COMPUTER SCIENCE AND INFORMATION SYSTEMS

Computer Science and Information Technology

- 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 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 Master's in Computing and Information Systems offers advanced education in several computing areas.

The learning outcomes for each program can be found at:

- BS in Computer Science (https://catalog.ysu.edu/undergraduate/ colleges-programs/college-science-technology-engineering-mathematics/ department-computer-science-information-systems/bs-computer-science/ #learningoutcomestext)
- AAS in Information Technology (https://catalog.ysu.edu/undergraduate/ colleges-programs/college-science-technology-engineering-mathematics/ department-computer-science-information-systems/aas-information-technology/#learningoutcomestext)
- BSAS in Information Technology (https://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 programs 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, 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 office (M-339) in Meshel Hall or from the School's website.

ADMISSION REQUIREMENTS FOR THE PROGRAMS

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 or Information Technology programs once they have met the eligibility requirements. Students will be eligible to transfer to the CSCI 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 program are:

- Intended Major - Computer Science: **MATH 1571** or **CSIS 2610**
- Intended Major - Information Technology: **CSIS 1525** 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. The curricular requirements for each program is listed below. For more information, please see the program coordinator/department chair.

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

Professor

Abdu Arslanyilmaz, Ph.D., Professor, Director

Robert Gilliland, Ph.D., Assistant Professor

Hailong Jiang, Ph.D., Assistant Professor

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

Alina Lazar, Ph.D., Professor

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

Zachary Lee While, Ph.D., Assistant Professor

Feng Yu, Ph.D., Associate Professor

Lecturer

Babatunde Adewole, M.S., Lecturer

Melanie DiCarlo, M.S., Lecturer

Rachel Gramann, D.B.A., Lecturer

Todd A. Jones, M.C.I.S., Lecturer

Majors

- AAS in Information Technology (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/aas-information-technology/)
- AAS in Web and Digital Design (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/aas-web-and-digital-design/)
- BSAS in Information Technology (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/bsas-information-technology/)
- BSAS in Information Technology 4+1 Track (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/bsas-information-technology/four-plus-one-graduate-track/)
- BS in Computer Science (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/bs-computer-science/)
- BS in Computer Science 4+1 Track (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/bs-computer-science/four-plus-one-graduate-track/)
- BS in Computer Science Cybersecurity Track (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/bs-computer-science-cybersecurity-track/)

Minors

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- Minor in Computer Networking (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-computer-networking/)
- Minor in Computer Science (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-computer-science/)
- Minor in Information Technologies (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-information-technologies/)
- Minor in Interdisciplinary Game Studies (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-interdisciplinary-game-studies/)

- Minor in Object-Oriented Programming (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/minor-object-oriented-programming/)
- Minor in Web Communication (https://catalog.ysu.edu/undergraduate/colleges-programs/college-liberal-arts-social-sciences-education/department-english/minor-web-communications/)
- Certificate in IT Professional -Essential (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/certificate-in-it-professional-essential/)
- Certificate in IT Professional -Linus and Security (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/certificate-in-it-professional-linux-and-security/)
- Certificate in IT Professional -Networking (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/certificate-in-it-professional-networking/)
- Certificate in Programmable Logic Controllers (https://catalog.ysu.edu/undergraduate/colleges-programs/college-science-technology-engineering-mathematics/department-computer-science-information-systems/certificate-in-programmable-logic-controllers/)

Computer Science and Information Systems

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.
This course presents the history of design and creation of the operating system, role and purpose of the operating system, functionality of a typical operating system, mechanisms to support client-server models, handheld devices, design issues (efficiency, robustness, flexibility, portability, security, compatibility). Influences of security, networking, multimedia, windowing systems. This course will introduce the Android, IOS, Linux, Windows, and Unix operating systems. This course is not applicable to the 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 1570   Web Systems and Technologies   3 s.h.
This course will cover the basics of web-based applications including related software, interfaces and digital media. Foundations of web-site development including design, implementation, and integration of web-site, multimedia integration, and security and accessibility issues.
Prereq.: CSIS 1590.

