

COMPUTER SCIENCES, B.A.

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (<http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext>) section of the *Guide*.

General Education	• Breadth–Humanities/Literature/Arts: 6 credits
	• Breadth–Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
	• Breadth–Social Studies: 3 credits
	• Communication Part A & Part B *
	• Ethnic Studies *
	• Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF LETTERS & SCIENCE DEGREE REQUIREMENTS: BACHELOR OF ARTS (B.A.)

Students pursuing a bachelor of arts degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either a bachelor of arts or a bachelor of science curriculum.

BACHELOR OF ARTS DEGREE REQUIREMENTS

Mathematics Complete the University General Education Requirements for Quantitative Reasoning A (QR-A) and Quantitative Reasoning B (QR-B) coursework.

Foreign Language	• Complete the fourth unit of a foreign language; OR
	• Complete the third unit of a foreign language and the second unit of an additional foreign language.

L&S Breadth	• 12 credits of Humanities, which must include 6 credits of literature; and
	• 12 credits of Social Science; and
	• 12 credits of Natural Science, which must include one 3+ credit Biological Science course and one 3+ credit Physical Science course.

Liberal Arts and Science Coursework	Complete at least 108 credits.
Depth of Intermediate/Advanced work	Complete at least 60 credits at the intermediate or advanced level.
Major	Declare and complete at least one major.
Total Credits	Complete at least 120 credits.
UW–Madison Experience	<ul style="list-style-type: none"> • 30 credits in residence, overall; and • 30 credits in residence after the 86th credit.
Quality of Work	<ul style="list-style-type: none"> • 2,000 in all coursework at UW–Madison • 2,000 in Intermediate/Advanced level coursework at UW–Madison

NON–L&S STUDENTS PURSUING AN L&S MAJOR

Non–L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements. They do not need to complete the L&S Degree Requirements above.

REQUIREMENTS FOR THE MAJOR BASIC COMPUTER SCIENCES

Code	Title	Credits
COMP SCI/ MATH 240	Introduction to Discrete Mathematics	3
COMP SCI/ E C E 252	Introduction to Computer Engineering	3
COMP SCI 300	Programming II	3
COMP SCI/ E C E 354	Machine Organization and Programming	3
COMP SCI 400	Programming III	3
Total Credits		15

BASIC CALCULUS

Code	Title	Credits
Complete one of these sequences:		
MATH 221 & MATH 222	Calculus and Analytic Geometry I and Calculus and Analytic Geometry 2	9–14
MATH 171 & MATH 217 & MATH 222	Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II and Calculus and Analytic Geometry 2	

MATH 275 & MATH 276	Topics in Calculus I and Topics in Calculus II	
Total Credits		9-14

ADDITIONAL MATHEMATICS (BEYOND CALCULUS)

Code	Title	Credits
Complete two courses for at least 6 credits:		
MATH 340	Elementary Matrix and Linear Algebra ¹	6-10
or MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	
STAT 324	Introductory Applied Statistics for Engineers	
COMP SCI 412	Introduction to Numerical Methods ²	
COMP SCI/E C E/ MATH 435	Introduction to Cryptography	
COMP SCI/ MATH 513	Numerical Linear Algebra	
COMP SCI/ MATH 514	Numerical Analysis	
COMP SCI/I SY E/ MATH/STAT 525	Linear Optimization	
COMP SCI/ I SY E 526	Advanced Linear Programming	
E C E 331	Introduction to Random Signal Analysis and Statistics	
MATH 234	Calculus--Functions of Several Variables ¹	
or MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	
MATH 319	Techniques in Ordinary Differential Equations	
MATH 320	Linear Algebra and Differential Equations ¹	
or MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	
MATH 321	Applied Mathematical Analysis	
MATH 322	Applied Mathematical Analysis	
MATH 331	Introductory Probability	
MATH 341	Linear Algebra	
MATH 376	Topics in Multi-Variable Calculus and Differential Equations	
MATH/STAT 431	Introduction to the Theory of Probability	
MATH 443	Applied Linear Algebra	
MATH 461	College Geometry I	
MATH/ COMP SCI/ STAT 475	Introduction to Combinatorics	
MATH 521	Analysis I	
MATH 541	Modern Algebra	
MATH 542	Modern Algebra	
MATH 567	Modern Number Theory	

