DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Department Objectives:

- To provide the necessary preparation for students planning careers in Computer Science and related areas;
- To provide the necessary preparation for students planning careers in Information Technology and related areas;
- To provide the courses to meet the requirements of General Studies;
- To provide the courses to meet the service functions for departments requiring knowledge of Computer Science and Information Technology;
- To provide courses that meet the service functions demanded by the community and state in Computer Science and Information Technology;
- To prepare students for graduate work and research in Computer Science and Information Technology.

Students who plan to major in Computer Science or Information Technology should have a strong high school background in mathematics. Those who have a minimum score of 22 on the math portion of the ACT may enroll in CSIT 130, Introduction to Computer Science.

All courses in any CSIT major program require a minimum grade of "C".

Computer Science Versus Information Technology

Computer Science (CS) and Information Technology (IT) are enormously vibrant fields that are constantly in motion. Just look around and see how much we rely on technology. CS & IT professionals are making a difference in our world today. The United States continues to suffer from a shortage of qualified CS & IT workers with flexible and portable skills who can readily adapt and respond to ever-changing IT demands and processes.

The CS graduate will be more involved with algorithm formulation, software development and implementation, while the IT graduate will likely find a career in web development, system administration, computer security, user support, etc. Graduates in both programs interact with people from all organizational functions in designing and implementing computer applications. The IT program is a one of a kind program in Nebraska.

Common Core Courses

All of the options in the Computer Science/Information Technology Major contain the following core courses:

- CSIT 130
- CSIT 150

The common core allows students to defer the decision as to which option to select.

Computer Science and Information Technology Major

Four options are available in this major:

1. Applied Computer Science (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/applied-computer-science-bs) - Bachelor of Science Degree
2. Computer Science Comprehensive (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/computer-science-comprehensive-bs) - Bachelor of Science Degree
3. Cyber Security Operations Comprehensive (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/cyber-security-operations-comprehensive-bs) - Bachelor of Science Degree
4. Information Technology (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/information-technology-bs) - Bachelor of Science Degree
   - Web Development Emphasis (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/information-technology-bs/#web)
   - System Administration Emphasis (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/information-technology-bs/#system)
   - General Information Technology Emphasis (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/information-technology-bs/#general)

There are electives within each major option that allow the student to individualize their own program.

A supplemental endorsement in Information Technology (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/supplemental-endorsement-information-technology) is available.

Minors in Computer Science (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/computer-science-minor) and Information Technology (http://catalog.unl.edu/undergraduate/departments-programs/computer-science-information-technology/information-technology-minor) are available for students pursuing majors in other disciplines.

The department participates in the Masters of Science in Education Degree with a specialization in Instructional Technology which is offered by the College of Education and in the Master of Business Administration degree. (See Graduate Catalog (http://catalog.unl.edu/graduate) for programs and courses.)

Sherri Harms, Chair

Professor: Sherri Harms, John Hastings

Assistant Professor: Abodule (Shahram) Alavi-Behbanahi, Matthew Miller
Computer Science and Information Technology (CSIT)


CSIT 100 – Computing Environments 1 credit hour
This course presents any one of a variety of currently demanded computer topics. It focuses on hands-on exposure to computer-based enhancement of personal productivity. Grading method is credit/no credit.

CSIT 100.1 – Computing Environments: Word Processing 1 credit hour

CSIT 100.2 – Computing Environments: Spreadsheet 1 credit hour

CSIT 100.3 – Computing Environments: Database 1 credit hour

CSIT 100.5 – Computing Environments: Presentation Graphics 1 credit hour

CSIT 100.6 – Computing: Networking 1 credit hour

CSIT 100.9 – Computing Environments: Software Sampler 1 credit hour

CSIT 100C – Computing Environments: LINUX 1 credit hour

CSIT 100D – Computing Environments: Windows 1 credit hour

CSIT 100E – Computing Environments: WWW Home Pages 1 credit hour

CSIT 100F – Computing Environments: MVS 1 credit hour

CSIT 100G – Computing Environments: JCL 1 credit hour

CSIT 106 – Computer Science Principles 3 credit hours
This course provides a broad, inspiring overview of computer science that is appropriate for all students. By the end of this course, students will become empowered to critically analyze computing innovations as well as create inspiring applications that express their interests. In addition, they will be ready to incorporate computational thinking into their future fields of study.