CSIS 1590   Foundations of Information Systems & Technologies   3 s.h.
Essential information technology concepts such as computer hardware & software, databases, network, big data & cloud computing, and security. Study of information systems in businesses, organizations, & society, including enterprise information systems, information system acquisition & development, and electronic commerce, as well as ethical, legal, and social issues related to information systems and technologies.
Prereq.: MATH 1510 or MATH 1510C (may be taken concurrently) or at least Level 35 on the Mathematics Placement Test.

CSIS 1595   Fundamentals of Programming and Problem-Solving 1   2 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. Credit will not be given for both CSIS 1595 and CSIS 2610.
Prereq.: CSIS 1590 or MATH 1510 or MATH 1511 or Math Level 35.
Coreq.: CSIS 1595L.

CSIS 1595L   Fundamentals of Programming and Problem-Solving 1 Lab   1 s.h.
Programming laboratory for CSIS 1595 Fundamentals of Programming and Problem Solving 1. This laboratory will meet for 100 minutes per week.
Coreq.: CSIS 1595.

CSIS 2605   Fundamentals of Programming and Problem- Solving 2   2 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. Credit will not be given for both CSIS 2605 and CSIS 2610.
Prereq.: C or better in CSIS 1595.
Coreq.: CSIS 2605L.

CSIS 2605L   Fundamentals of Programming and Problem- Solving 2 Lab   1 s.h.
Programming laboratory for CSIS 2605: Fundamentals of Programming and Problem Solving 2. This laboratory will meet for 100 minutes per week.
Coreq.: CSIS 2605.

CSIS 2610   Programming and Problem-Solving   3 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. Credit will not be given for both CSIS 2610 and CSIS 1595 or CSIS 2605.
Prereq.: MATH 1513 or Math Level 45.
Coreq.: CSIS 2610L.

CSIS 2610L   Programming and Problem-Solving Lab   1 s.h.
Programming laboratory for CSIS 2610. This laboratory will meet for 100 minutes per week.
Coreq.: CSIS 2610.

CSIS 2620   System Configuration and Maintenance   3 s.h.
Theory and practice of installing and maintaining hardware and software for complex systems. Motherboards, memories, storage devices, processors, power supplies, network interface cards, and I/O peripheral devices. Operating systems, startup and boot process, I/O peripheral devices, data backup, data protection and recovery, networking, security strategies, virtualization, and troubleshooting.
Prereq.: CSIS 1590 or CSIS 2605 or CSIS 2610.

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   3 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, priority queues, trees, networks, and graphs.
Prereq.: "C" or better in either CSIS 2605 or CSIS 2610.
Coreq.: CSIS 3700L.

CSIS 3700L   Data Structures and Objects Lab   1 s.h.
Programming laboratory for CSIS 3700: Data Structures and Objects. This laboratory will meet for 100 minutes per week.
Prereq.: "C" or better in either CSIS 2605 or CSIS 2610.
Coreq.: CSIS 3700.

CSIS 3701   Advanced Object-oriented Programming   3 s.h.
Object-oriented design and programming, including classes, encapsulation, inheritance, polymorphism, exception handling, and generics. Design, development, and testing of large-scale programs using object-oriented programming.
Prereq.: "C" or better in either CSIS 2605 or CSIS 2610.

CSIS 3722   Development of Databases   3 s.h.
This course covers concepts about data modelling, relational data model, Structured Query Language (SQL), relational database design and transaction processing. Storing, retrieving, updating and displaying data using Structured Query Language (SQL), functions and triggers. Secure operations performed by database administrators.
Prereq.: CSIS 1590 or CSIS 2605 or CSIS 2610.

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 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 for 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 principles 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.
Introduction to Cyber Security basics. Topics include: the roles organizations, laws, and people play in cyber security, current cyber security trends including an analysis of cyber-attacks and possible defenses, and industry best practices in regard to information security. Disaster planning and recovery.
Prereq.: CSIS 1590 or CSIS 2605 or CSIS 2610.

