS 206. Studies requirement analysis, system development and modification process. Includes topics such as lifecycle phases and the role of systems analyst; organizational style, feasibility and impact of information systems; requirements analysis, sampling and investigating data, interviewing; data flow diagrams, data dictionaries, preparing and writing proposals; prototyping, designing for effective input and output, user interface; software metrics, quality assurance and software package evaluation and acquisition. Requires supervised laboratory sessions. 4 Cr.

CIS 404 Multimedia and Human-computer Interaction (A). Prerequisite: CSC 209 and CIS 317. Studies multimedia systems and applications in the business world. Includes these topics: multimedia applications, hypertext and hypermedia, audio, graphics, images, and full motion video; multimedia-ready
personal computers and workstations, storage devices, operating systems and graphical user interfaces; communication and networking requirements, multimedia applications on the Internet; file formats, data compression and streaming audio/video; and multimedia authoring tools. 3 Cr. Spring.

CIS 419 Computer Networks and Internet Applications (A). Prerequisites: CIS 303, CSC 205 and CSC 209. Provides a comprehensive study of the field of computer communications, local area networks, and internetworking. Includes these topics: the OSI and TCP/IP models, protocols, topologies, data communication issues, error detection and correction, local area networks, network hardware, Ethernet and wireless technologies, WAN, packet-switching, routing, datagrams, Internet addressing, home networking and security. Includes hands-on experience with network hardware and software. Closed to students who have received credit for CSC 419. 3 Cr.

CIS 421 Computer and Network Security (A). Prerequisite: CIS419. Studies concepts, techniques, and tools in computer and network security. Includes these topics: security, privacy, information assurance, threats, user authentication and access control; UNIX and Windows examples; logs and intrusion detection; cryptography, public-key and private-key systems, Kerberos, IP security, firewalls, Web and database access control and security issues; ethical issues. Includes hands-on experience with security hardware and software. Closed to students who have received credit for CSC 421. 3 Cr. Spring.

CIS 422 Physical Design and Implementation With DBMS (A). Prerequisite: CSC209 and CIS422. Covers information systems design and implementation within a database management system environment. Requires students to design and construct a physical system using database software to implement the logical design. Stresses basic knowledge of normalization of data modeling, database methods, database design, and the use of databases in business. 3 Cr.

CIS 427 Project Management and Practice (A). Prerequisites: CIS 317 and CSC 205. Introduces software development and management of the development process. Includes these topics: managing the software life cycle (requirements definition, logical design, physical design, implementation, testing, system integration, maintenance); design techniques (structured, event-driven, object-oriented); implementation; testing and software quality assurance; delivery and user training; metrics for project management and system performance evaluation; management expectations; personnel management, cost analysis and change management; management of behavioral and technical project aspects. 3 Cr. Spring.

CIS 434 Decision Support and Expert Systems (A). Prerequisite: CIS 202, CIS 206, and CSC 203. Covers Decision Support Systems (DSS) and its subsystems. Includes the following topics: DSS overview, modeling and analysis using linear programming, decision tables, trees, AHP, etc., group decision support systems, fundamentals of AI, expert systems, expert system building tools, and validation, knowledge representation. Involves hands-on experience with Excel LP Solver, Scenarios, Goal Seeking, etc., and DSS and ES software tools such as Expert Choice, Prolog or Essays, etc. 3 Cr.

CIS 436 Data Mining (A). Prerequisite: CIS422. Studies data mining process with the goal of discovering nontrivial, interesting and actionable knowledge from large data sources. Includes the following topics: concepts, models and techniques of data mining; data preparation; concept description; decision tree and Bayesian classifications; cluster analysis and distance measures, hierarchical and probability based clustering; association rule mining. 3 Cr.

CIS 442 Electronic Commerce Systems (A). Prerequisites: CSC 209 and CIS 422. Covers defining tools of e-business, to understand the manner in which users, tools, needs and opportunities interact. Includes these topics: the infrastructure of e-commerce, e-commerce Web site design and implementation, social, political and ethical issues associated with e-commerce, and business plans for technology ventures. Real world applications and cases are studied to introduce concepts related to the analysis, design, implementation and maintenance of e-commerce systems. Closed to to students who have received credit for CSC 442. 3 Cr. Fall.

