

COMPUTER SCIENCE, BACHELOR OF SCIENCE

The Bachelor of Science in Computer Science provides students with a solid background in the fundamentals of computing and prepares them for employment in a wide variety of positions and for graduate study in computer science. The content of the department's courses is continually monitored to ensure they are consistent with fast-changing developments in the discipline. Courses are offered in the day, evening, and some online sections for the convenience of our students. Appropriate university and departmental computing resources are available to students taking computer science courses.

Student Group

The Association of Computer Machinery (ACM) (<https://www.acm.org/>) is a major force in advancing the skills of information technology professionals and students worldwide, providing the industry's leading portal to computing literature and more.

Requirements

A minimum of 120 credit hours is required for a Bachelor of Science degree in Computer Science (BCS). Thirty of the last 36 hours must be University of Nebraska at Omaha courses. Registering for courses without having taken the stated prerequisites could result in administrative withdrawal. Students must have a C or better grade in CIST 1400 and CSCI 1620 to serve as the prerequisite for all subsequent Computer Science (CSCI) courses. For all other courses applied towards the major, a grade of C- or better will meet the prerequisite and degree requirements.

To obtain a BCS, a student must fulfill the University General Education, College, and Departmental requirements. Some courses may satisfy requirements in more than one area, but credit is awarded only once, thereby reducing the total number of credit hours for the degree to 120. (This total does not include prerequisites.)

Code	Title	Credits
46 hours of University General Education courses (13 hours of which can be satisfied by courses in the required areas below)		33
18 hours of College of IS&T Core courses		18
16 hours of Mathematics courses		16
27 hours of Computer Science Core courses		27
21 hours of Computer Science Core Extension courses		21
5 hours of elective/prerequisite courses		5
Total Credits		120

Code	Title	Credits
Electives/Prerequisites		
Select one of the following:		3-4
CSCI 1200 & CSCI 1204	COMPUTER SCIENCE PRINCIPLES and COMPUTER SCIENCE PRINCIPLES LABORATORY ¹	
CSCI 1280	INTRODUCTION TO COMPUTATIONAL SCIENCE	
CIST 1300	INTRODUCTION TO WEB DEVELOPMENT	

College of IS&T Core Courses for Computer Science Majors

The College of IS&T has developed a series of courses that are required for students wishing to obtain a degree from the College. The development and implementation of this core curriculum is unique; it serves as a basis for preparing students to enter more advanced courses. The core curriculum is as follows (students are accountable for prerequisite courses):

CIST 1400	INTRODUCTION TO COMPUTER SCIENCE I	3
CSCI 1620	INTRODUCTION TO COMPUTER SCIENCE II	3
CSCI 2240	INTRODUCTION TO C PROGRAMMING	3
CIST 2100	ORGANIZATIONS, APPLICATIONS AND TECHNOLOGY ²	3
CIST 2500	INTRODUCTION TO APPLIED STATISTICS FOR IS&T	3
CIST 3110	INFORMATION TECHNOLOGY ETHICS ³	3

Mathematics Courses

MATH 1950	CALCULUS I	5
MATH 1960	CALCULUS II	5
CSCI 2030	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	3
MATH 2050	APPLIED LINEAR ALGEBRA	3

Department Requirements for the BCS Degree

Computer Science Required Courses

CSCI 3320	DATA STRUCTURES	3
CSCI 3550	COMMUNICATION NETWORKS	3
CSCI 3660	THEORY OF COMPUTATION	3
CSCI 3710	INTRODUCTION TO DIGITAL DESIGN AND COMPUTER ORGANIZATION	3
CSCI 4220	PRINCIPLES OF PROGRAMMING LANGUAGES	3
CSCI 4350	COMPUTER ARCHITECTURE	3
CSCI 4500	OPERATING SYSTEMS	3
CSCI 4830	INTRODUCTION SOFTWARE ENGINEERING	3
CSCI 4970	CAPSTONE PROJECT	3
CSCI 4000	ASSESSMENT (MFT) ⁴	0

Computer Science Core Extension Courses

See "Computer Science Core Extension Courses" below. 21

Total Credits **85-86**

¹ NOTE: CSCI 1200, CSCI 1204 and CSCI 1280 count toward the Natural and Physical Sciences requirement.

² NOTE: CIST 2100 counts toward Social Science requirement.

³ NOTE: CIST 3110 counts toward Humanities requirement.