CSIT 108 – Computers in Society 3 credit hours
An elementary description of the components and principles of digital computers. Background and implications of information processing, computer influence on society, and uses of computers. Hands-on computer applications to reinforce concepts of problem solving and critical thinking and to illustrate modern applications of computers.

CSIT 111 – Applied Computer Programming 3 credit hours
The main emphasis in this course is on identifying, analyzing, and implementing solutions for business and scientific problems through the use of event-driven programming techniques and concepts. The problem-solving tools that will be covered include (but are not limited to) table handling, graphic user interfaces, subprograms, file creation and manipulation, sorting and searching.

CSIT 112 – Programming in C 3 credit hours
Study of programming and problem-solving concepts and the implementation of these concepts using the C programming language. Demonstrates the power of C as a high and low level language.

CSIT 130 – Introduction to Computer Science 4 credit hours
A first course in problem solving and software development; including logic, data storage and manipulation, data types, assignment statements, standard input/output, selection control, repetition control, subprograms, parameter passage, scope of identifiers, data file input/output, simple GUIs, software classes, objects, one dimensional arrays and rudimentary software engineering techniques. Students complete programming projects using a modern programming language. Good programming techniques, object-oriented design, program clarity, style, and effective documentation are emphasized through practice in designing, coding, and debugging programs. Intended for students interested in improving their problem-solving abilities through the use of software development. Laboratory assignments develop mastery of a high-level programming language and good programming and experience in modern software development practices. Three hours lecture, two hours laboratory each week.

Prerequisite: Completion of or concurrent enrollment in MATH 102 or ACT Math score of 22 or above or Math placement into MATH 103 or above or completion of MATH 102 or above.

CSIT 150 – Object Oriented Programming 3 credit hours
Structured programming concepts and principles including an introduction to data structures. Comprehensive study of a structured programming language with a variety of programming applications. An appropriate state-of-the-art language will be used.

Total Credits Allowed: 3.00
Prerequisite: CSIT 130 or CSIT 112

CSIT 180 – Discrete Structures 3 credit hours
The study of mathematical topics and data structures necessary for a successful program of study in Computer Science. Topics include set theory, Boolean algebra, propositional calculus, logic circuits and finite state machines. (May be taken concurrently with MATH 115.)

Prerequisite: CSIT 130 and completion of or concurrent enrollment in MATH 115

CSIT 188 – GS Portal 3 credit hours
Students analyze critical issues confronting individuals and society in a global context as they pertain to the discipline in which the Portal course is taught. The Portal is intended to help students succeed in their university education by being mentored in process of thinking critically about important ideas and articulating their own conclusions. Students may take the Portal in any discipline, irrespective of their major or minor. Satisfies the General Studies Portal course requirement. Students may take their Portal course in any discipline. Students who transfer 24 or more hours of General Studies credit to UNK are exempt from taking a portal course.

Total Credits Allowed: 6.00
Prerequisite: First year freshman standing or sophomore standing only.
CSIT 199 – Current Issues in CS/IT 1-3 credit hours
A course designed to enable students to become knowledgeable of recent trends and issues in computer science and information technology. The course format varies depending on subject matter, instructor and student needs.
Total Credits Allowed: 6.00

CSIT 210 – Structured Transaction Programming 3 credit hours
This is an introductory programming course. The topics include basic computer concepts and terminology, in conjunction with program development using elements of a programming language. Stress is placed upon transaction processing algorithm using structured programming. The assignments are exercises that develop in-depth skills and techniques from the lecture topics. CSIT 100.F MVS and CSIT 100.G JCL are recommended co-requisites.

CSIT 223 – Information Technology Infrastructure 3 credit hours
A study of computer organization as it relates to the selection of computer hardware devices. The goal of the course is to create an understanding of the organization issues that influence system design and purchasing decisions. Topics include memory management, RAID, error detection, compaction, process management, pipelining, and cloud computing.
Prerequisite: CSIT 150
Additional Course Fee Required

CSIT 280H – Special Topics 3 credit hours
A General Studies course for Honors students. Interdisciplinary course that examines the connections between disciplines.

