

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS

(330) 941-3134

Room 339 Meshel Hall

CSIS@ysu.edu

Welcome to Computer Science and Information Systems. The department is committed to high quality education in the classroom, in student research, and in internships with our business partners. The department offers a wide range of programs to meet student needs:

- The Computer Science program is offered as the Bachelor of Science degree and is a traditional, analytical program which involves extensive computer programming and support courses in mathematics.
- The Information Technology program is also offered as the Associate of Applied Science and the Bachelor of Science in Applied Science. Coursework emphasizes applying high-end computer applications and system management.
- The Computer Information Systems program is offered as the Associate of Applied Science and the Bachelor of Science in Applied Science. Coursework involves extensive programming with an emphasis on applied business programming.
- The Master's in Computing and Information Systems offers advanced education in several computing areas.

Mission Statement

- The primary mission of the Computer Science and Information Systems Department is to design a broad range of current Computer Science, Computer Information Systems, and Information Technology experiences that include multidisciplinary activities and community interaction, using current computing technology and supported by strong written, critical thinking, and verbal communication skills to enable students to function effectively in a technology-based society.
- The Department is an important academic resource for computing information, consultation, and computer-related instruction for the campus and the community. Partnerships are developed with local industry and school systems to benefit the economic health of the Mahoning Valley.
- The Department supports and encourages research, industry partnerships, and other activities leading to the development of new technologies, new courses and curriculum, and new classroom methods and techniques.
- The Department recognizes that computing has become an increasingly crucial aspect of all disciplines of knowledge, and supports interdisciplinary programs and forms symbiotic relationships with other disciplines in areas of greatest benefit to students.
- The Department supports the social growth of students, promoting ethical decision making, the development of secure and reliable computing systems, and an awareness of the role of computing in a global environment. The Department also constantly strives for diversity in terms of groups underrepresented in computing, particularly women.

Curriculum sheets and suggested schedules for each program may be obtained from the department office in Meshel Hall or on the department's website.

Chair

Kriss A. Schueller, Ph.D., Acting Chair

Professors

Abdurrahman Arslanyilmaz, Ph.D., Associate Professor

Robert W. Kramer, Ph.D., Associate Professor

Alina Lazar, Ph.D., Professor

Kriss A. Schueller, Ph.D., Professor

Bonita Sharif, Ph.D., Associate Professor

John R. Sullins, Ph.D., Associate Professor

Feng Yu, Ph.D., Assistant Professor

Yong Zhang, Ph.D., Associate Professor

Instructor

Robert Gilliland, M.C.I.S., Instructor

Majors

- BS in Computer Science (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/bs-computer-science>)
- AAS in Computer Information Systems (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/aas-computer-information-systems>)
- BSAS in Computer Information Systems (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/bsas-computer-information-systems>)
- AAS in Information Technology (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/aas-information-technology>)
- BSAS in Information Technology (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/bsas-information-technology>)

Minors

- Minor in Computer Databases (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/minor-computer-databases>)
- Minor in Computer Networking (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/minor-computer-networking>)
- Minor in Electronic Commerce Technology (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/minor-electronic-commerce-technology>)
- Minor in Information Systems Programming (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/minor-information-systems-programming>)
- Minor in Integrated Technologies (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/minor-integrated-technologies>)
- Minor in Multimedia and Web Design (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-engineering-mathematics/department-computer-science-information-systems/minor-multimedia-and-web-design>)

technology-engineering-mathematics/department-computer-science-information-systems/minor-multimedia-web-design)

- Minor in Object-Oriented Programming (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-object-oriented-programming>)
- Minor in Computer Science (<http://catalog.ysu.edu/archives/2016-2017/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-computer-science>)

Computer Information Systems

CIS 3714 Assembly Language and Architecture 3 s.h.

Fundamentals of computer architecture and organization. Forms of data representation. Assembly language and machine language programming. The assembly process. Methods and protocols for subroutine linkage.

Prereq.: CIS 2605 or CIS 2610.

CIS 3718 Operating Systems Concepts 3 s.h.