⁴ **MFT- Major Field Test** - The Computer Science Department uses the MFT to statistically compare our graduates to graduates from other institutions of higher education nationwide. The test consists of 60 multiple-choice questions. Individual scores on the MFT give an effective metric to measure levels of achievement and allow students to compare their scores with national comparative data. The Computer Science Department uses the scores to assist in its ongoing, detailed curriculum review and evaluation. All results are confidential.

⁵ Note: MATH 1950 is required for this degree program. This course will also satisfy UNO's General Education Quantitative Literacy requirement. Students who do not place into MATH 1950 are responsible for prerequisite courses MATH 1220, MATH 1320, and MATH 1330.

MATH 1120/STEM 1120, MATH 1130, and STAT 1530 will not serve as prerequisites for MATH 1950. These courses will satisfy the General Education Quantitative Literacy requirement; however, they do not satisfy the Math requirement for the degree program. Students are highly encouraged to consult with their academic advisor before enrolling in a particular course.

Computer Science Core Extension Courses (21 hours)

Various core extensions and areas of emphasis for the Computer Science Core Extension may be taken to form an area of specialization, such as

the Information Systems Engineering track. A core extension of at least 21 semester hours must be completed to obtain a Bachelor of Science degree in Computer Science. At least 12 of the 21 hours selected must be approved upper-division computer science courses (courses with numbers of 3000 or higher). The remaining hours must be in an area of emphasis consistent with the computer science degree. They may include additional upper division computer science courses or courses selected from a different academic area.

- 12 credit hours must be upper-division (3000+) Computer Science courses
- 9 credit hours must be related courses and can be selected from 2000 to 4000 level courses

Computer Science Upper-Division Courses (12 hours)

Code	Title	Credits
CSCI/MATH 3100	APPLIED COMBINATORICS	3
CSCI/MATH 3300	NUMERICAL METHODS	3
CSCI 3510	ADVANCED GAME PROGRAMMING	3
CSCI/CYBR 3450	NATURAL LANGUAGE PROCESSING	3
CSCI 3470	FUNDAMENTALS AND ALGORITHMS OF MACHINE LEARNING	3
CSCI 3830	ADVANCED JAVA PROGRAMMING	3
CSCI 3850	FOUNDATIONS OF WEB SEARCH TECHNOLOGIES	3
CSCI/MATH 4010	INTRODUCTION TO THE THEORY OF RECURSIVE FUNCTIONS	3
CSCI 4100	INTRODUCTION TO ALGORITHMS	3
CSCI/MATH 4150	GRAPH THEORY & APPLICATIONS	3
CSCI 4250	HUMAN COMPUTER INTERACTION	3
CSCI 4260	USER EXPERIENCE DESIGN	3
CSCI/MATH 4300	DETERMINISTIC OPERATIONS RESEARCH MODELS	3
CSCI/MATH 4310	PROBABILISTIC OPERATIONS RESEARCH MODELS	3
CSCI/CYBR 4380	DIGITAL FORENSICS	3
CSCI 4430	QUANTUM COMPUTING AND CRYPTOGRAPHY	3
CSCI 4440	INTRODUCTION TO PARALLEL COMPUTING	3
CSCI 4450	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	3
CSCI 4470	PATTERN RECOGNITION	3
CSCI 4480	ALGORITHMS FOR ROBOTICS	3
CSCI 4510	ADVANCED OPERATING SYSTEMS	3
CSCI/MATH 4560	NUMBER THEORY & CRYPTOGRAPHY	3
CSCI 4620	COMPUTER GRAPHICS	3
CSCI/MATH 4660	AUTOMATA, COMPUTABILITY, AND FORMAL LANGUAGES	3
CSCI 4700	COMPILER CONSTRUCTION	3
CSCI 4850	DATABASE MANAGEMENT SYSTEMS	3
CSCI 4890	DATA WAREHOUSING AND DATA MINING	3
CSCI 4900	INTERNET SYSTEMS DEVELOPMENT	3
CSCI 4950	INTERNSHIP IN COMPUTER SCIENCE	1-3
CSCI 4980	TOPICS IN COMPUTER SCIENCE	1-3
CSCI 4990	INDEPENDENT STUDIES	1-3

Additional Computer Science Core Extension Courses (9 hours)

Code	Title	Credits
CSCI 2310	VIDEO GAME DESIGN	3
CSCI 2410	INTRODUCTION TO DATA ANALYTICS USING PYTHON	3
CSCI 2510	INTRODUCTION TO GAME PROGRAMMING	3
CSCI 2620	2D GRAPHICS: IMAGE PROCESSING	3
CSCI 2840	C++ & OBJECT-ORIENTED PROGRAMMING	3
CSCI 2850	PROGRAMMING ON THE INTERNET	3
CSCI 2980	TOPICS IN COMPUTER SCIENCE	1-3

Writing in the Discipline

All UNO students are required to take a writing-in-the-discipline course within their major. Computer Science degree students must take CIST 3000

Computer Science Elective Tracks and Concentrations

Students may incorporate one of the elective tracks or one of the concentrations below as their Core Extension focus.