CSIT 301 – Computer Organization 3 credit hours
A study of computer organization and Assembly language. Topics include basic logic design, addressing modes and instruction sets, data path, memory hierarchy, buses and peripherals, parallel processing, error detection and recovery, encryption and compaction.
Prerequisite: CSIT 150 and CSIT 180

CSIT 310 – Programming Data and File Structures 3 credit hours
Study of advanced structured COBOL programming techniques and applications with respect to table handling, subprograms, sequential files, and indexed sequential files.
Prerequisite: CSIT 210

CSIT 330 – Algorithms and Data Structures 3 credit hours
A comprehensive study of data structures and algorithms with programming applications. Topics include: a review of basic data structures (linked-lists, stacks, queues) and abstract data types, advanced data structures and their associated algorithms, heaps, priority queues, hash tables, trees, binary search trees, and graphs, advanced sorting and searching algorithms, divide and conquer algorithms, greedy algorithms, and dynamic programming. Problem analysis is emphasized. Computability, asymptotic notation and NP-completeness are introduced. An object-oriented programming language will be used.
Prerequisite: ENG 102 and MATH 115 and CSIT 180 and CSIT 150
Additional Course Fee Required

CSIT 350 – Information Systems Concepts 3 credit hours
This course deals with the role, structure and objectives of information systems. Other topics include theory of systems and information, decision support, human considerations, applications of information systems, system evaluation and selection.
Prerequisite: Completion of CSIT 111 or CSIT 130 and ENG 102
Enrollment not allowed in CSIT 350 if MIS 302 has been completed

CSIT 380 – Systems Analysis and Design 3 credit hours
Explore the System Development Life Cycle. Learn tools and strategies for system and information analysis, including need identification, feasibility studies, data and process modeling, requirements assessment, project management and group dynamics.
Prerequisite: Completion of CSIT 150 Enrollment not allowed in CSIT 380 if MIS 381 has been completed.

CSIT 388 – GS Capstone 3 credit hours
An interdisciplinary experience where students apply the knowledge, cognitive abilities, and communication skills they have gained from General Studies in designing and completing an original project or paper. Students employ methods and interpretive means of two or more disciplines to integrate knowledge and synthesize their results. Satisfies the General Studies capstone course requirement. Students may take their Capstone course
Prerequisite: Junior or Senior level standing or within 6 hours of completing general studies requirements.

CSIT 399 – Campus Lab Consultantship 1-3 credit hours
Work in campus computer labs as a consultant to computer science and computer information technology students. (A total of three credit hours in any combination of CSIT 399 and CSIT 492-495 may be applied toward a computer science/information technology major or minor.)
Department Consent Required
Total Credits Allowed: 9.00

CSIT 401 – Operating Systems 3 credit hours
Introduction to modern operating system concepts and design. Topics will include: Processes, semaphores, monitors, concurrent process management, virtual memory, file systems, scheduling algorithms, deadlocks and protection, I/O control interrupt handling, client-server model, remote procedure call, distributed synchronization, threads and transactions.
Prerequisite: CSIT 330

CSIT 402 – Introduction to Automata, Formal Languages, and Computability 3 credit hours
A survey of the fundamental concepts and conclusions in the theory of computation. Topics cover regular languages and finite automata, Kleen's theorem, context-free languages and pushdown automata, formal grammars, Chomsky hierarchy, Turing machine and computability, computational complexity.
Prerequisite: Junior standing and CSIT 180 or MATH 115

CSIT 404 – Software Engineering 3 credit hours
This course will include the fundamental principles of software engineering. Software specification techniques: rigorous methods and formal methods. Software design: object-oriented design, function-oriented design, real-time systems design, user interface design. Programming techniques and tools. Software reuse and software metrics. Design patterns and component-based software development. Computer-aided software engineering. Software validation and verification. The object-oriented language Java will be used as the major programming language for this course.
Prerequisite: CSIT 330
Additional Course Fee Required

CSIT 405 – Compiler Construction 3 credit hours
Techniques and organization of compilers, assemblers, and interpreters. Structure of programming language symbol tables, scans, and object code generation.
Prerequisite: CSIT 402
CSIT 406 – Enterprise Web Application Development  3 credit hours
This course is designed to assist students in learning the skills necessary to design and build enterprise-level web applications. Skills and knowledge gained in this course can be applied in the development of interactive web sites, electronic commerce systems, cloud-based applications and other service-based architectures. Security of internet based information systems will also be covered.
Prerequisite: CSIT 150

