DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS

OVERVIEW

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.

WELCOME FROM THE CHAIR

As the Chair of the Computer Science and Information Systems (CSIS) Department, I extend my greetings to you! I hope you find this booklet to demonstrate the excitement found within our department.

This is a great era to be a computer scientist. Computers and software have found themselves majorly in everyday life and assist in advancing the areas of business, healthcare, education, social science, and science and engineering. The smartphone on your pocket right now, is more powerful than desktop computers five to six years ago!

Computer Science is a creative and exciting, dynamic and interactive, and highly integrated into social lifestyles. Computer Science blends together both mathematical and philosophical questions of intricacy and intelligence for technologies that makeup our lifestyles. In all areas, we collect and prompt data, which requires a new scale of algorithms and systems that drive to create new technology. As of right now, there is major demand for those trained in both Computer Science and Information Systems graduates and undergraduates. This demand has created growth in Computer Science and Information Systems worldwide. The areas of anthropology and zoology have begun to notice a need for computational thinking, making this a high demand for not in the program.

Our goal is to give students the most current curriculum that helps create software to benefit our society. Our capstone courses give students a chance to collaborate projects with industries. We take pride in giving both our graduate and undergraduate students quality education. Our program prepares students to apply both knowledge and training to create solutions to specific solutions. Students learn how to define a problem, then determine its manageability, when outside help is needed, and then to evaluate appropriate solutions. They then study, specify, create, implement, test, and document that solution. They evaluate both alternatives and risks for the solution, integrate different technologies, and then communicate this solution to their colleagues. The key to learning the ability of problem-solver and to work in a team environment.

We also have a long history of undergraduates successfully being involved in research. Every year, students are given the opportunity to join research groups or their own design with the assistance of a faculty member. We also actively send students for internships for companies big and small. Students can also pursue a co-op program in which they work for a company for nine months.

We offer a variety of degrees in computing-related areas. All programs combined core-principles along with hands-on laboratory experience, helping prepare students for exciting careers. All students can participate in sponsored research programs and professional student organization such as ACM or IEEE. Most undergraduates go to work in major companies, while others pursue startups, work in government, or continue education. A number of our graduate students pursue careers in academia.

I am very proud of both our students and faculty. Please make arrangements to visit us, we would love to meet you! If you have any questions feel free to contact me at cbayrak@ysu.edu.

DEPARTMENT CONTACT INFORMATION

Phone: (330) 941-3134

Location: Meshel Hall, Room 339

E-mail: CSIS@ysu.edu

LEARNING OUTCOMES

The learning outcomes for each program can be found at:

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

For more information, please see the program coordinator/department chair.

MISSION STATEMENT

The increasingly interdisciplinary nature of computer science has significantly pushed its frontiers, while at the same time reinvigorated research into the foundations of computing. This duality informs and guides how we implement our mission. The primary mission of the CSIS Department is to:

- generate and spread knowledge, train future scholars who actively participate in their field of study, and give services to our community. The field of computer science has extensively created new technology and has also given way for new research topics. This ability creates our mission in this department.

- 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.
- develop partnerships with local industry and school systems to benefit the economic health of the Mahoning Valley.
- supports and encourages research, industry partnerships, and other activities leading to the development of new technologies and new classroom methods and techniques.
- recognize that computing has become an increasingly crucial aspect of all disciplines of knowledge, and support interdisciplinary programs and forms symbiotic relationships with other disciplines in areas of greatest benefit to students.
- support 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.
- 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 (M-339) in Meshel Hall or from the department's website.

ADMISSION REQUIREMENTS FOR THE DEPARTMENT

Students will initially be admitted to University in the "STEM-T" (formerly "PRE-COMPUTER") major in the STEM College. Students may and should apply for a transfer into the Computer Science, Computer Information Systems, or Information Technology programs once they have met the eligibility requirements. Students will be eligible to transfer to the CSCI, CIS, or IT major once they have completed all pre-college Math (i.e. ready to take MATH 1513, 1552, or higher MATH) and pre-college English (i.e. ready to take ENGL 1550).

The typical courses taken by a PRE-COMPUTER major prior to transferring to a departmental program follows:

- Intended Major - Computer Science: **CSIS 1590** or **CSIS 2610**
- Intended Major - Computer Information Systems: **CSIS 1590** or **CSIS 2610**
- Intended Major - Information Technology: **INFO 1575** or **CSIS 1590**

New students, former YSU students, and external transfer students will enter the University as "STEM-T" majors and apply for admission to a departmental major when the above criteria are satisfied.

