

Computer Science

Department Information

- **Department Web Site:**
www.ndsu.edu/cs/ (<http://www.ndsu.edu/cs/>)
- **Credential Offered:**
B.S.; B.A.; Minor; UG Certificate
- **Official Program Curriculum:**
catalog.ndsu.edu/undergraduate/program-curriculum/computer-science/ (<http://catalog.ndsu.edu/undergraduate/program-curriculum/computer-science/>)

The Department of Computer Science at North Dakota State University offers coursework leading to bachelor's, master's, and doctoral degrees in computer science and software engineering / software and security engineering. We offer a B.S. in Computer Science in which students have the choice of three tracks with focus on cybersecurity, software engineering, or data science. In addition, we also offer a B.S. in Software Engineering in which students have the choice of a systems and an application track (jointly with the Department of Electrical and Computer Engineering). The department is a designated Center for Academic Excellence in cybersecurity research (CAE-R) by the National Security Agency (NSA) and the Department of Homeland Security (DHS).

Background Information

As an undergraduate student, an advisor is assigned to help in choosing electives in their particular area of interest. For students with no or very limited computer experience, we offer introductory courses. Advanced undergraduate students may have the opportunity to take graduate courses while completing their undergraduate program. An extensive and varied set of elective courses in every aspect of computer science and software engineering is available as well.

The Program

Computer Science can be earned as a B.A. or a B.S. degree, a minor and a undergraduate certificate. In addition, the department collaborates with two other departments to issue a dual major in Math and Computer Science, and Physics and Computer Science. An Accelerated Program is available for undergraduates with a 3.5 grade point average or better to complete a B.S. and an M.S. with a target graduation time of five years. In the Accelerated Program, graduate courses taken while an undergraduate student are used for both the B.S. and M.S. degree requirements. Currently, only the undergraduate certificate can be earned in an on-campus face-to-face format and in an online format.

We offer the most comprehensive and varied computer science programs in the region. In the core courses required of all majors, students are offered an opportunity to study concepts, applications and implementation techniques, which provide a broad and practical base both for a satisfying, well-paying career in computer science, and for advanced study. The curriculum offers an opportunity for an in-depth study of topics such as artificial intelligence, software engineering, cybersecurity, machine learning, data science, system simulation, computer communication networks, multimedia, operating systems, and database management systems. The department is expanding offerings in cybersecurity, data science, and software engineering. Students are encouraged to choose courses from related areas, such as business, economics, engineering, mathematics and statistics to broaden their program of study. Beginning in the junior year, students can explore co-op and internship opportunities to broaden their application of course-based knowledge. A senior capstone experience that provides a semester long project for industry is required and serves as an incredible opportunity to add maturity to the computer science skill set before graduation.

Career Opportunities

Computer scientists choose jobs in government, industry, teaching, research, agriculture, energy and other areas. A 2019 study showed that four of the eleven jobs with the most potential for growth are in areas taught by the Department. Graduates in computer science might choose a job in any of these areas: artificial intelligence, systems analysis, software development/engineering, security, information assurance, cybersecurity, bioinformatics, data science, web development, networking, information system development, database management, technical support, automatic systems, robotics, and internet of things.

According to the Federal Bureau of Labor Statistics, software engineers, cybersecurity analysts, network systems and data scientists / analysts, computer scientists and database administrators are expected to be among the fastest growing occupations. Employment of these computer specialists is expected to increase much faster than average. Our programs provide excellent foundations for successful careers in these areas. As an undergraduate student, you will find many opportunities to work part-time as a research assistant on campus, or as a paid intern with a local or regional business.

Graduates of our department have accepted employment in major national businesses including Hewlett-Packard, IBM, AT&T, Apple, CISCO Systems, Google, Adesto, Cargill, SGI, FAST Enterprises, Medtronic, Microsoft, Bobcat, Facebook, Digi-Key, John Deere, Amazon, Intel, Raytheon, Target Corp. and Thomson Reuters. Many have chosen positions in North Dakota and adjoining states. There is a large and growing need for computer professionals in North Dakota.

During the final semester of their senior year, students take part in a capstone program. The objective of the capstone program is to provide the students with an experience that brings together the technical knowledge they have acquired while fostering valuable teamwork skills. This is accomplished by working in small teams on real-life projects. Capstone projects are done in conjunction with corporate, industrial or government clients/sponsors. Recent sponsors include Adventium, Aeritae Consulting, Appareo, ATC, BargInns, BCBSND, Border States Electric, Botlink, Bushel, Capturis, Collins Aerospace, Fjorge, IBM, Inwerken, John Deere, Marvin Windows, Microsoft, NAU Country, Noridian, OpenStack, Pedigree Technologies, Scheels, and UGPTI.

The Facilities

The department is located in the Quentin Burdick Building along with Information Technology Services. Students have free access to a wide range of computer systems.

CS Department equipment includes two clusters of Linux workstations, a number of virtual machines, and Hadoop and Spark analytic systems. Research labs support Windows, Macs, and Linux computers along with various peripheral equipment such as a cyber range, drones, and 3D printers. The department and the University have assumed a leadership role in computer networking through the acquisition and implementation of high-bandwidth network switches. The University also has entered into a six-state consortium for extremely high-level networking in the Upper Midwest. The high-performance Center for Computationally Assisted Science and Technology (CCAST) is available for distributed research projects. We are also a charter member of Internet2 and have connectivity to the national vBNS research network. The department maintains numerous web servers for class assignments and other information, which are accessed by thousands of users each day. The University provides more than 1,000 computers in 133 instrumented classrooms, 46 public computer labs, 21 department-owned labs and other spaces supported by Information Technology Services. There are 54 GoPrint release stations on campus for student printing. Internet usage is available for all students.