CSIT 408 – Principles of Programming Languages  3 credit hours
Study of the essential concepts of programming languages including, language design concepts and semantics; examination of language features and major programming paradigms with a focus on functional programming; and design and implementation of language interpreters.
Prerequisite: CSIT 402 and CSIT 301 or CSIT 330

CSIT 422 – Computer Graphics  3 credit hours
Introduction to the techniques for generating lines, curves, surfaces, 2D and 3D graphics, modeling and rendering. Topics include display hardware, transformations, interactive technologies, geometric modeling, 2D and 3D display algorithms, graphics software system architecture, visible-surface algorithms, illumination and shading.
Prerequisite: CSIT 330

CSIT 425 – Database Systems  3 credit hours
This course is a comprehensive study of multi-user database concepts. The relational model and relational database management systems along with proper database design will be emphasized. The normalization process and the various normal forms will be covered. Internet database applications are introduced. SQL will serve as the standard language for database manipulation. Several current database management systems will be introduced and will serve as the sample DBMSs for implementation of the course material.
Prerequisite: CSIT 112 or CSIT 130 or CSIT 434

CSIT 426 – Computer Architecture  4 credit hours
The study of the logic and theory of operation of the main hardware blocks of computers, their control, and their software/hardware interactions. The emphasis is on microcomputer architecture, including laboratory experiments with various systems and their I/O and interfacing characteristics.
Prerequisite: PHYS 205 and PHYS 205L or PHYS 275 and PHYS 275L and six hours of CSIT courses preferably CSIT 130 and CSIT 301.

CSIT 428 – Data Communications and Distributed Processing  3 credit hours
The study of network topology, protocols, management, and communication media. Evaluate present communication hardware, software, and future advancements in networking.
Prerequisite: CSIT 130 or CSIT 434 or ITEC 345

CSIT 434 – Information Technology Teaching Methods  3 credit hours
This course will include information technology curriculum development and instruction, with a focus on applying programming concepts to K-12 education. Intended only for Teachers. Cannot be applied toward any other Computer Science/Information System Major or Minor.
Prerequisite: Junior or senior standing

CSIT 440 – Interactive Web Application Development  3 credit hours
This course covers the wide range of state-of-the-art computer technologies for interactive web application development. Students will learn how to write both static web pages and dynamic web pages. This is a programming-intensive course.
Prerequisite: CSIT 130 or CSIT 434

CSIT 441 – Artificial Intelligence  3 credit hours
An in-depth study of intelligent agents, tree and search methods, constraint satisfaction problems, optimization problems, game-playing, logical analysis, and uncertainty modeling. Machine learning techniques are introduced. Applications to robotics, psychology, business intelligence and data mining are also discussed.
Prerequisite: CSIT 150

CSIT 444 – Software Reverse Engineering  3 credit hours
This course provides students with the opportunity to standard techniques used to Reverse Engineer software systems. These techniques will allow students to understand the process involved in program compilation, such that they can deduce the functionality of a program and recreate a program source code without the original source.
Prerequisite: CSIT 301

Additional Course Fee Required

CSIT 448 – System Administration  3 credit hours
This course provides an overview of how to manage a server and its users. Topics include but not limited to installing server operating system, creating user and group accounts, setting up policies, adding and configuring devices and drivers, managing data storage, setting up security evaluating performance, trouble shooting, and virtualization.
Prerequisite: CSIT 130 or ITEC 345 or CSIT 434

CSIT 450 – E-Commerce Information Systems  3 credit hours
This course will present, develop, explore, and illustrate the nature and use of E-commerce Information System development methodologies in an inter-organizational setting, and discuss responsibilities at all life cycle stages. It is a comprehensive study of electronic commerce, with in-depth coverage of e-commerce technologies and e-commerce business models including business-to-consumer models, business-to-business models, consumer-to-consumer models, peer-to-peer models, and mobile commerce. It introduces global e-commerce, security and encryption issues, and ethical, social and political issues related to e-commerce. E-commerce interface designs for electronic storefronts, malls, catalogs, shopping carts, search engines, auctions, e-payment systems, e-learning, and e-government will be covered. Consumer interactions with payment processing mechanisms and relationships to information technology development and support will be studied.
Prerequisite: CSIT 130 or MIS 302 or CSIT 434 and Sophomore standing or above