GRADUATION POLICIES

Students must meet the degree requirement of each program offered in the department. The curricular requirements for each program is listed below. For more information, please see the program coordinator/department chair.

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

ADVISING AND ADVISOR LIST

Advising, which is a continuous and consistent collaborative process between faculty members and students, is to make sure that students are making the right decision in the growth and development process, while seeking a degree. The role of academic advisor is to help students in developing efficient and effective educational plans that is inline with the life goals. Therefore, advisors are to:

- help students (advisees) to adapt the planning nature of the academic life and expectations, which is consistent with their abilities and interests.
- meet with students once a semester to for academic planning
- monitor and mentor the the student progress towards the educational goals
- make sure rules and regulations are well understood by the students and the necessary steps are taken in the correct order.
- approve all designated educational transactions (registration, advising, course transfer, major selection, graduation requirements, etc..)

The programs offered in the department has the following advisors (* indicates the coordinator of the program):

- Computer Science (CS) (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/bs-computer-science): (Dr. Robert Kramer*, Dr. John Sullins, Dr. Yong Zhang)
- Computer Information Systems (CIS) (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/bsas-computer-information-systems): (Dr. Kriss, Schueller*, Dr. Feng Yu, Dr. Bonita Sharif)
- Information Technology (IT) (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/bsas-information-technology): (Dr. Abdu Arslanyilmaz*, Mr. Robert Gilliland)

Chair

Coskun Bayrak, Ph.D., Professor, Chair

Professor

Abdurrahman Arslanyilmaz, Ph.D., Associate Professor

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

Alina Lazar, Ph.D., Professor

Kriss A. Schueller, Ph.D., Professor

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

Feng Yu, Ph.D., Associate Professor

Yong Zhang, Ph.D., Associate Professor

Lecturer

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

Majors

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

Minors

- Minor in Computer Databases (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-computer-databases)
- Minor in Computer Networking (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-computer-networking)
- Minor in Electronic Commerce Technology (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-electronic-commerce-technology)
- Minor in Information Systems Programming (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-information-systems-programming)
- Minor in Integrated Technologies (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-integrated-technologies)
- Minor in Multimedia and Web Design (http://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-multimedia-web-design)
- Minor in Object-Oriented Programming (http://catalog.ysu.edu/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/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-computer-science)
- Minor in Security -- Requirements will be posted soon.
- Minor in Tech Support-- Requirements will be posted soon.
- Minor in Web Communication-- Requirements will be posted soon.

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.: CSIS 2605 or CSIS 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.: CSIS 2605 or CSIS 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.: CSIS 2605 or CSIS 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.: CSIS 2605 or CSIS 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.: CSIS 3722, CSIS 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 Systems and Technologies   3 s.h.
Concepts of web-based applications including related software, interfaces and digital media. Foundations of web-site development including design, implementation, and integration. Multimedia integration and security and accessibility issues.
Prereq.: MATH 1505 or MATH 1507 or Math Placement Level 35.

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; prerequisite 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 3737   Game Programming   3 s.h.
Programming and development of computer games using a game programming environment. Software tools for coding 2D and 3D graphics and animation, sprites and other assets, and handling input events, motion, and collisions. Object-oriented programming and AI concepts for game development.
Prereq.: CSIS 1595 or CSIS 2610.

CSIS 3738   Graphics and Animation Gaming   3 s.h.
Design and implementation of animated characters in 3D computer games. Mesh design creation; surface materials, textures, and lighting; skeletal and facial rigging; motion and animation. Underlying physical principle and realistic character design concepts. Use of 3D animation software.
Prereq.: CSIS 1595 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 4878   Mobile Application Development   3 s.h.
Principles of designing and developing cross-platform mobile applications. Techniques for designing, developing, testing, packaging, and publishing cross-platform mobile apps. Client- and server-side programming theories and practices regarding mobile app development.
Prereq.: CSIS 3722, INFO 3776, and CSIS 3701.

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 or CSIS 3701 or 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.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 or CSIS 3701.

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, cryptovariable techniques, key management, and database security issues.
Prereq.: CSIS 2605 or CSIS 2610; MATH 1513 or MATH 1552 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   Client-Side Scripting Techniques   4 s.h.
Scripting and the role of scripting languages in software development for the web, and identifying key scripting languages used for the web. Developing, debugging, and testing scripts for the web, and local and remote software version control systems. Three hours lecture and two hours lab.
Prereq.: CSIS 1570, and CSIS 2605 or CSIS 2610.

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.