High School Preparation

While NDSU offers remedial courses for students who have not had the opportunity to complete all college-preparatory coursework, we recommend taking courses in high school that develop the ability to think logically, to organize, and to analyze (e.g., algebra, geometry, trigonometry, statistics and calculus). NDSU accepts the results of some AP tests in lieu of college classes through our Credit by Examination policy.

Sample Program Guide

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To ensure proper program completion, enrolled students should utilize Degree Map (<https://www.ndsu.edu/registrar/degreemap/>) and Schedule Planner (<https://www.ndsu.edu/onestop/degree-map-and-planning/>) in Campus Connection and consult regularly with their academic advisor to ensure requirements are being met.

B.S. Calculus Ready 4-Year Plan

Freshman			
Fall	Credits	Spring	Credits
CSCI 160		4 CSCI 161	4
MATH 165		4 MATH 166	4
ENGL 110		3 ENGL 120	3
Gen. Ed Natural & Phys Science + Lab		4 Gen Ed Science/Tech	3
		Gen Ed HUM/FA and Cultural Diversity	3
		15	17
Sophomore			
Fall	Credits	Spring	Credits
CSCI 213		3 CSCI 313	3
CSCI 222		3 CSCI 336	3
COMM 110		3 Gen Ed Soc/Beh Sci and Global Perspectives	3
CSCI 277 or MATH 129		3 Gen Ed Wellness	2

Gen Ed SOC/BehSci	3 Elective	3
15		14

Junior			
Fall	Credits	Spring	Credits
CSCI 372		3 CSCI 467	3
STAT 367		3 STAT 368	3
CSCI 366		3 CSCI 374	3
Gen Ed HUM/FA		3 Elective	3
CSCI Elective I		3 Gen Ed Upper Division Writing	3
15		15	

Senior			
Fall	Credits	Spring	Credits
CSCI 489		3 CSCI 445	3
CSCI 474		3 CSCI Elective III	3
CSCI Elective II		3 Additional Electives	6
Gen Ed Science/Tech		3 CSCI 455	3
Additional Electives		3	
15		15	

Total Credits: 121

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B.S. Preparatory Mathematics Course Required

Freshman			
Fall	Credits	Spring	Credits
CSCI 122 or 159		3 CSCI 160	4
ENGL 110		3 ENGL 120	3
Gen. Ed Natural & Phys Science + Lab		4 Gen Ed Science/Tech	3
Pre-Calculus course per placement		3 Pre-Calculus course	3
13		13	

Sophomore					
Fall	Credits	Spring	Credits	Summer	Credits
CSCI 161		4 COMM 110		3 CSCI 213	3
MATH 165		4 MATH 166		4	
CSCI 277 or MATH 129		3 Gen Ed Soc/Beh Sci and Glob Persp		3	
Gen Ed Science/Tech		3 Gen Ed Hum/FineArt and Cult Div		3	

Gen Ed Wellness		2 Elective		3	
		16		16	3
Junior					
Fall	Credits		Spring		Credits
CSCI 222		3	CSCI 313		3
CSCI 366		3	CSCI 336		3
STAT 367		3	CSCI 374		3
CSCI 372		3	STAT 368		3
Gen Ed Hum/FineArt		3	Elective		3
		15		15	
Senior					
Fall	Credits		Spring		Credits
CSCI Elective I		3	CSCI Elective III		3
CSCI Elective II		3	CSCI 445		3
CSCI 474		3	CSCI 467		3
CSCI 489		3	Electives		3
Gen Ed Upper Division Writing		3	Gen Ed Soc/Beh Sci		3
CSCI 455		3			
		18		15	

Total Credits: 124

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B.A. Plan of Study

First Year					
Fall	Credits		Spring		Credits
CSCI 159		3	ENGL 120		3
MATH 105		3	CSCI 160		4
CSCI 114		3	MATH 146		4
ENGL 110		3	First Year Language 102		4
First Year Language 101		4			
		16		15	
Second Year					
Fall	Credits		Spring		Credits
CSCI 161		4	COMM 110		3
COMM 260		3	CSCI 222		3
Second Year Language 201		3	CSCI 371		3
Gen Ed Soc/Beh Sci		3	Second Year Language 202		3

		Elective	3
		13	15
Third Year			
Fall	Credits	Spring	Credits
CSCI 213		3 CSCI 313	3
STAT 330		3 STAT 331	2
COMM 261		3 Gen Ed Science/Tech	3
Gen Ed Wellness		2 Gen Ed Upper Division Writing	3
Gen Ed Science and Tech/Lab		4 Gen Ed Soc/Beh Sci	3
		15	14
Fourth Year			
Fall	Credits	Spring	Credits
CSCI 366		3 CSCI 445	3
CSCI 489		3 Elective (#300 or higher)	3
CSCI 488		3 Gen Ed	6
Elective (#300 or higher)		3 Electives	4
Elective		6	
		18	16

Total Credits: 122