COMPUTER SCIENCES, PHD

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement	Detail
Minimum Credit Requirement	51 credits
Minimum Residence Credit Requirement	32 credits
Minimum Graduate Coursework Requirement	26 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).
Other Grade Requirements	All required qualifying breadth courses must have a grade of at least AB.
Assessments and Examinations	Doctoral students must complete a qualifying process, a preliminary examination, and a dissertation requirement. The qualifying process includes both completion of "qualifying breadth courses" (see Required Courses, below) as well as satisfactory completion of a depth examination in a selected focus area. The preliminary examination is an oral examination demonstrating depth of knowledge in the area of specialization in which research for the dissertation will be conducted. The dissertation requirement consists of conducting a substantial piece of original research in computer science, reporting it in a dissertation that meets the highest standards of scholarship, and explaining and defending the contents of the dissertation in a final oral examination and defense.
Language Requirements	No language requirements.
Graudate School Breadth Requirement	All doctoral students are required to complete a doctoral minor or graduate/professional certificate. Refer to the Graduate School: Breadth Requirement in Doctoral Training policy: https://policy.wisc.edu/library/UW-1200 (https://policy.wisc.edu/library/UW-1200/).

REQUIRED COURSES

Additional Qualifying Breadth Courses Requirement

PhD students must take one course from each of the bands 1, 2, 3 and 4 listed below. Two of the four courses used to satisfy this requirement must be numbered 700 or above; the remaining two courses must be numbered 500 above. Grades in all courses used for breadth must be at least AB. COMP SCI 839 may satisfy breadth in the band declared by the course instructor at the time of course offering.

One course taken as a graduate student at another institution may satisfy breadth. A request for this must be made in writing to the faculty member designated to approve equivalence for the respective course on the breadth list. The request should indicate the corresponding UW–Madison course, include a transcript showing a grade equivalent to AB or better, a course syllabus and description.

Code	Title	Credits
Band 1		
COMP SCI/ E C E 506	Software Engineering	3
COMP SCI 536	Introduction to Programming Languages and Compilers	3
COMP SCI 537	Introduction to Operating Systems	4
COMP SCI 538	Introduction to the Theory and Design of Programming Languages	3
COMP SCI 542	Introduction to Software Security	3
COMP SCI/ E C E 552	Introduction to Computer Architecture	3
COMP SCI 640	Introduction to Computer Networks	3
COMP SCI 642	Introduction to Information Security	3
COMP SCI 701	Construction of Compilers	3
COMP SCI 703	Program Verification and Synthesis	3
COMP SCI 704	Principles of Programming Languages	3
COMP SCI 706	Analysis of Software Artifacts	3

COMP SCI/ E C E 707	Mobile and Wireless Networking	3
COMP SCI 736	Advanced Operating Systems	3
COMP SCI 739	Distributed Systems	3
COMP SCI 740	Advanced Computer Networks	3
COMP SCI 744	Big Data Systems	3
COMP SCI/ E C E 752	Advanced Computer Architecture I	3
COMP SCI/ E C E 755	VLSI Systems Design	3
COMP SCI/ E C E 757	Advanced Computer Architecture II	3
COMP SCI 758	Advanced Topics in Computer Architecture	3
COMP SCI 763	Security and Privacy for Data Science	3
COMP SCI/ E C E 782	Advanced Computer Security and Privacy	3
Band 2		
COMP SCI 534	Computational Photography	3
COMP SCI 559	Computer Graphics	3
COMP SCI 564	Database Management Systems: Design and Implementation	4
COMP SCI 565	Introduction to Data Visualization	3
COMP SCI 566	Introduction to Computer Vision	3
COMP SCI 570	Introduction to Human-Computer Interaction	3
COMP SCI 571	Building User Interfaces	3
COMP SCI/ B M I 576	Introduction to Bioinformatics	3
COMP SCI 764	Topics in Database Management Systems	3
COMP SCI 765	Data Visualization	3
COMP SCI/ E C E 766	Computer Vision	3
COMP SCI/ ED PSYCH/ PSYCH 770	Human-Computer Interaction	3
COMP SCI 774	Data Exploration, Cleaning, and Integration for Data Science	3
COMP SCI/ B M I 776	Advanced Bioinformatics	3
COMP SCI 784	Foundations of Data Management	3
Band 3		
COMP SCI/ MATH 513	Numerical Linear Algebra	3
COMP SCI/ MATH 514	Numerical Analysis	3
COMP SCI 520	Introduction to Theory of Computing	3
COMP SCI/E C E/ I SY E 524	Introduction to Optimization	3
COMP SCI/I SY E/ MATH/STAT 525	Linear Optimization	3
COMP SCI/ I SY E 526	Advanced Linear Programming	3
COMP SCI 577	Introduction to Algorithms	4
COMP SCI/ I SY E 635	Tools and Environments for Optimization	3
COMP SCI 710	Computational Complexity	3
COMP SCI/ MATH 714	Methods of Computational Mathematics I	3
COMP SCI/ MATH 715	Methods of Computational Mathematics II	3
COMP SCI/ I SY E 719	Stochastic Programming	3
COMP SCI/ I SY E 723	Dynamic Programming and Associated Topics	3
COMP SCI/I SY E/ MATH/STAT 726	Nonlinear Optimization I	3
COMP SCI/ I SY E 727	Convex Analysis	3
COMP SCI/I SY E/ MATH 728	Integer Optimization	3
COMP SCI/I SY E/ MATH 730	Nonlinear Optimization II	3
COMP SCI 787	Advanced Algorithms	3
COMP SCI 880	Topics in Theoretical Computer Science	3
Band 4		
COMP SCI/E C E/ M E 532	Matrix Methods in Machine Learning	3
COMP SCI/E C E/ M E 539	Introduction to Artificial Neural Networks	3
COMP SCI 540	Introduction to Artificial Intelligence	3
COMP SCI/ E C E 561	Probability and Information Theory in Machine Learning	3
COMP SCI/ E C E 760	Machine Learning	3
COMP SCI/ E C E 761	Mathematical Foundations of Machine Learning	3
COMP SCI 762	Advanced Deep Learning	3
COMP SCI 769	Advanced Natural Language Processing	3
COMP SCI/B M I 771	Learning Based Methods for Computer Vision	3
COMP SCI/E C E/ STAT 861	Theoretical Foundations of Machine Learning	3