CSIS 3756   Security Design   3 s.h.
Application of tools and methodologies used in cyber security. Analysis of threat actors' methods and how to defend against them. Methods and tools on securing enterprise infrastructure including network access and communication security.
Prereq.: CSIS 3755 and CSIS 3782.

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 3758   Ethical Hacking   3 s.h.
Application of tools and methodologies used in cyber security. Analysis of threat actors' methods and how to defend against them. Methods and tools on securing enterprise infrastructure including network access and communication security.
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 3782   Cisco Networking Academy 1   3 s.h.
Introduction to Networks (ITN) covers the architecture, structure, functions and components of the Internet and other computer networks. Students achieve a basic understanding of how networks operate and how to build simple local area networks (LAN), perform basic configurations for routers and switches, and implement Internet Protocol (IP). Two hours lecture and two hours lab per week.
Prereq.: CSIS 1590.

CSIS 3783   Cisco Networking Academy 2   3 s.h.
Switching, Routing, and Wireless Essentials (SRWE) covers the architecture, components, and operations of routers and switches in small networks and introduces wireless local area networks (WLAN) and security concepts. Students learn how to configure and troubleshoot routers and switches for advanced functionality using security best practices and resolve common issues with protocols in both IPv4 and IPv6 networks. Two hours lecture and two hours lab per week.
Prereq.: CSIS 3782.

CSIS 3784   Cisco Networking Academy 3   3 s.h.
Enterprise Networking, Security, and Automation (ENSA) describes the architecture, components, operations, and security to scale for large, complex networks, including wide area network (WAN) technologies. The course emphasizes network security concepts and introduces network virtualization and automation. Students learn how to configure, troubleshoot, and secure enterprise. Two hours lecture and two hours lab per week.
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 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 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 5723   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.: Enrollment in Computer Science Endorsement Program.
Cross-Listed: CSIS 3723.

CSIS 5755   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. Cross-Listed: CSIS 3755.

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 5825   Natural Language Processing   3 s.h.
This course will explore the field of NLP (Natural Language Processing) as it is concerned with the theory and practice of modern AI. It covers major concepts of NLP. It presents important algorithms, methods, structures, and techniques required to construct natural language interfaces for software agents and physical agents. It introduces students to important approaches necessary to build practical, useful, and interesting systems that require natural language processing, interfaces, and models.
Prereq.: CSCI 3710, CSCI 5835, CSCI 5870, or CSIS 5824.

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 or graduate standing.

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 3D computer games. Development of 3D characters, including surface creation and effects, skeletal and facial rigging, and motion and animation. Programming those characters in a 3D game engine, including scripting, level and game design, and game physics.
Prereq.: CSIS 2605 or CSIS 2610 or CSIS 3737.

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   Concepts of Programming Languages   3 s.h.
Comparative survey of programming language paradigms, including imperative, object-oriented, event-driven, functional, logic-based, and concurrent programming languages. Design and tradeoffs of programming language features and implementation, including syntax, control structures, types, memory management, and security.
Prereq.: CSIS 3701.

CSCI 4850   Advanced Database Design and Administration   3 s.h.
Design, development, implementation, and administration of large database systems at the enterprise level, including logical data models, data security and assurance, concurrent processing, data distribution, data marts, data warehouses, data mining, and data extraction, cleansing, and loading.
Prereq.: CSIS 3722 with a grade of C or better.
Cross-Listed: CSCI 6950.

CSCI 4851   Data Science and Machine Learning   3 s.h.
Basic methodologies for the data science pipeline: data acquisition and cleaning, handling missing data, exploratory data analysis, visualization, feature engineering, modeling, interpretation, and presentation in the context of real-world datasets. Classical models and techniques for classification, clustering, anomaly detection, deep learning, and collaborative filtering.
Prereq.: CSIS 3722 with a grade of C or better.
Cross-Listed: CSCI 6951.

CSCI 4852   Deep Learning   3 s.h.
Foundations of neural networks and deep learning. Master the practical aspects of implementing deep learning solutions, using a hands-on approach to understanding both theory and practice. Key architectures in deep learning are covered, including feedforward networks, convolution neural networks, recurrent neural networks, long short-term memory networks, autoencoders and generative adversarial networks. Apply deep learning to real world problems.
Prereq.: CSIS 3722.
Cross-Listed: CSCI 6952.