Concepts of computer operating systems, including memory allocation, job scheduling, process communication, and input/output processing. Examinations of operating systems on several platforms.

Prereq.: CIS 2605 or CIS 2610.

CIS 3735 UNIX Environment 3 s.h.

Use of the UNIX operating system or similar systems, including file management utilities, editors, compilers, and communication utilities. A comprehensive examination of programming in various shells such as Bourne, C, and Korn.

Prereq.: CIS 2605 or CIS 2610.

CIS 3741 Business Programming Project 4 s.h.

This course provides an in-depth study of business programming. It includes the mastery of a high-level language suitable for business programming, such as COBOL, and the development of a large multi-step business application project. Three hours lecture, two hours lab.

Prereq.: CIS 2605 or CIS 2610.

CIS 4810 Special Topics 2-4 s.h.

Study of special topics in computer information systems. Subject matter and credit hours will be announced in advance. May be repeated multiple times if topic is different.

Prereq.: At least 3 s.h. of upper-division departmental courses, and permission of chair.

CIS 4820 Computer Center Operations 3 s.h.

The organization of a computer center, with emphasis on features and selection criteria of communication equipment, including mainframe, minicomputer, and microcomputer systems.

Prereq.: CIS 3741 or INFO 2663, 3 s.h. of upper-division departmental courses.

CIS 4840 Business System Analysis and Design 4 s.h.

Development of communication and written skills for the analysis and design of business systems. Utilization of project management techniques for design, development, and maintenance of a departmental level system.

Prereq.: CIS 3722, CIS 3723, and 3 additional s.h. of upper-division departmental courses.

Gen Ed: Capstone.

Computer Science and Information Systems

CSIS 1500 Computer Literacy 3 s.h.

A survey of computer concepts and applications. Network access and electronic mail. Emphasis on software applications packages available for microcomputers, including word processing. This course is meant for students with minimal or no background in computers. Credit will not be given for both CSIS 1500 and for either CSIS 1514, CSIS 1525, or CSIS 1590.

CSIS 1510 Global Electronic Information Resources 3 s.h.

A survey of concepts and tools relating to communicating and gathering information on the Internet. Electronic mail, newsgroups, on-line services, and the World Wide Web. Using Internet and web search tools to locate sites, and to retrieve and evaluate information. Creating home pages on the World Wide Web. Basic telecommunication, hypermedia, and ethical concepts.

Prereq.: CSIS 1500.

CSIS 1514 Business Computer Systems 3 s.h.

Hands-on business software, with emphasis on operating systems, word processing, database and spreadsheet applications. This course is not designed for beginning computer users. Beginning computer users should take CSIS 1500: Computer Literacy before taking this course.

CSIS 1525 Survey of Modern Operating Systems 3 s.h.

An introduction to the common operating systems currently used with computers, such as DOS, Microsoft Windows, UNIX, and X-windows. Topics include setting up the user's work environment, file manipulation, and other commands. Not applicable to the CIS or CSCI major. This course is not designed for beginning computer users. Beginning computer users should take CSIS 1500: Computer Literacy before taking this course.

CSIS 1550 Survey of Language Topics 3 s.h.

Introductory language course with emphasis on writing structured programs in a particular computer language. The language topic and special prerequisites are announced in advance. Not applicable to the CIS or CSCI major.

Prereq.: Permission of chair.

CSIS 1560 Basic Programming 3 s.h.

An introduction to computer programming using a visual object-oriented programming tool. Topics include control structures, loops, functions, methods, recursion, array processing, and events. Students will learn to design and implement virtual worlds.

CSIS 1570 Web Graphics Programming 3 s.h.

Computer programming in a graphical/web-based language such as JavaScript. Modular program design, control structures, and data types and objects. Application to dynamic web pages, graphics, and animation.

CSIS 1580 Technical Presentation and Communication 3 s.h.

Tools and techniques for presentation of information in a computer-based environment. Introduction to slide making, graphics, and multimedia software. Methods for gathering information and determining requirements, and for designing and critiquing presentations.

