

# COMPUTER SCIENCES, CERTIFICATE

Regardless of your major, you can **enhance your career** with a background in computer sciences. The computer sciences certificate is designed to **deepen and validate your computing savvy** for your future career prospects and/or graduate school. Compared to a major in computer sciences, the certificate requires fewer courses and offers more **flexibility in course selection**.

## HOW TO GET IN

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All undergraduate, degree-seeking students are eligible to declare the computer sciences certificate, except for students majoring in Computer Sciences or Computer Engineering.

### DECLARATION REQUIREMENTS

To declare the computer sciences certificate, students must meet the following requirements:

- Completion of COMP SCI 300
- Grade of BC or higher in one of these introductory programming course, taken at UW-Madison: COMP SCI 300, COMP SCI/ E C E 354 or COMP SCI 400

Students having difficulties meeting the above requirements should schedule a meeting with a computer sciences advisor to discuss alternatives.

For instructions on declaring the certificate, see the Department of Computer Sciences website (<https://www.cs.wisc.edu/undergraduate/certificate-in-computer-sciences/>).

## REQUIREMENTS

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Five courses and at least 14 credits from: <sup>1</sup>

Code	Title	Credits
COMP SCI 300	Programming II	3
<b>Two courses numbered 400-679:</b>		<b>6-8</b>
COMP SCI 400	Programming III	
COMP SCI 407	Foundations of Mobile Systems and Applications	
COMP SCI 412	Introduction to Numerical Methods	
COMP SCI/I SY E/ MATH 425	Introduction to Combinatorial Optimization	
COMP SCI/E C E/ MATH 435	Introduction to Cryptography	
COMP SCI/ STAT 471	Introduction to Computational Statistics	
COMP SCI/ MATH/STAT 475	Introduction to Combinatorics	

COMP SCI/ E C E 506	Software Engineering
COMP SCI/ MATH 513	Numerical Linear Algebra
COMP SCI/ MATH 514	Numerical Analysis
COMP SCI/DS/ I SY E 518	Wearable Technology
COMP SCI 520	Introduction to Theory of Computing
COMP SCI/E C E/ I SY E 524	Introduction to Optimization
COMP SCI/I SY E/ MATH/STAT 525	Linear Optimization
COMP SCI/ I SY E 526	Advanced Linear Programming
COMP SCI/E C E/ M E 532	Matrix Methods in Machine Learning
COMP SCI/ E C E 533	Image Processing
COMP SCI 534	Computational Photography
COMP SCI 536	Introduction to Programming Languages and Compilers
COMP SCI 537	Introduction to Operating Systems
COMP SCI 538	Introduction to the Theory and Design of Programming Languages
COMP SCI/E C E/ M E 539	Introduction to Artificial Neural Networks
COMP SCI 540	Introduction to Artificial Intelligence
COMP SCI 541	Theory & Algorithms for Data Science
COMP SCI 542	Introduction to Software Security
COMP SCI 544	Introduction to Big Data Systems
COMP SCI/ E C E 552	Introduction to Computer Architecture
COMP SCI/I SY E/ M E 558	Introduction to Computational Geometry
COMP SCI 559	Computer Graphics
COMP SCI/ E C E 561	Probability and Information Theory in Machine Learning
COMP SCI 564	Database Management Systems: Design and Implementation
COMP SCI 565	Introduction to Data Visualization
COMP SCI 566	Introduction to Computer Vision
COMP SCI/ B M I 567	Medical Image Analysis
COMP SCI 570	Introduction to Human-Computer Interaction
COMP SCI 571	Building User Interfaces
COMP SCI/ B M I 576	Introduction to Bioinformatics
COMP SCI 577	Introduction to Algorithms
COMP SCI/ DS 579	Virtual Reality
COMP SCI/ I SY E 635	Tools and Environments for Optimization