Computer Science (CSCI) Tracks

- Software Engineering Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/software-engineering-track/>)
- Computer Networking and Communications Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/computer-networking-communications-track/>)
- Information Systems Engineering Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/information-systems-engineering-track/>)
- Internet and Intranet Software Application Development Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/internet-intranet-software-application-development-track/>)

Core Extension Elective Tracks from Other Academic Areas. From the following selected tracks, a maximum of 9 hours can be applied towards the core extension area:

- Cybersecurity (CYBR) Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/school-interdisciplinary-informatics-si2/cybersecurity-track/>)
- Bioinformatics (BIOI) Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/school-interdisciplinary-informatics-si2/bioinformatic-track/>)
- IT Innovation (ITIN) Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/school-interdisciplinary-informatics-si2/it-innovation-track/>)
- Information Systems & Quantitative Analysis (ISQA) Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/information-systems-quantitative-analysis-track/>)
- Mathematics (MATH) Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/mathematics-track/>)
- Computer and Electronics Engineering (ECEN) Track (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/computer-electronics-engineering-track/>)

Other Elective Areas

Other elective areas may be acceptable. The entire core extension must be approved by the Computer Science Undergraduate Program Committee (UPC), and should be submitted at the end of the sophomore year. Completed core extension proposals should be turned into the IS&T Undergraduate Advising Office in PKI 170. Allow at least one month to receive a response from the UPC.

Optional Concentrations or Electives (*some courses may apply towards the CS core extension area)

See your advisor for more information on this option.

- Artificial Intelligence Concentration (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/artificialintelligence-concentration/>)
- Game Programming Concentration (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/game-programming-concentration/>)
- Internet Technologies (IT) Concentration for Computer Science Majors (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/internet-technologies-it-concentration-computer-science-majors/>)
- Information Assurance Concentration (<http://catalog.unomaha.edu/undergraduate/college-information-science-technology/computer-science/computer-science-bs/information-assurance-concentration/>)

Computer Science - Start 1300-1200-1280

Freshman

Fall		Credits
ENGL 1150	ENGLISH COMPOSITION I	3
CMST 1110	PUBLIC SPEAKING FUNDS	3
CIST 1300 or CSCI 1200 or CSCI 1280	INTRODUCTION TO WEB DEVELOPMENT or COMPUTER SCIENCE PRINCIPLES or INTRODUCTION TO COMPUTATIONAL SCIENCE	3
MATH 1950	CALCULUS I ¹	5
Free Elective		1
Credits		15

Spring

ENGL 1160	ENGLISH COMPOSITION II	3
CIST 1400	INTRODUCTION TO COMPUTER SCIENCE I	3
MATH 1960	CALCULUS II	5
Natural/Physical Sciences Requirement		4
Credits		15

Sophomore

Fall		Credits
CSCI 1620	INTRODUCTION TO COMPUTER SCIENCE II	3
CSCI 2030	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	3
CIST 2100	ORGANIZATIONS, APPLICATIONS AND TECHNOLOGY	3
US Diversity/Social Sciences Requirement		3
Natural/Physical Sciences Requirement		3
Credits		15

Spring

CIST 3110	INFORMATION TECHNOLOGY ETHICS	3
CIST 2500	INTRODUCTION TO APPLIED STATISTICS FOR IS&T	3
CSCI 2240	INTRODUCTION TO C PROGRAMMING	3

Core Extension/Specialization Elective	3	
Social Sciences Requirement	3	
Credits		15

Junior

Fall		Credits
MATH 2050	APPLIED LINEAR ALGEBRA	3
CIST 3000	ADVANCED COMPOSITION FOR IS&T	3
CSCI 3320	DATA STRUCTURES	3
CSCI 3710	INTRODUCTION TO DIGITAL DESIGN AND COMPUTER ORGANIZATION	3
Humanities & Fine Arts Requirement		3
Credits		15