Prereq.: CSIS 1500.

CSIS 1590 Survey of Computer Science and Information Systems 3 s.h.

Concepts, theory, and contemporary issues underlying the computing sciences. Introduction to computer applications, the YSU computing environment, the use of communication and information networks, and basic problem solving techniques using computers. This course is not designed for beginning computer users. Beginning computer users should take CSIS 1514: Business Computer Systems before taking this course.

Prereq.: or concurrent MATH 1505 or MATH 1507 or at least Level 30 on the Mathematics Placement Test.

CSIS 1595 Fundamentals of Programming and Problem- Solving 1 3 s.h.

Introduction to concepts, principles, and skills of programming using a high-level programming language. Topics include programming language characteristics, an integrated development environment, algorithms and pseudocode, variables, operators, conditional statements, looping statements, functions, arrays, testing, debugging, documentation and program style. Two hours lecture and two hours lab. Credit will not be given for both CSIS 1595 and CSIS 2610.

Prereq.: CSIS 1590 or MATH 1507 or Level 40 on Math Placement Test.

CSIS 2602 Programming in C 3 s.h.

Programming concepts and techniques, with emphasis on scientific and engineering applications. An accelerated survey of the C programming language and an introduction to the UNIX programming environment. Not applicable to the CIS or CSCI major.

Prereq.: CSIS 1500 and MATH 1513 or Math Placement Level 5 or 50 or higher.

CSIS 2605 Fundamentals of Programming and Problem-Solving 2 3 s.h.

Theory and application of programming principles, data and information structures, simple linked lists, searching, and sorting, software development life cycle. Practice using these concepts in an object-oriented programming language. Two hours lecture and two hours lab. Credit will not be given for both CSIS 2605 and CSIS 2610.

Prereq.: CSIS 1595.

Prereq. or concurrent: MATH 1511 or MATH 1513 or MATH 1552 or Level 50 on Math Placement Test.

CSIS 2610 Programming and Problem-Solving 4 s.h.

Problem solving methods and algorithms using a high-level programming language. Designing, coding, debugging, and documenting programs using techniques of good programming style. Three hours lecture, two hours lab. Credit will not be given for both CSIS 2605 and CSIS 2610.

Prereq.: MATH 1511 or MATH 1513 or MATH 1552 or Level 50 on Math Placement Test.

CSIS 2615 Information Structures for Information Technology 3 s.h.

Study and application of information structure concepts such as lists, trees, multilevel lists, files, and data-method integration. Practice using these concepts in a 3D animation environment using an object-oriented programming language in the background. Emphasis on algorithm design, object utilization, and storyboarding.

Prereq.: CSIS 1590, and either CSIS 2605 or CSIS 2610.

CSIS 2620 System Configuration and Maintenance 3 s.h.

Theory and practice of installing and maintaining hardware and software for complex systems. Installation of application software, with emphasis on Windows and Mac applications. Essential DOS utilities: formatting, data recovery, protecting data. Printing problems, Windows environment problems, and problems with booting the machine. Small laboratory management.

Prereq.: CSIS 1590.

CSIS 2655 Personal Cyber Security 3 s.h.

PC system security including data assurance, standards and legal issues, and methods and procedures for guarding against potential software attack. Not applicable to the CIS, CSCI, or INFO major. Credit will not be given for 2655 if a student already received credit for CSIS 3755 or its equivalent.

CSIS 2660 Foundations of Electronic Commerce 3 s.h.

Framework of electronic commerce, including e-commerce architecture, infrastructure, technologies, tools, and strategies. Topics include security, environmental, and implementation issues. Includes web site analysis, hardware/software issues, mini-cases, and introduction to site development.

Prereq.: CSIS 1590.

CSIS 2699 Computer Science and Information Systems Internship 1-3 s.h.

Classroom theory applied to on-the-job professional experience related to the student's major. Work for a minimum of 12 hours per week at an approved site, complete a related project, and attend seminars. May be repeated once with the permission of coordinator.