MATH/ PHILOS 571	Mathematical Logic	
STAT/MATH 309	Introduction to Probability and Mathematical Statistics I	
STAT/MATH 310	Introduction to Probability and Mathematical Statistics II	
STAT 311	Introduction to Theory and Methods of Mathematical Statistics I	
STAT 312	Introduction to Theory and Methods of Mathematical Statistics II	

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MATH 375 Topics in Multi-Variable Calculus and Linear Algebra will not meet the requirement if a student already has credit for MATH 234 Calculus--Functions of Several Variables, MATH 320 Linear Algebra and Differential Equations or MATH 340 Elementary Matrix and Linear Algebra.

ADVANCED COMPUTER SCIENCE COURSES

THEORY OF COMPUTER SCIENCE

Code	Title	Credits
Complete one:		
COMP SCI 577	Introduction to Algorithms	3
COMP SCI 520	Introduction to Theory of Computing	

SOFTWARE & HARDWARE

Code	Title	Credits
Complete two:		
COMP SCI 407	Foundations of Mobile Systems and Applications	6-8
COMP SCI/ E C E 506	Software Engineering	
COMP SCI 536	Introduction to Programming Languages and Compilers	
or COMP SCI 531	Introduction to the Theory and Design of Programming Languages	
COMP SCI 537	Introduction to Operating Systems	
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 564	Database Management Systems: Design and Implementation	
COMP SCI 640	Introduction to Computer Networks	
COMP SCI 642	Introduction to Information Security	

APPLICATIONS

Code	Title	Credits
Complete one:		
COMP SCI 412	Introduction to Numerical Methods ¹	3
COMP SCI/I SY E/ MATH 425	Introduction to Combinatorial Optimization	
COMP SCI/ MATH 513	Numerical Linear Algebra	
COMP SCI/ MATH 514	Numerical Analysis	

COMP SCI/E C E/ I SY E 524	Introduction to Optimization
COMP SCI/I SY E/ MATH/STAT 525	Linear Optimization
COMP SCI 534	Computational Photography
COMP SCI 540	Introduction to Artificial Intelligence
COMP SCI 545	Natural Language and Computing
COMP SCI 559	Computer Graphics
COMP SCI 566	Introduction to Computer Vision
COMP SCI 570	Introduction to Human-Computer Interaction
COMP SCI 571	Building User Interfaces

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In every case, a course used toward one requirement may not be used again toward another requirement. For example, if COMP SCI 412 is applied to the ADDITIONAL MATH (BEYOND CALCULUS) requirement, it cannot also apply to the APPLICATIONS requirement.

ELECTIVES

Code	Title	Credits
Complete two:		6-8
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 542	Introduction to Software Security
COMP SCI 545	Natural Language and Computing
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/ 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

RESIDENCE AND QUALITY OF WORK

- 2.000 GPA in all COMP SCI courses and courses counting toward the major
- 2.000 GPA on 15 upper-level credits, taken in residence³
- 15 credits in COMP SCI, taken on campus

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COMP SCI courses numbered 400 through 699 count as Upper Level.

HONORS IN THE MAJOR

Students may declare Honors in the Computer Sciences Major in consultation with the Computer Sciences undergraduate coordinator(s). To earn Honors in the Major in Computer Sciences, students must satisfy both the requirements for the major (above) and the following additional requirements:

- Earn a minimum 3.300 University GPA
- Earn a minimum 3.500 GPA for all COMP SCI and major courses

- Complete one COMP SCI course numbered 500 through 699, taken for Honors with a grade of B or higher
- Complete COMP SCI 681 and COMP SCI 682 for a total of 6 credits. ⁴

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Senior Honors Thesis proposal must be approved by both the thesis/project advisor and the department undergraduate coordinator before enrollment in COMP SCI 681. A final thesis or project must be completed before a final grade for COMP SCI 682 can be awarded.

UNIVERSITY DEGREE REQUIREMENTS

Total Degree To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Residency Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

Quality of Work Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.