

Department of Computer Science

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The Department of Computer Science offers a full range of courses designed to prepare students who plan to enter computing careers in business, government, education, and industry as well as those who plan to enter graduate school. The department emphasizes a blend of theory, abstraction, and design needed to prepare students to meet their future goals.

Programs in the department lead to the Bachelor of Science degree with a major in Computer Science. Students may select a major in Computer Science (Computing Sciences Accreditation Board accredited) or a concentration in Business Applications. Only one minor is required for a Computer Science major. The department cooperates with the Aerospace Department to offer the Airway Science curriculum approved by the Federal Aviation Administration. In addition, a minor in Computer Science is offered.

In all curricular listings, (Area __) refers to the General Studies requirements as outlined on pages 59-61.

Service courses are listed on page 122.

Major in Computer Science

All Computer Science majors are assigned to a faculty advisor through the Computer Science Department office (KOM 306). The student is responsible for seeking the assistance of the advisor. This catalog is not intended to provide the detail necessary for self-advising.

Core Requirements for all Computer Science Majors

A major in Computer Science consists of 44 semester hours of computer science courses, including

1. a 29-hour core of CSCI 1170, 2170, 3080, 3110, 3130, 3160, 3250, 3420, and 4700;
2. a mathematics core of MATH 1910 and 1920 and MATH 2050;
3. an additional math course (3 hours) that can be counted toward a math major;
4. COMM 2200;
5. additional courses as described below.

A maximum of 3 hours in the major may come from CSCI 3970, 4600, and 4910. Credit in secondary computer lan-

guages toward the major is limited to 3 hours. In order to take any computer science course having a prerequisite, the student must have earned a grade of C (2.00) or better in the prerequisite. The courses listed as service courses do not count toward a major.

Major in Computer Science: No Concentration

In addition to the core requirements, students must complete the following for the CSAB-Accredited Computer Science major:

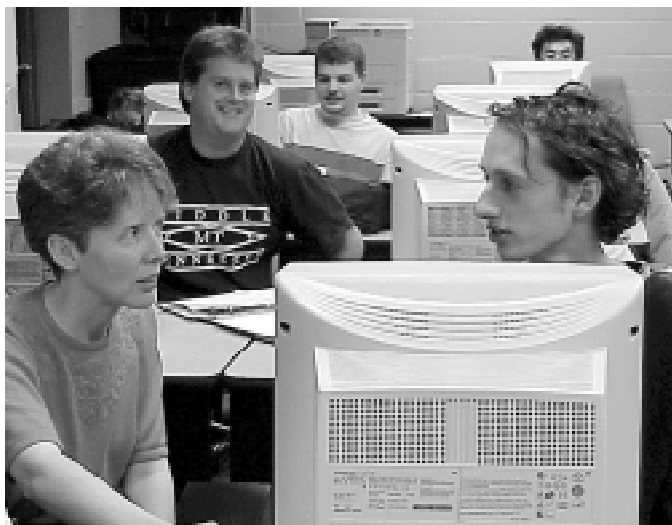
1. CSCI 3210 and 4160;
2. 2-3 hours in an approved high-level language;
3. upper-division computer science electives (6-7 hours);
4. minor to be selected with the approval of the computer science advisor;
5. a minimum of 15 hours of approved mathematics;
6. a two-semester sequence in a laboratory science for Science majors (8 hours);
7. additional hours in science for Science majors and/or courses with strong emphasis on quantitative methods to make a total of at least 12 hours including the 8-hour science sequence required above;
8. a minimum total of 30 hours of approved mathematics and science;
9. 30 semester hours of humanities, social sciences, and other disciplines (excluding science, mathematics, computer science, and physical education).

Recommended Lower-Division Curriculum,

CSAB-Accredited Major

FRESHMAN		SOPHOMORE	
CSCI 1170, 2170	8	CSCI 3080, 3110, 3130, 3160	13
MATH 1910, 1920	8	MATH 2050	3
English (Area I-A)	6	English (Area II-A)	6
Year of Physics, Chemistry, or Biology	8	History (Area III-A)	6
PHED or MS (Area V)	2	COMM 2200 (Area I-B)	3
Gen. Studies (Area II-B)	3	Gen. Studies (Area III-B)	3
		PHED or MS (Area V)	2
	35		36

NOTE: A list of quantitative methods courses may be obtained from the department office.



Concentration: Business Applications

In addition to the core requirements, students must complete the following for the Business Applications concentration under the Computer Science major:

1. CSCI 4110 and 4560;
2. 9 hours of computer science electives, at least 6 of which are upper division;
3. a minor in either Business Administration or Mathematics. If a minor in Mathematics is chosen, then the following additional business requirements must be taken: ACTG 2110, ECON 2420, FIN 3000, MGMT 3610, and one of ACTG 2120, BLAW 3400, MKT 3820, ACSI 4230, or MGMT 3620.