CIS 487 Information Technology for Development (A). Introduces IT for Development concepts for developing and adding value through IT to organizations. Involves working with small businesses in the region. Requires students to evaluate micro-business technology needs, prepare technology plans, provide training, and implement solutions. Teaches students to develop technical training and trust building skills to address IT needs. Provides an opportunity to apply knowledge from the classroom by working in a professional setting. 3 Cr. Spring.

CIS 492 Computer Information Systems Internship (A). Prerequisites: Junior status, 3.0 or better average in computer science courses, appropriate course work, at least 18 credits towards the major completed prior to starting the internship, and instructor's permission. Provides an opportunity to apply knowledge from the classroom by working in a professional setting. Also provides a valuable and
challenging experience for students who have never worked in such a situation, as well as for professionals furthering their education. Teaches the successful intern how effective professional performance requires integrating substantive knowledge with behavioral skills and proficiency in oral and written communication. Each student is supervised on campus by a computer science faculty member, and at the work site by qualified management personnel. Past projects have involved business programming, requirement analysis, web applications, database design, data communications, and project management. 1-3 Cr. By Arrangement.

CIS 493 Senior Thesis (A). Prerequisites: Junior status, 3.0 or better average in computer information system courses, appropriate course work, at least 18 credits toward the major completed prior to starting the thesis, and instructor's permission. Provides students with an opportunity to apply knowledge from the classroom by working in an independent research or development project in an academic setting, which is a valuable and challenging experience for students who are contemplating graduate studies to test out their potential for independent study and advanced research. May involve substantial software development, structuring available commercial software/hardware for specific applications, or an empirical case study of the use of technology. By developing a successful thesis, permits students to enrich their knowledge of computer applications, theory, hardware or software, to develop skills in analyzing problems involving current computing technologies, and to make effective oral and written presentations of their accomplishments. Each student is supervised by a Department of Computer Science faculty member. 3 Cr. By Arrangement.

CIS 495 Topics in CIS (A). Prerequisites: Published prior to registration each semester. As an advanced course, addresses current topics in the field. Each offering of the course is motivated by the expertise of the instructor and by students' interests. Expects students to complete a major research, design, or development project. Descriptions and prerequisites are published prior to the registration period for the course. 3 Cr.

CIS 499 Independent Study in Information Systems (A). Prerequisite: Instructor's permission. Arranged in consultation with the professor-sponsor and in accordance with the procedures of the Office of Academic Advisement prior to registration. 1-3 Cr. By Arrangement.

CSC 104 Computers in the Business World (A,T). Provides a general introduction to the different uses of computers in business. Includes these topics: computer system concepts, data representation and storage, processor and peripheral hardware, data processing and word processing systems, spreadsheets, report generation, database queries, and management packages. 3 Cr.

CSC 105 Internet and Web Publishing (A). Prerequisites: CSC 104 or CIS 106 or GEP 150 or equivalent. Provides a general introduction to cyberspace. Includes these topics: Internet, e-mail, lists, newsgroups, Gopher, Telnet, FTP, World Wide Web, net browsers, and creating Web home pages using HTML. 3 Cr.

CSC 120 Introduction to Computer Science (A). Prerequisite: MTH 111 or higher. Provides a breadth-first introduction to computer science. Includes these topics: algorithms and their properties; binary, octal and hexadecimal: arithmetic and conversion; representation of integer and real numbers; elementary computer organization, architecture and programming of a simple machine; digital logic; Java programming: declarations, assignments, expressions, I/O and loops; operating systems and networks; database, spreadsheet, etc.; ethical, legal and social issues of computing. Preparation for CSC 203. 3 Cr.

CSC 203 Fundamentals of Computer Science I (A). Prerequisites: CSC 120 and MTH 122. Covers fundamental computer science concepts and object-oriented program development in Java. Includes these topics: problem solving, algorithm design and implementation; program testing and documentation; primitive data types, data manipulation, selection, loops; classes, methods, parameters, inheritance; arrays, strings, files, introduction to sorting and searching techniques and other basic algorithms. Requires extensive programming and supervised laboratory sessions. 4 Cr. Every Semester.