CSIT 458 – Computer Security  3 credit hours
This course provides an overview of security issues associated with the development and deployment of information systems. Topics include authentication, encryption, firewalls, security standards and protocols, attack prevention, detection, and recovery.
Prerequisite: CSIT 150 or CSIT 448 or ITEC 345 or instructor permission
CSIT 492 – Practicum in Computer Science/Information Technology 1-6 credit hours
This course provides the student the opportunity to gain experience in the application of computer science/computer information technology principles in a variety of settings. Arrangements must be made in writing prior to registering for the course. (A total of 3 credit hours of any combination of CSIT 399 and CSIT 492-495 may be applied toward a computer science/information technology major, minor, or endorsement. A total of 6 credits may be earned for a summer practicum and a total of 3 credits may be earned for a semester practicum.)
Department Consent Required
Total Credits Allowed: 18.00
Prerequisite: CSIT 150 and permission of department chair and documentation of internship employment from intern's site supervisor
Student must provide where employed name of supervisor and basic duties primary responsibility for finding internship belongs to student.

CSIT 493 – Directed Readings in Computer Science/Information Technology 1-3 credit hours
Independent readings on advanced or contemporary topics in computer science/information technology, to be selected in consultation with and directed by a computer science/information technology faculty member. A written contract specifying readings and requirements for the course is required before registering for the course. Any topic that is thoroughly covered by any regularly offered computer science or information technology course is not allowed for Directed Readings. Upon completion of the project a format presentation will be given by the student to all interested parties. (A total of three credit hours of any combination of CSIT 399 and CSIT 492-495 may be applied toward a computer science/information technology major or minor.)
Department Consent Required
Total Credits Allowed: 6.00
Prerequisite: CSIT 150 and permission of department chair

CSIT 494 – Directed Research in Computer Science/Information Technology 1-6 credit hours
Independent original research in computer science/computer information technology under the direction of a computer science/information technology faculty member. A written contract specifying topic and requirements is required before registering for the course. Upon completion of the project a format presentation will be given by the student to all interested parties. (A total of three credit hours in any combination of CSIT 399 and CSIT 492-495 may be applied toward a computer science/information technology major or minor.)
Department Consent Required
Total Credits Allowed: 6.00
Prerequisite: CSIT 150 and permission of department chair

CSIT 495 – Independent Study in Computer Science/Information Technology 1-3 credit hours
This course provides the opportunity for students to conduct independent study on any computer science/information technology topic not covered by other regularly offered courses. The topic will be selected in consultation with and the study will be supervised by a computer science/information technology faculty member. The student must complete a project in an area of interest to the student and should include programming. Upon completion of the project a format presentation will be given by the student to all interested parties. A written contract specifying the topic and requirements is required before registering for the course. (A total of three credit hours in any combination of CSIT 399 and CSIT 492-495 may be applied toward a computer science/information technology major or minor.)
Department Consent Required
Total Credits Allowed: 6.00
Prerequisite: CSIT 150 and permission of department chair

CSIT 496 – Seminar in Computer Science 1-3 credit hours
Provides experience and background that will prepare the student for an actual working environment. Reinforcement of previous classwork, enhancement of communication skills, and learning to work with people will be stressed. Primary tasks include a team-based computer science project and the study of ethics for computer science professionals. Should be taken in student’s senior year.
Total Credits Allowed: 3.00
Prerequisite: CSIT 330
Additional Course Fee Required

CSIT 497 – Seminar in Information Technology 3 credit hours
This course provides experience and background that will prepare the student for an actual working environment. Reinforcement and validation of knowledge gained in previous course work, enhancement of communication skills, and learning to work with people will be stressed. Primary tasks will include a team-based information systems development project and the study of ethics for CS/IT professionals.
Prerequisite: Completion of CSIT 380 and completion of or concurrent enrollment in CSIT 425.
Additional Course Fee Required

CSIT 499 – Special Topics in Computer Science & Information Technology 3 credit hours
A course designed to enable students to become knowledgeable of recent trends and issues in computer science and information technology. The course format varies depending on subject matter, instructor and student needs.
Total Credits Allowed: 9.00