Prereq.: Sophomore in good standing and permission of internship coordinator.

CSIS 3700 Data Structures and Objects 4 s.h.

Program design, style and expression, testing and debugging for larger programs. Introductory concepts of object oriented programming, including classes, methods, encapsulation, and abstract data types. Theory and application of data structures, including linked structures, trees, networks, and graphs. Credit will not be given for both CSIS 2617 and CSIS 3700. Three hours lecture, two hours lab.

Prereq.: CSIS 2605 or CSIS 2610.

CSIS 3701 Advanced Object-oriented Programming 3 s.h.

Object-oriented design and programming, including classes, inheritance, polymorphism, and exception handling. Introductory software engineering techniques for program development, specification, documentation, verification, and user interface design.

Prereq.: CSIS 2605 or CSIS 2610.

CSIS 3722 Development of Databases 3 s.h.

The basic structure, design, development, implementation, and modification of databases for use in management of information systems.

Prereq.: CSIS 1590.

CSIS 3723 Networking Concepts and Administration 3 s.h.

Overview of electronic communications concepts and technologies, with emphasis on Local Area Networks. Network topologies, design, administration, installed applications, and performance monitoring. Privacy, ethical and legal concerns.

Prereq.: CSIS 2605 or CSIS 2610.

CSIS 3726 Visual/Object-Oriented Programming 4 s.h.

Use of one or more visual programming languages in conjunction with the concepts of object-oriented programming. Development of interactive programs using a graphical user interface. Database and Internet programming. Three hours lecture, two hours lab.

Prereq.: CSIS 2605 or CSIS 2610.

CSIS 3730 Computer Graphics 3 s.h.

Techniques of computer raster graphics, including scan conversion, two- and three- dimensional clipping and windowing, transformations, and viewing in 3D. Algorithms and more advanced topics.

Prereq.: CSIS 3700 and MATH 1572.

CSIS 3731 Human-Computer Interaction 3 s.h.

Concepts of human-computer interaction, including human factors, performance analysis, cognitive processing, usability studies, environment, training, user and task analysis, ergonomics, and accessibility standards.

Prereq.: CSIS 2605 or CSIS 2610 or INFO 2663.

CSIS 3732 Intranet Database Implementation 3 s.h.

Design and implementation of 3NF PC-based databases uploaded to intranet Web sites. Remote database design, development, and updating using SQL within an application development software package. Validating database integrity. Includes site development and projects.

Prereq.: CSIS 3722 and either CSIS 2605 or CSIS 2610.

CSIS 3740 Computer Organization 4 s.h.

Basic hardware components, structure, and implementation of computer systems. Assembly language and instruction set architecture. Combinational and sequential digital logic. CPU and control unit design.

Prereq.: CSIS 2605 or CSIS 2610.

CSIS 3755 Information Assurance 3 s.h.

Confidentiality, integrity, and authenticity of information. Methods of controlling access to electronic data, enforcing security policies, protecting against malicious attacks (including web site attacks), intrusion detection, and disaster recovery.

Prereq.: CSIS 1590.

CSIS 3756 Security Design 3 s.h.

Operating system security concepts, techniques and applications including MS Windows and LINUX/UNIX platforms. Includes a hands-on design project.

Prereq.: Either CSCI 5806 or CSIS 3755 and either CSIS 1525 or CIS 3718.

CSIS 3757 Computer Forensics 3 s.h.

Professional computer forensics, including methods and investigative techniques for the discovery and recovery of digital images and information at all levels, from PCs to large information systems. Chain of evidence and investigative techniques for cybercrime detection.

Prereq.: CSIS 3755.

CSIS 3760 Electronic Commerce Programming 3 s.h.

Programming for client/server systems related to electronic commerce, including server-side languages such as Perl and Client-side languages such as JavaScript. Topics include form validation and parsing, database access and manipulation, and design, networking, and security issues.

Prereq.: CSIS 2605 or CSIS 2610.

CSIS 3761 Electronic Commerce Strategies 3 s.h.