Recommended Lower-Division Curriculum, Business Applications Major

FRESHMAN		SOPHOMORE	
CSCI 1170, 2170	8	CSCI 3080, 3110, 3130, 3160	13
MATH 1910, 1920	8	MATH 2050	3
English (Area I-A)	6	English (Area II-A)	6
Science (Area IV-A)	8	History (Area III-A)	6
PHED or M S (Area V)	2	COMM 2200 (Area I-B)	3
Gen. Studies (Area II-B)	3	Gen. Studies (Area III-B)	3
	35	PHED or M S (Area V)	2
			36

Minor in Computer Science

A minor in Computer Science consists of 18 semester hours including CSCI 1170, 2170, 3160, and additional courses including three hours selected from upper-division computer science with approval of the minor advisor. The courses listed as service courses do not count toward a minor in Computer Science. CSCI 3420 does not count toward a Computer Science minor. Credit in secondary computer languages toward a minor is limited to three hours. A GPA of 2.00 is required in the Computer Science minor.

Courses in Computer Science [CSCI]

1160 (116) Fortran Programming. Four credits. Prerequisite: Sufficient background in algebra and trigonometry. Computer organization and algorithm development. Topics include fundamental computer science terminology, data representation, structured programming using the FORTRAN 77 language, and simple data structures. Three lectures and one three-hour laboratory. Only three hours may be counted toward a Computer Science major or minor. Will not count toward Computer Science major if taken after CSCI 1170.

1170 (117) Computer Science I. Four credits. Prerequisite: Sufficient background in algebra and trigonometry. The first of a two-semester sequence using a high-level language; language constructs and simple data structures such as arrays, strings, and sets covered. Emphasis on problem solving using the language and principles of structured software development. Three lectures and one two-hour laboratory.

2170 (217) Computer Science II. Four credits. Prerequisite: CSCI 1170 or equivalent. A continuation of CSCI 1170. Topics include introductory object-oriented programming techniques, software engineering principles, records, recursion, pointers, stacks and queues, linked lists, trees, and sorting and searching. Three lectures and one two-hour laboratory.

3031- Computer Languages. One to three credits. Prerequisite: CSCI 3037 2170 or consent of instructor. An opportunity for a Computer Science major or minor to gain experience and training in a secondary language. Covers the syntax, advantages, disadvantages, limitations, and selected applications of a language. Credit will not be given toward a Computer Science major or minor if credit has been received for the same language in another course. May be repeated for up to three hours credit in the major or minor.

3031 (303C) C-Language. Two credits.

3032 (303F) FORTRAN. Two credits.

3033 (303J) Java. Two credits.

3034 (303P) Pascal. Three credits.

3035 (303S) Smalltalk. Two credits.

3036 (303U) UNIX C-Shell Programming. One credit.

3037 (303V) Visual Programming. Two credits.

3080 (308) Discrete Structures. Three credits. (Same as MATH 3080.) Prerequisites: CSCI 1160 or 1170 and MATH 1910 or consent of instructor. Topics include formal logic, proof techniques, matrices, graphs, formal grammars, finite state machines, Turing machines, and binary coding schemes.

3110 (311) Advanced Data Structures. Three credits. Prerequisite: CSCI 2170; corequisite: CSCI 3080. Topics include additional object-oriented programming techniques, algorithm design, analysis of algorithms, advanced tree structures, indexing techniques, internal and external sorting, graphs, and file organizations.

3130 (313) Introduction to Computer Architecture. Four credits. Prerequisite: CSCI 3160. Organization and basic architecture of computer systems. Topics include hardware components of digital computers, microprogramming, and memory management. Laboratory exercises involve logical, functional properties of components from gates to microprocessors. Three lectures and one three-hour laboratory.

3160 (316) Introduction to Assembly Language. Three credits. Prerequisite: CSCI 1170 or equivalent. Computer architecture and assembly language. Major emphasis on addressing techniques, macros, and program segmentation and linkage.

3180 (318) Introduction to Numerical Analysis. Three credits. (Same as MATH 3180.) Prerequisites: MATH 1920 and CSCI 1160 or 1170. Topics include series approximation, finite differences interpolation, summation, numerical differentiation and integration, iteration, curve fitting, systems of equations and matrices, and error analysis.

3210 (321) Theory of Programming Languages. Three credits. Prerequisite: CSCI 2170; corequisite: CSCI 3080. Syntax and theory of multiple languages covered with emphasis on binding times, parsers, grammars, finite automata, regular expressions, type checking and equivalence, scope of variables, exception handling, parameter passing, and storage management.

3250 (325) Operating Systems. Three credits. Prerequisites: CSCI 2170 and 3160. Concepts and facilities of an operating system. Major concepts in memory, processor, device, and information management are covered as well as inter-relationships between the operating system and the architecture of the computer system.

3420 (342) Social, Ethical, and Legal Implications of Computing. Two credits. Prerequisites: A three-hour course in computing and junior standing. Introduction to the impact of computers on society and the ethical and legal issues confronting com-

puter users and professionals. Does not count toward a minor in Computer Science.