COMP SCI 640	Introduction to Computer Networks	
COMP SCI 642	Introduction to Information Security	
COMP SCI 639	Undergraduate Elective Topics in Computing	
<b>Two additional courses, chosen from courses numbered 400–679 (above) or these:</b>		<b>5-8</b>
COMP SCI/ MATH 240	Introduction to Discrete Mathematics	
COMP SCI/ E C E 252	Introduction to Computer Engineering	
COMP SCI 270	Fundamentals of Human-Computer Interaction	
COMP SCI/ E C E 352	Digital System Fundamentals	
COMP SCI 310	Problem Solving Using Computers	
COMP SCI 320	Data Science Programming II	
COMP SCI/ E C E 354	Machine Organization and Programming	
<b>Total Credits</b>		<b>14</b>

<sup>1</sup> Courses taken Pass/Fail do not meet requirements of the Certificate.

## RESIDENCE AND QUALITY OF WORK

- At least 7 Certificate credits must be completed in Residence
- Minimum 2.000 GPA on all COMP SCI and Certificate courses

## UNDERGRADUATE/SPECIAL STUDENT CERTIFICATE

This certificate is intended to be completed in the context of an undergraduate degree and for those seeking this certificate that is preferred. For students who have substantially completed this certificate at UW–Madison and may need one or two courses to complete the certificate, they may do so immediately after completion of the bachelor’s degree by enrolling in the course as a University Special (nondegree) student. The certificate must be completed within a year of completion of the bachelor’s degree. Students should keep in mind that University Special students have the last registration priority and that may limit availability of desired courses. Financial aid is not available when enrolled as a University Special student to complete an undergraduate certificate.

## LEARNING OUTCOMES

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1. Recognize and apply the core principles of Computing (abstractions and algorithms) to solve real-world problems.
2. Use fundamental and detailed knowledge, skills, and tools (e.g., specific algorithms, techniques methods, etc.) of computer science and develop the ability to acquire new knowledge, skills, and tools.
3. Design, implement, and evaluate software in multiple programming paradigms and languages.
4. Can solve problems by applying a broad toolbox of knowledge and techniques.

## ADVISING AND CAREERS

### ADVISING AND CAREERS ADVISING

The undergraduate coordinators in the Department of Computer Sciences are ready to help students with questions about the major, L&S degree requirements and policy, and course selection. Information on academic advising for students interested or declared in the computer sciences major is posted on the Computer Sciences advising page (<https://www.cs.wisc.edu/undergraduate/undergraduate-advisors/>).

### L&S CAREER RESOURCES

Every L&S major opens a world of possibilities. SuccessWorks (<https://successworks.wisc.edu/>) at the College of Letters & Science helps students turn the academic skills learned in their major, certificates, and other coursework into fulfilling lives after graduation, whether that means jobs, public service, graduate school or other career pursuits.

In addition to providing basic support like resume reviews and interview practice, SuccessWorks offers ways to explore interests and build career skills from their very first semester/term at UW all the way through graduation and beyond.

Students can explore careers in one-on-one advising, try out different career paths, complete internships, prepare for the job search and/or graduate school applications, and connect with supportive alumni and even employers in the fields that inspire them.

- SuccessWorks (<https://careers.ls.wisc.edu/>)
- Set up a career advising appointment (<https://successworks.wisc.edu/make-an-appointment/>)
- Enroll in a Career Course (<https://successworks.wisc.edu/career-courses/>) - a great idea for first- and second-year students:
  - INTER-LS 210 L&S Career Development: Taking Initiative (1 credit)
  - INTER-LS 215 Communicating About Careers (3 credits, fulfills Comm B General Education Requirement)
- Learn about internships and internship funding (<https://successworks.wisc.edu/finding-a-job-or-internship/>)
  - INTER-LS 260 Internship in the Liberal Arts and Sciences
- Activate your Handshake account (<https://successworks.wisc.edu/handshake/>) to apply for jobs and internships from 200,000+ employers recruiting UW–Madison students
- Learn about the impact SuccessWorks has on students' lives (<https://successworks.wisc.edu/about/mission/>)

## PEOPLE

### PEOPLE

Visit the CS website to view our department faculty (<https://www.cs.wisc.edu/people/faculty/>) and staff (<https://www.cs.wisc.edu/people/staff/>).