CSCI 4855   Transformers: Large Language and Vision Models   3 s.h.
A comprehensive course about Transformer-based models. This course covers the inner workings of large language models such as GPT and BERT, and vision transformers such as ViT. Learn their architectures, applications, and how they revolutionize AI in language understanding and image processing. Hands-on projects and case studies will deepen your practical knowledge of these cutting-edge technologies.
Prereq.: CSCI 4852 with a grade of C.
Cross-Listed: CSCI 6955.

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 4870   Biometrics   3 s.h.
Major biometric techniques, including face, fingerprint, voice and iris. Biometric methods with roots in computer vision, image processing, pattern recognition and machine learning.
Prereq.: CSIS 3700 or FSCI 3716/L or permission of instructor.

CSCI 4871   Cloud Computing and Big Data   3 s.h.
Fundamental knowledge of cloud computing and big data. Advances in cloud computing and data intensive computing environment across multiple disciplines. Students will build, manage, and program on popular cloud and big data platforms.
Prereq.: At least 3 semester hours of upper division CSIS or CSCI courses.

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 2024.

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 or graduate standing.

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, concurrency 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's: (undergraduates) CSIS 3700 and CSIS 3740, CSCI 3710 (graduates) CSCI 6901.

Prereq.: See Course Description.

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 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   Automata Theory   3 s.h.
Abstract models of computers, and the languages they generate or recognize. Finite state automata and regular expressions; Context-free grammars and pushdown automata; Turing machines. Limits of each model, including decidability and undecidability of computing-related problems. Applications of these models to areas such as input validation, security, language design, and compilers.
Prereq.: CSCI 3710.

CSCI 5849   Computational Methods for problems in the Physical Sciences   3 s.h.
Use of contemporary computational approaches to conduct research in the physical sciences using Matlab and supercomputers. Algorithm development and formal exercise tasks may vary depending on the stage of the course, student abilities, and the topic under consideration. Provides application of the techniques discussed in the class to real world situations.
Prereq.: MATH 3705 and PHYS 2610.
Cross-Listed: MATH 5849 and PHYS 5849.

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 5858   Blockchain and Cryptocurrency Technologies   3 s.h.
This course introduces the fundamentals and mechanics of blockchain and cryptocurrency. Topics include an introduction to basic cryptography and cryptocurrencies, decentralization and mechanism of bitcoin, storage and transactions of bitcoin, mining of bitcoin, and regulation, platforms, and applications of bitcoin.
Prereq.: Senior standing or graduate student status.

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 or graduate standing.

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 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 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   Digital Image Processing   4 s.h.
Technical configurations, graphic creation, manipulation, exchange, and digital asset management. Image sampling and quantization, image enhancement, color image theory, image transforms, compression, and restoration. Storyboarding strategies, layout, and design issues. Three hours lecture, two hours lab.
Prereq.: CSIS 1590 or CSIS 1570.

INFO 3775   Digital Multimedia Design & Creation   4 s.h.
A study of digital multimedia design and creation. Methods for designing, creating and integrating text, graphics, audio, animation, and video into a digital multimedia application. Project required. Three hours lecture and two hours lab.
Prereq.: CSIS 1570.

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.

INFO 3777   Digital Audio & Video Production   4 s.h.
Study of tools and technology to produce digital audio and video. Digital audio and video design, creation, acquisition, digitization, transformation, compression, editing, and publishing. Project required. Three hours of lecture and two hours of lab.
Prereq.: CSIS 1570.

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 2024.

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.
This course is a study of advanced multimedia authoring principles. Through assigned reading, lab exercises, and lectures, you will generate guiding principles of designing and developing effective multimedia materials. Additionally, advanced-scripting language concepts toward developing multimedia materials, integrating text, graphics, sound, and animation, will be presented. 3 hours lecture and 2 hours lab.
Prereq.: INFO 3774 or INFO 3775 or INFO 3776.