- 4110 (411) Advanced Commercial EDP.** Three credits. Prerequisite: CSCI 2170 or equivalent. File management in business applications. Structuring and identification of files stressed along with software engineering principles. COBOL language used as the implementation tool.
- 4130 (413) Microprocessor Operation and Control.** Three credits. Prerequisite: CSCI 3160. Digital systems based around microcomputers, microcomputer architecture, logic replacement, memory design, timing considerations, input/output design, interfacing, robotics, and total system design.
- 4160 (416) Compiler Analysis and Design.** Three credits. Prerequisites: CSCI 3110 and 3160. The various phases of a compiler along with grammars, finite automata, regular expressions, LR parsing, error recovery, backward and forward flow analysis, and code optimization. A term project consisting of the design and construction of a functional compiler required.
- 4250 (425) Computer Graphics.** Three credits. Prerequisite: CSCI 2170 or consent of instructor. Topics include vector drawing displays, raster scan displays, input devices and techniques, graphics software, transformations, projections, interpolation, and approximation.
- 4300 (430) Data Communication and Networks.** Three credits. Prerequisite: CSCI 3250. Computer network architectures, protocol hierarchies, and the open systems interconnection model. Modeling, analysis, design, and management of hardware and software on a computer network.
- 4330 (433) Parallel Processing Concepts.** Three credits. Prerequisites: CSCI 3130, 3250, and a working knowledge of either C or C++. Basic concepts in parallel processing and programming in a parallel environment. Topics include classification of parallel architectures, study of actual parallel architectures, design and implementation of parallel programs, parallel software engineering.
- 4350 (435) Introduction to Artificial Intelligence.** Three credits. Prerequisite: CSCI 2170 or equivalent. Principles include search strategies, knowledge representation, reasoning, and machine learning. Applications include expert systems and natural language understanding.
- 4440 (444) System Simulation.** Three credits. Prerequisites: CSCI 2170 and MATH 2050. System simulation in problem solving. Theoretical and realtime systems investigated. Network, discrete, and continuous modeling techniques examined.
- 4560 (456) Database Management Systems.** Three credits. Prerequisite: CSCI 3110. The relational and object models of database design along with relational algebras, data independence, functional dependencies, inference rules, normal forms, schema design, modeling languages, query languages, and current literature.
- 4600 (460) Independent Study in Computer Science.** One to six credits. Prerequisites: Senior standing and consent of instructor. Students wishing to enroll must submit a written course/topic proposal to the department prior to the semester in which CSCI 4600 is taken. Proposal must be approved prior to taking the course. At the course conclusion, each enrollee must submit a written report to the department. May count up to 3 hours toward Computer Science major. May not be used in conjunction with CSCI 3970.

4700 (470) Software Engineering. Three credits. Prerequisite: CSCI 3110. Consists of a theoretical component and a practical component. Topics include the history of software engineering, software development paradigms and life cycles, and computer-aided software engineering (CASE). Team project developed in parallel with the theory.

4800 (480) Software Testing. Three credits. Prerequisites: CSCI 2170 and 3080. Integrates theory and applications of software testing techniques. Provides actual hands-on testing experience. Considers multiple testing paradigms.

4850 (485) Neural Nets. Three credits. Prerequisite: CSCI 3080. Various neural net architectures, theory, and applications including models such as Perceptron, back propagation, Kohonen, ART, and associative memory. Learning and conditioning methods also studied.

4900 (490) Selected Topics in Computer Science. Three credits. Prerequisite: CSCI 2170. Advanced topics in computer science to be selected and announced at time of class scheduling. May be repeated for up to six credits total.

4910 (491) Internship. One to six credits. Prerequisites: CSCI 2170 and 3160. Must be at least a junior with a minimum overall average of 2.75 and 3.00 in computer science. Employment experience in a computer-related function in a firm, governmental agency, etc. Must be approved by the department.

Service Courses*

1000 (100) Computer Literacy. One credit. An introduction to computers at the non-professional level. Major topics include historical development; impact on society; ethics, applications, languages, and terminology with emphasis on personal computers; productivity tools: word processor, spreadsheet, and Internet.

1150 (115) Computer Orientation. Three credits. A general introduction to computers with an emphasis on personal computing, database, word processing, presentation graphics, spreadsheets, and Internet tools.

3150 (315 A-Z) Technology Tools. One to three credits. Prerequisite: CSCI 1000 or equivalent or permission of instructor. The use, history, and impact of technology tools. Hands-on laboratory exercises. Does not count for Computer Science major or minor.

*Service courses do not count toward a major or minor in Computer Science.

Cooperative Education

CSCI 2930, 2940, 3970, 3980. Cooperative Education Experience I, II, III, IV. Three credits each. Experiences must be taken in sequence. CSCI 3970 may count toward the Computer Science major. It may not be used in conjunction with CSCI 4600.

Graduate Study

The Master of Science is offered in Computer Science as is a graduate minor on the masters and doctoral levels. Requirements and a list of courses offered for graduate credit may be found in the Graduate Catalog.