Advanced concepts for development and maintenance of electronic commerce web sites. Topics include e-commerce paradigms, software and programming, and infrastructure issues. Site design, evaluation, deployment, and administration issues, including prototyping and SDLC issues. Building web-based training components. Includes IT project.

Prereq.: CSIS 2660 and INFO 2663.

CSIS 3782 Cisco Networking Academy 1 4 s.h.

Current and emerging networking concepts and technology. Topics include networking standards, terminology, and protocols; LANs and WANs, the OSI and TCP/IP models, network topology and design, physical and logical addressing, subnet masking, router configuration and programming. Includes structured cabling project. Three hours lecture and three hours lab. By permit only.

Prereq.: CSIS 1590, and either CSIS 2605 or CSIS 2610.

CSIS 3783 Cisco Networking Academy 2 4 s.h.

Advanced networking concepts and technology. Topics include LAN switching, VLAN design and implementation, IGRP, Access Control Lists, Novell IPX, Token Ring, Network Management, WAN design, WAN protocols (PPP, Frame Relay, ISDN), CCNA certification review. LAN design project. Three hours lecture and three hours lab.

Prereq.: CSIS 3782.

CSIS 3790 Undergraduate Research 1-3 s.h.

A research experience under the supervision of a faculty mentor. Course may be repeated for a total of up to 6 semester hours.

Prereq.: CSIS 2605 or CSIS 2610, and faculty approval.

CSIS 4804 Programming in Operations Research Applications 3 s.h.

Basic operations research techniques and programming. Linear programming, queuing, mathematical modeling, and network analysis.

Prereq.: CIS 2610 and 3 semester hours of upper-division departmental courses.

CSIS 4819 Parallel and Distributed Computing 3 s.h.

Survey of current development of parallel processing with emphasis on parallel programming. Topics include parallel architecture, interconnection networks for inter-processor communication, parallel sorting/searching algorithms, parallel constructs for parallel programming paradigms, and implementation of the algorithms in a parallel programming language.

Prereq.: CSIS 3700 and CSIS 3740.

CSIS 4822 Database Applications 3 s.h.

Design and development of applications using database languages.

Prereq.: CSIS 3722.

CSIS 4823 Data Communications Networking 3 s.h.

Study of present methods for design and evaluation of information networks, LAN and WAN. Includes queuing, routing, security, reliability, error detection and correction, and distributed processing.

Prereq.: CSIS 3723.

CSIS 4831 Virtual Reality Systems 3 s.h.

An investigation into the use, design, implementation, and evaluation of virtual reality interfaces. Experiences with VR systems using both 2D projections and stereoscopic display and other systems. Students work in multidisciplinary groups.

Prereq.: CSIS 3730.

CSIS 4870 Web Communications Capstone 3 s.h.

A project course requiring the integration of website development tools and techniques, database development, effective writing for the web, and audience analysis, to produce a website of substantial depth and breadth. Oral and written presentations of final project. Listed also as ENGL 4870.

Prereq.: Senior standing and permission of instructor.

Gen Ed: Capstone.

CSIS 4893 Computer Science and Information Systems Advanced Internship 2-4 s.h.

An industrial/academic experience in information systems/technology. Employment for 15 to 20 hours per week. May be repeated once with the permission of internship supervisor.

Prereq.: 16 s.h. of department courses (at least 3 hours upper-division) and permission of department internship supervisor.

CSIS 5824 Applied Artificial Intelligence 3 s.h.

Study of artificial intelligence software related to decision making. Topics may include robotic control, expert systems, automated knowledge acquisition, or logic programming.

Prereq.: CSIS 3700 and 3 s.h. of upper-division departmental courses, or CSIS 6901.

CSIS 5828 Computer Network Security 3 s.h.

Overview of security issues that arise from computer networks, including the spectrum of security activities, methods, methodologies, and procedures. Intrusion detection, firewalls, threats and vulnerabilities, denial of service attacks, viruses and worms, encryption, and forensics.

Prereq.: CSIS 3723 or equivalent.