CSC 205 Fundamentals of Computer Science II (A). Prerequisites: CSC 203 and MTH 281. Covers an introduction to abstract data structures and their implementation. Includes these topics: program development (interpreting specifications, object-oriented and top-down development, information hiding, structured testing), stacks, queues, linked lists, recursion, trees, searching and sorting algorithms, introduction to analysis of algorithms, program verification, event-driven programming with graphical user interfaces. Requires extensive programming and supervised laboratory sessions 4 Cr.

CSC 209 UNIX Tools (A). Prerequisite: CSC 203. Provides a comprehensive introduction to the UNIX operating system from the programmer's point of view. Includes these topics: basic commands, file system structure, concept of shells, shell features (pipes, redirection, etc.), access control, process control,
scripting, UNIX tools (sed, grep, make, etc.). Requires extensive hands-on laboratory exercises and shell-script programming. 1 Cr. Every Semester.

CSC 212 Programming in Visual Basic (A). Prerequisite: MTH 111. Provides a general introduction to computer programming and applications for non-majors using the VISUAL BASIC language. Includes these topics: computer terminology, programming concepts, language features, and algorithm design. Introduces a survey of computer applications using the following programming techniques: structured design concepts, decisions, loops, functions, subroutines, arrays, and files. Requires extensive programming. 3 Cr.

CSC 219 Programming in C (A). Prerequisite: CSC205 and CSC209. Provides an advanced coverage of the C language. Includes these topics: syntax, semantics, control structures; arrays, pointers and pointer arithmetic; string manipulation; structs and unions; functions and parameter passing, command line arguments; bit level operations. Requires extensive programming. 1 Cr. Every Semester.

CSC 295 Topics in Computer Science (A). Prerequisite: Published prior to registration each semester. Addresses current topics in the field at an introductory level. Each offering of the course is motivated by the expertise of the instructor and by students' interests. Descriptions and prerequisites are published prior to the registration period for the course. Example topic: Windows NT. 1-3 Cr.

CSC 303 Digital Logic and Computer Design (A). Prerequisite: MTH 281. Provides an introduction to digital logic and design of computers. Includes these topics: number systems, Boolean algebra and logic gates, simplification of Boolean functions, combinational and sequential logic design, registers, counters, memory units, and ALU. Includes hands-on experience with hardware circuit components. 3 Cr. Every Semester.

CSC 311 Computer Organization and Software Interface (A). Prerequisites: CSC 205 and CSC 209. Covers basic hardware organization of digital computers and software interface at the assembly and C programming levels. Includes the following topics: Processor and memory organization, fetch-execute-decode cycle, data representation of integer and floating point numbers, computer arithmetic, assembly language programming (instruction encoding, addressing modes, control flow logic, subroutines, linking and loading), C programming (program development, modularization, I/O concepts, library function calls, programming environment). Requires extensive programming and supervised laboratory sessions. 4 Cr.

CSC 356 Life in the Digital Age (A,I,W,Y). Studies the impact of new technologies on a global society. Includes the changing nature of privacy and growing use of government surveillance, i.e. national ID cards and RFID tracking. Also considers the Internet's effect on societal communication and differences in gender communication patterns, issues of freedom of expression and censorship, the influence of technology in the workplace and at home, and other relevant topics. 3 Cr.

CSC 401 Programming Languages (A). Prerequisite: CSC 311. Studies the concepts of various programming languages. Includes these topics: history of languages, design principles, formal syntax and semantics, implementation: compilation and interpretation, comparative study of features in various languages considering criteria such as binding, scope, type conversion, data abstraction, parameter passing techniques, exceptions and I/O. Covers various programming paradigms such as procedural, object-oriented, functional, logic and scripting. Requires extensive programming. 3 Cr. Every Semester.

CSC 406 Algorithms and Data Structures (A). Prerequisites: CSC 205 and MTH 481. Covers design and analysis of data structures and associated algorithms using object-oriented methods. Includes these topics: complexity measures, pre-and post-conditions, programming to interfaces, union-find sets, hashing, trees (AVL, splay, B-Trees), graphs, recursion, algorithm design strategies and NP-complete. Extensive programming. 3 Cr.