Spring

CSCI 3550	COMMUNICATION NETWORKS	3
CSCI 3660	THEORY OF COMPUTATION	3
CSCI 4350	COMPUTER ARCHITECTURE	3
Global Diversity/Humanities & Fine Arts Requirement		3
Core Extension/Specialization Elective		3
Credits		15

Senior

Fall		Credits
CSCI 4220	PRINCIPLES OF PROGRAMMING LANGUAGES	3
CSCI 4500	OPERATING SYSTEMS	3
CSCI 4830	INTRODUCTION SOFTWARE ENGINEERING	3
Core Extension/ Specialization Elective		3
Core Extension/ Specialization Elective		3
Credits		15

Spring

CSCI 4000	ASSESSMENT	0
CSCI 4970	CAPSTONE PROJECT	3
Core Extension/ Specialization Elective		3
Core Extension/ Specialization Elective		3
Core Extension/ Specialization Elective		3
Free Elective		3
Credits		15
Total Credits		120

Computer Science - Start 1400

Freshman

Fall		Credits
ENGL 1150	ENGLISH COMPOSITION I	3
CMST 1110	PUBLIC SPEAKING FUNDS	3
CIST 1400	INTRODUCTION TO COMPUTER SCIENCE I	3
MATH 1950	CALCULUS I ¹	5
Elective		1
Credits		15

Spring

ENGL 1160	ENGLISH COMPOSITION II	3
CSCI 1620	INTRODUCTION TO COMPUTER SCIENCE II	3
MATH 1960	CALCULUS II	5
Natural/Physical Sciences Requirement		4
Credits		15

Sophomore**Fall**

CSCI 2240	INTRODUCTION TO C PROGRAMMING	3
CSCI 2030	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	3
CIST 2100	ORGANIZATIONS, APPLICATIONS AND TECHNOLOGY	3
US Diversity/Social Sciences Requirement		3
Natural/Physical Sciences Requirement		3
Credits		15

Spring

CIST 3110	INFORMATION TECHNOLOGY ETHICS	3
CIST 2500	INTRODUCTION TO APPLIED STATISTICS FOR IS&T	3
CSCI 3320	DATA STRUCTURES	3
Free Elective		3
Social Sciences Requirement		3
Credits		15

Junior**Fall**

MATH 2050	APPLIED LINEAR ALGEBRA	3
CIST 3000	ADVANCED COMPOSITION FOR IS&T	3
CSCI 3710	INTRODUCTION TO DIGITAL DESIGN AND COMPUTER ORGANIZATION	3
Core Extension/Specialization Elective		3
Humanities & Fine Arts Requirement		3
Credits		15

Spring

CSCI 3550	COMMUNICATION NETWORKS	3
CSCI 3660	THEORY OF COMPUTATION	3
CSCI 4350	COMPUTER ARCHITECTURE	3
Core Extension/Specialization Elective		3
Global Diversity/Humanities & Fine Arts Requirement		3
Credits		15

Senior**Fall**

CSCI 4220	PRINCIPLES OF PROGRAMMING LANGUAGES	3
CSCI 4500	OPERATING SYSTEMS	3
CSCI 4830	INTRODUCTION SOFTWARE ENGINEERING	3
Core Extension/Specialization Elective		3
Core Extension/Specialization Elective		3
Credits		15

Spring

CSCI 4000	ASSESSMENT	0
CSCI 4970	CAPSTONE PROJECT	3
Core Extension/Specialization Elective		3
Core Extension/Specialization Elective		3
Core Extension/Specialization Elective		3
Free Elective		3
Credits		15
Total Credits		120

¹ MATH 1950 - Satisfies General Education Quantitative Literacy requirement

This roadmap is a suggested plan of study and does not replace meeting with an advisor. Please note that students may need to adjust the actual sequence of courses based on course availability. Please consult an advisor in your major program for further guidance.

This plan is not a contract and curriculum is subject to change.

Additional Information About this Plan:

University Degree Requirements: The minimum number of hours for a UNO undergraduate degree is 120 credit hours. Please review the requirements for your specific degree program to determine all requirements for the program. In order to graduate on time (four years for an undergraduate degree), you need to take 30 credit hours each year.

Placement Exams: For Math, English, and Foreign Languages, a placement exam may be required. More information on these exams can be found at <https://www.unomaha.edu/enrollment-management/testing-center/placement-exams/information.php>

Please note that transfer credit or placement exam scores may change a suggested plan of study.