CSIS 5837 Artificial Intelligence in Game Design 3 s.h.

Artificial intelligence techniques for designing and programming intelligent non-player characters for a variety of different types of game genres. Finite and fuzzy state machines, terrain analysis and path planning, board games, language understanding, and learning.

Prereq.: CSIS 3700, CSIS 3726 or CSCI 6901.

CSIS 5838 Graphics and Animation for Gaming 3 s.h.

Design and implementation of animated characters in 3D computer games. Surface creation and effects; skeletal and facial rigging; motion and animation; basic game physics. Use of 3D animation software and scripting languages for game engine programming.

Prereq.: CSIS 2605 or CSIS 2610 and at least 3 s.h. of upper division CSIS courses, or CSCI 6901.

CSIS 5883 Remote Access and Multilayer Switched Networks 4 s.h.

Advanced WAN connectivity, including Frame Relay, ATM, ISDN, DSL, and modems; IP address scaling techniques; advanced access control; core issues in network design and management, focusing on multilayer switched networks and emerging multi-service networks. Will incorporate CCNP Cisco Academy curriculum. Three hours lecture, three hours lab.

Prereq.: CSIS 3783.

CSIS 5884 Building Scalable Networks and Advanced Internetwork Troubleshooting 4 s.h.

Designing scalable networks; advanced routing protocols; VLSM and route aggregation; management and diagnostic tools; troubleshooting tools and methodology for TCP/IP, Novell, and AppleTalk connectivity, VLANs, routers, and switches; Frame Relay and ISDN connectivity. Will incorporate CCNP Cisco Academy curriculum. Three hours lecture, three hours lab.

Prereq.: CSIS 3783.

Computer Science

CSCI 3710 Introduction to Discrete Structures 3 s.h.

Basic set theory, including functions and relations. Boolean algebra, propositional logic, regular expressions, and finite automata.

Prereq.: CSIS 2610 and MATH 1571 or MATH 1585H, or Math Placement Level 9 or 90.

CSCI 3750 Advanced UNIX and C Programming 3 s.h.

Use of UNIX programming environment and associated tools and utilities. Command language programming. Systems programming with ANSI C. May include UNIX internals and system administration.

Prereq.: CSIS 3700.

CSCI 3770 Survey of Programming Languages 3 s.h.

Survey of several programming languages. May include Ada, Modula-2, C, Lisp, and SNOBOL.

Prereq.: CSIS 3701.

CSCI 3780 Microcomputer System Software 3 s.h.

Programming microprocessor based systems using assembly language. Study of addressing techniques, machine language, program segmentation, and linking on microcomputers.

Prereq.: CSIS 3700.

CSCI 4805 System Programming 3 s.h.

Topics selected from aspects of systems programming, including assemblers, loaders, linkage editors, macro processors, and file management.

Prereq.: CSIS 3700 and CSIS 3740.

CSCI 4830 Advanced Computer Graphics 3 s.h.

A thorough investigation of graphics algorithms. Topics include hidden surface removal, parametric curves, lighting, shading, and texturing. Implementation of a graphics project required.

Prereq.: CSIS 3730 and MATH 3720.

CSCI 4862 Server-Side Web Development and Programming 3 s.h.

Configuration of web server software and the use of server-side programming. Server-side scripting. Database access and drivers. Security issues, including access control and secured transmissions.

Prereq.: CSIS 3700 or CSIS 3701.

CSCI 4890 Computer Projects 2-4 s.h.

Individualized study of a topic in computer science culminating in a written report and an oral presentation. May be repeated up to 8 s.h. of upper-division CSCI courses) applicable to the minimum requirements of a computer science major, and formal project proposal.

Prereq.: 24 s.h. of computer science (including at least 3 s.

Gen Ed: Capstone.

CSCI 5801 Software Engineering 3 s.h.

Developing and maintaining complex software systems. Process and life-cycle models, and tools for software development (such as CASE). Specification methods, prototyping, validation and verification strategies, and version maintenance. Management of the system development process. A group project is required.