CSC 411 Computer Architecture (A). Prerequisites: CSC 303 and CSC 311. Covers design and organization of digital computers. Includes these topics: digital logic and circuit design, data representation, computer history, performance evaluation, CISC/RISC architectures, registers, memories and memory management, CPU and ALU architectures, instruction sets, busses and I/O systems, interrupt structure, microprogramming and control unit design. Covers additional topics such as virtual machines, parallelism and pipelining. 3 Cr. Every Semester.

CSC 412 Operating Systems (A). Prerequisites: CSC 219 and CSC 411. Covers basic principles of operating systems. Includes these topics: OS structures and design principles, concurrent processes and programming, threads, CPU scheduling, memory management and virtual memory, process synchronization and deadlock, file systems, mass-storage structure, I/O systems, and case study of UNIX/LINUX operating system. Requires extensive programming. 3 Cr. Spring.
CSC 419 Computer Networks (A). Prerequisites: CSC 303 and CSC 311. Provides a comprehensive study of the field of computer communications, local area networks, and internetworking. Includes these topics: the OSI and TCP/IP models, protocols, topologies, data communication issues, error detection and correction, local area networks, network hardware, Ethernet and wireless technologies, WAN, packet-switching, routing, datagrams, Internet addressing, home networking and security. Includes hands-on experience with network hardware and software. Closed to students who have received credit for CIS 419. 3 Cr. Spring.

CSC 421 Computer and Network Security (A). Prerequisites CSC419 or CIS419: Studies concepts, techniques, and tools in computer and network security. Includes these topics: security, privacy, information assurance, threats, user authentication and access control; UNIX and Windows examples; logs and intrusion detection; cryptography, public-key and private-key systems, Kerberos, IP security, firewalls, Web and database access control and security issues; ethical issues. Includes hands-on experience with security hardware and software. Closed to those who have received credit for CIS 421. 3 Cr. Spring.

CSC 422 Relational Data Base Design (A). Prerequisite: CSC 205. Provides a study of the theory and practice of the relational approach to database design. Includes these topics: nature of relational databases, relational algebra, normalization, lossless and/or dependency preserving decomposition, query languages such as SQL and a language that is available on the system, remote connectivity, integrity and security, and database project design and implementation. Closed to students who have received credit for CIS 422. 3 Cr. Fall.

CSC 423 Web Application Development (A). Prerequisites: CSC 209 and CSC 422. Covers the basic principles involved in developing Web-based applications that operate with a back-end relational database. Includes these topics: basics of HTTP-based client-server systems, web page creation with XHTML/CSS, client-side scripting, server-side software development, interfacing to relational databases, model-view separation, and database serialization/viewing using XML/XSLT. Requires team project involving design/setup of database server and development of application interfacing to database. 3 Cr. Spring.

CSC 427 Software Systems Engineering (A). Prerequisite: CSC 311. Provides an introduction to software engineering methodologies and programming-in-the-large. Includes these topics: life-cycle models, development standards, project organization, estimation techniques, requirements modeling, specification techniques, object-oriented and structured approaches to software design, implementation issues, testing, verification and validation, maintenance and documentation. Requires students to work in teams developing a large-scale software product. Develops technical communication and writing skills. Requires extensive programming. 3 Cr. Fall.

CSC 429 Object-Oriented Software Development (A). Prerequisite: CSC 427. Provides an introduction to OOP concepts and their applications using Java. Includes these topics: review of OOP fundamentals, UML modeling; advanced Java features: interfaces, abstract classes, GUI programming, layout managers, event and exception handlers, etc.; software design principles, cohesion and coupling; detailed coverage of design patterns: model-view-controller, observer, adapter, factory, strategy, singleton, etc.; software quality assurance: testing strategies. Requires extensive programming. 3 Cr. Spring.

CSC 434 Artificial Intelligence (A). Prerequisite: CSC 401. Provides an introduction to artificial intelligence, its applications, and languages. Includes these topics: problem solving using state space search, heuristics, A* algorithm, game playing, mini-max, alpha-beta, knowledge-based expert systems, forward and backward chaining, natural language understanding, evolutionary computing, cellular automata, genetic algorithms, neural networks; programming AI applications using Prolog, LISP, and/or using frameworks in Java. Requires extensive programming. 3 Cr. Fall.

CSC 442 Electronic Commerce Technology (A). Prerequisite: CSC 209 and (CIS 442 or CSC 442). Surveys electronic commerce technologies and realities. Studies defining tools of e-business to understand the manner in which users, tools, needs and opportunities interact. Includes these topics: the infrastructure of e-commerce and the design and implementation of e-business portals using network and database technologies, data/Web mining and security/encryption techniques for finding and negotiating with trading partners to execute electronic transactions. 3 Cr. Fall.

CSC 444 Introduction to Parallel Computing (A). Prerequisites: CSC 406 and MTH 481. Deals with design and analysis of parallel algorithms. Includes these topics: parallel models of computation, measures of complexity, parallel algorithms for selection, searching, sorting, merging, matrix algorithms, transitive closure, connected components, shortest path, minimum spanning tree and routing algorithms. Provides hands-on experience in a parallel programming environment. 3 Cr.
CSC 483 Theory of Computation (A). Prerequisites: CSC 203 and MTH 481. Provides a study of formal languages and theory of automata with an emphasis on Church's thesis and the "algorithm = machine" point of view. Includes these topics: regular expressions and context-free languages, finite and pushdown automata, Turing machines, computability, undecidability, and complexity of problems. 3 Cr. Spring.

CSC 486 Junior/Senior Seminar (A,Y). Prerequisite: CSC 205; junior or senior status and computer science and computer information system majors only. Provides an overall view of the professional field of computing, emphasizing development of communication skills for the profession. Includes these topics: detailed history of computing technology, social effects of computing, ethics in the field, professional literature, organizations and related activities, current industrial, social, legal governmental and technical developments, and career opportunities. Requires extensive reading and writing, both technical and non-technical, as well as library research, and prepared group discussions and oral presentations. 3 Cr.

CSC 492 Computer Science Internship (A). Prerequisites: Junior status, 3.0 or better average in computer science courses, appropriate course work, at least 18 credits towards the major completed prior to starting the internship, and instructor's permission. Provides an opportunity to apply knowledge from the classroom by working in a professional setting. Also provides a valuable and challenging experience for students who have never worked in such a situation, as well as for professionals furthering their education. Teaches the successful intern how effective professional performance requires integrating substantive knowledge with behavioral skills and proficiency in oral and written communication. Each student is supervised on campus by a computer science faculty member, and at the work site by qualified management personnel. Past projects have involved software engineering, graphics, database design, data communications, and process control. 1-3 Cr. By Arrangement.

CSC 493 Senior Thesis (A). Prerequisites: Junior status, 3.0 or better average in computer science courses, appropriate course work, at least 18 credits towards the major completed prior to starting the thesis, and instructor's permission. Provides students with an opportunity to apply knowledge from the classroom by working in an independent research or development project in an academic setting, which is a valuable and challenging experience for students who are contemplating graduate studies in computer science, to test out their potential for independent study and advanced research. May involve substantial software or hardware development, structuring available commercial software/hardware for specific applications, or theoretical analysis of computational schemes. By developing a successful thesis, permits students to enrich their knowledge of computer applications, theory, hardware or software, to develop skills in analyzing problems involving current computing technologies, and to make effective oral and written presentations of their accomplishments. Each student is supervised by a Department of Computer Science faculty member. For details, see "The Computer Science Thesis Option" in the Handbook. 3 Cr. By Arrangement.

CSC 495 Topics in Computer Science (A). Prerequisite: Published prior to registration each semester. As an advanced course, addresses current topics in the field. Each offering is motivated by the expertise of the instructor and students' interests. Requires students to complete a major research, design, or development project. Descriptions and prerequisites are published prior to the registration period for the course. Past topics include: networking, human factors, computational linguistics, advanced architecture, software engineering, logic programming, and program validation, object-oriented programming and parallel algorithms. 3 Cr.

CSC 499 Independent Study in Computer Science (A). Prerequisite: Instructor's permission. Arranged in consultation with the instructor-sponsor and in accordance with the procedures of the Office of Academic Advisement prior to registration. 1-3 Cr. By Arrangement.