Prereq.: CSIS 3701.

CSCI 5802 Software Tools and Practices 3 s.h.

A course that focuses on the different tools and techniques that software engineers typically use while developing software. Topics include current software engineering tools and practices, software testing, software architecture, version control systems, build and make systems, debuggers, static analysis tools, dynamic analysis tools, and design patterns. Students gain experience in multiple environments (Windows and a UNIX-based environment).

Prereq.: Junior standing and CSIS 3700 or CSCI 6901.

CSCI 5806 Operating Systems 3 s.h.

Study of the various components of operating systems including kernels and monitors, currency and parallel processing, processor management, storage management, device management, I/O processing and file management.

Prereq.: CSIS 3700 and CSIS 3740.

CSCI 5807 Compiler Design 3 s.h.

Study of compiler design and construction, including context-free languages, lexical analysis, parsing, code generation and optimization.

Prereq.: CSIS 3700 and CSIS 3740, CSCI 3710.

CSCI 5814 Computer Architecture 3 s.h.

Study of high-performance sequential computer architecture. Topics include performance evaluation, instruction set design, processor implementation techniques, pipelining, vector processing, memory hierarchy design, and parallel architecture.

Prereq.: CSIS 3700 and CSIS 3740.

CSCI 5820 Simulation 3 s.h.

Methods for modeling discrete event systems by algorithmic approaches using simulation languages.

Prereq.: CSIS 3700 and STAT 3743.

CSCI 5822 Database Design and Information Retrieval 3 s.h.

Study of physical database storage, relational and object data modeling, logical database design (normalization process), and structural query languages.

Prereq.: CSIS 3700 and CSCI 3710.

CSCI 5823 Communication Networks 3 s.h.

Study of network structures and topologies, international standards, models, communication media and protocols, hardware and software.

Prereq.: CSIS 3700 and either CSIS 3723 or CSIS 3740.

CSCI 5835 Artificial Intelligence 3 s.h.

Study of the theory and applications of intelligent systems. Topics may include general problem-solving techniques, knowledge representation and expert systems, vision and perception, and natural language processing. AI systems and languages.

Prereq.: CSIS 3700 and CSCI 3710.

CSCI 5840 Theory of Finite Automata 3 s.h.

The structural and behavioral aspects of finite automata.

Prereq.: CSCI 3710 and MATH 3720.

CSCI 5857 Encoding and Encryption 3 s.h.

Securing computer and information systems through encoding and/or encryption. Private and public cryptographic methods, digital certificates and signatures, cryptovvariable techniques, key management, and database security issues.

Prereq.: CSIS 1560 or CSIS 2610; MATH 1552, MATH 1570 or MATH 1571 or Math Placement Test of 4 or 40 or higher; and at least 3 s.h. of upper-division departmental courses.

CSCI 5860 Programming Language Structures 3 s.h.

Systematic approach to the study of the structures of programming languages. Formal descriptions, syntax, semantics and technical characteristics.

Prereq.: CSIS 3701 and CSCI 3710.

CSCI 5870 Data Structures and Algorithms 3 s.h.

Study and application of analysis and design techniques to nonnumerical algorithms. Topics selected from algorithms acting on sets, trees, graphs; memory management; notions of complexity and related areas.

Prereq.: CSIS 3700 and CSCI 3710.

CSCI 5881 Microcomputer System Architecture 3 s.h.

State-of-the-art course on microcomputer architecture. Topics include introduction to microcomputer systems, 16 and 32 bit microprocessors, direct memory access and other I/O transfer schemes, architecture of I/O processors, introduction to computer communications.

Prereq.: CSIS 3740 and CSCI 3780.

CSCI 5895 Special Topics 2-4 s.h.

A study of special topics in computer science. Subject matter and credit hours will be announced in advance. May be repeated multiple times if topic is different.

Prereq.: At least 3 s.h. of upper-division departmental courses, and permission of chair.

Information Technology

INFO 1575 Document Preparation 4 s.h.

Preparation of documents using information processing and standard and advanced electronic productivity tools such as templates, tables, columns, forms macros, graphics, and merging. Integration of documents with other software. Creating and maintaining hypertext documents.

Prereq.: Knowledge of word processing or ENGL 1550.

INFO 2600 Concepts of Information Technologies 3 s.h.

The foundation and general principles behind information technology, including data representation, encoding systems, encryption methods, database fundamentals, logic for programming, basic data analysis, and graph applications in networking.

INFO 2663 Information Technology Management 3 s.h.

Principles and practices of effective information systems management. Includes organization environment, leadership issues, information system types, strategic role of information technology, planning issues, managing and supporting essential technologies, system development and computing, and successful integration of people and technology.

Prereq.: CSIS 1590 or INFO 2600.

INFO 2672 Desktop Publishing 1 3 s.h.

Document creation using desktop publishing software on a microcomputer. Application must be mastered on a software package used by industry. Lab time required.

Prereq.: CSIS 1590.

INFO 2673 Desktop Publishing 2 3 s.h.

Specialized and advanced document creation using desktop publishing software used by industry. A second software package must be mastered. Lab time required.

Prereq.: INFO 2672.

INFO 2698 Special Topics 1-3 s.h.

An in-depth study of information technologies. Topics vary. May be repeated for different topics.

Prereq.: Permission of chairperson.

INFO 3704 Business Communication 3 s.h.

Communication theory and practice. Business letter writing; oral communication. Review of English usage.

Prereq.: ENGL 1551.

INFO 3714 Advanced Spreadsheets 3 s.h.

Includes macros, look-up tables, advanced problems, templates, and projects with emphasis on accounting and finance applications.

Prereq.: CSIS 1514 or CSIS 1590.

INFO 3774 Multimedia Technology 4 s.h.

Technical configurations, graphic creation, manipulation, exchange, and digital asset management. Web and multimedia audio and video. Video strategies on the Internet. Fundamental Web utility tools. Storyboarding strategies, layout, and design issues. Three hours lecture, two hours lab.

Prereq.: CSIS 1590.

INFO 3775 Multimedia Authoring 4 s.h.

A study of multimedia authoring tools. Methods for integrating text, graphics, sound, and video. Project required. Three hours lecture and two hours lab.

Prereq.: INFO 3774.

INFO 3776 Web Site Development 4 s.h.

Foundations of web site development including e-commerce, multimedia, database integration, security, and accessibility. Use of scripting languages for interactivity. Three hours lecture and two hours lab.

Prereq.: CSIS 1590.

INFO 3777 Computer Technology for Digital Image Processing 4 s.h.

Study of tools and technology for digital image processing. Creating and capturing still and video images for use in Web site development. Techniques used in compression and archiving of graphics files. Project required. Three hours lecture and two hours lab.

Prereq.: INFO 3774.

INFO 3787 Training and Employee Development 3 s.h.

Theory and practice of designing training programs. Analyzing training needs, selecting instructional strategies, and implementing and evaluating training programs.

Prereq.: INFO 3774 or both INFO 1575 and CSIS 1590.

INFO 3790 Integrated Information Systems 3 s.h.

Students organize and operate an information center utilizing decision-making skills, and information systems procedures and components. Lab time required.

Prereq.: INFO 3714 or CSIS 3723.

INFO 4880 Information Technology Analysis and Design 3 s.h.

Information systems integration and modeling. Analysis of dynamic information flow, functional requirements, and system design in theory and practice.

Prereq.: CSIS 3722 and either CSIS 3723 or CSIS 3782.

Gen Ed: Capstone.

INFO 4895 Special Topics 2-4 s.h.

A study of special topics in information technologies. Subject matter and credit hours will be announced in advance. May be repeated multiple times if topic is different.

Prereq.: At least 3 s.h. of upper-division departmental courses and permission of chair.

INFO 5875 Advanced Multimedia Authoring 4 s.h.

Advanced study of multimedia authoring tools. Analysis of commercial applications. Group project required. Three hours lecture and two hours lab.

Prereq.: INFO 3775.