

MATHEMATICS & COMPUTER SCIENCE, BSLAS

for the degree of Bachelor of Science in Liberal Arts & Sciences Major in Mathematics & Computer Science

The Math & CS major provides students with the mathematical background to be able to solve complex problems, while incorporating computer science techniques that are immediately useful in a variety of fields. The duality of this joint program aids students in building skills to become flexible professionals who are confident to take on new systems and technology.

Math&CS students are trained in the tools of both disciplines – formal methods, analysis, and computer programming – with the aim of acquiring the appropriate skills required by the field. The combination of coursework offers students an integrated program where their knowledge in both curricula is complementary and intertwined. Research opportunities include the Illinois Mathematics Lab (<https://publish.illinois.edu/illinoisgeometrylab/>) and PURE (<https://pure.engr.illinois.edu/>).

Students in this major are welcome in both Computer Science (<https://cs.illinois.edu/student-life/student-organizations/>) and Mathematics (<https://math.illinois.edu/academics/undergraduate-program/student-organizations-and-journals/>) student organizations.

This background is suitable for graduate work in computer science, mathematics, and many related areas, including financial engineering, software engineering, theoretical computer science, and data analysis.

Undergraduate programs in Mathematics

Actuarial Science, BSLAS (<http://catalog.illinois.edu/undergraduate/las/actuarial-science-bslas/>)

Mathematics, BSLAS (<http://catalog.illinois.edu/undergraduate/las/mathematics-bslas/#text>)

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Departmental distinction: To graduate with distinction requires a specified minimum grade point average in all Computer Science and Mathematics courses listed below. A GPA of 3.25 is required for Distinction, 3.5 for High Distinction, and 3.75 for Highest Distinction.

In addition, students must complete at least three semester hours of additional Computer Science or Mathematics courses selected from the following: CS 196, CS 296, CS 397, CS 492, CS 493, CS 499, any CS course numbered 411 or higher, MATH 412, MATH 414, MATH 417, MATH 418, MATH 423, MATH 432, MATH 448, MATH 482, MATH 484, MATH 496.

NOTE: A student taking a cross-listed course in this major may designate it as either mathematics or computer science.

General education: Students must complete the Campus General Education (<https://courses.illinois.edu/>) requirements including the campus general education language requirement.

Minimum required major and supporting course work: Normally equates to 71-75 hours. Twelve hours of 300- and 400-level in the major must be taken on this campus.

Minimum hours required for graduation: 120 hours. Requirements

Code	Title	Hours
CS 100	Computer Science Orientation (recommended)	1
Calculus through MATH 241-Calculus III		11-12
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
MATH 347	Fundamental Mathematics	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations		8-11
CS 233 & CS 341	Computer Architecture and System Programming	
OR		
CS 340	Introduction to Computer Systems & two CS courses at the 400 level above CS 403, excluding CS 421 and CS 491. These two courses must be distinct from all other courses used to fulfill program requirements or options.	
CS/MATH 357	Numerical Methods I	3
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
CS 450	Numerical Analysis	3
MATH 415 or MATH 416	Applied Linear Algebra / Abstract Linear Algebra	3
400-level mathematics and computer science requirements:		18
Students must select at least six 400-level mathematics and computer science courses, including one from each of the following groups:		
GROUP I		
CS 361	Probability & Statistics for Computer Science (recommended)	
MATH 461	Probability Theory	
STAT 400/ MATH 463	Statistics and Probability I	
GROUP II		

MATH 412	Graph Theory
MATH 413	Intro to Combinatorics
MATH 417	Intro to Abstract Algebra
MATH 427	Honors Abstract Algebra
GROUP III	
MATH 441	Differential Equations
MATH 446	Applied Complex Variables
MATH 484	Nonlinear Programming
GROUP IV	
MATH 424	Honors Real Analysis
MATH 444	Elementary Real Analysis
MATH 447	Real Variables
GROUP V	
MATH 414	Mathematical Logic
CS/MATH 473	Algorithms
CS/MATH 475	Formal Models of Computation
CS 476	Program Verification
CS 477	Formal Software Development Methods
Total Hours	71-75

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Sample Sequence

This sample sequence is intended to be used only as a guide for degree completion. All students should work individually with their academic advisors to decide the actual course selection and sequence that works best for them based on their academic preparation and goals. Enrichment programming such as study abroad, minors, internships, and so on may impact the structure of this four-year plan. Course availability is not guaranteed during the semester indicated in the sample sequence.

Students must fulfill their Language Other Than English requirement by successfully completing a fourth level of a language other than English. See the corresponding section on the Degree and General Education Requirements page (<http://catalog.illinois.edu/general-information/degree-general-education-requirements/>).

First Year	
First Semester	Hours
CS 100	1
MATH 220 or 221	4
General Education course	3
Composition I or General Education course	4
CS 124	3
15	
Total Hours 15	

First Year	
Second Semester	
MATH 231	3
CS 128	3
CS 173	3

General Education course or Composition I	3
General Education course	3
15	

Total Hours 15

Second Year

First Semester	Hours
MATH 241	4
CS 225	4
CS 222	1
Language Other Than English (3rd level)	4
General Education course	3
16	

Total Hours 16

Second Year

Second Semester	Hours
MATH 347	3
MATH 415 or 416	3
CS 233 or 340	3
Language Other Than English (4th level)	4
Free Elective course	2
15	

Total Hours 15

Third Year

First Semester	Hours
CS 361, MATH 461, or STAT 400	3
CS 341 (or CS 4XX if CS 340 was chosen)	4
MATH 441, 446, or 484	3
General Education course	3
General Education course	3
16	

Total Hours 16

Third Year

Second Semester	Hours
CS 374	4
CS 357	3
MATH 444, 447, or 424	3
General Education course	3
Free Elective course	2
15	

Total Hours 15

Fourth Year

First Semester	Hours
CS 450	3
CS 421	3
MATH 412, 413, 417, or 427	3

General Education course	3
General Education course	3
	15

Total Hours 15

Fourth Year

	Hours
Second Semester	
CS 473, 475, 476, 477, or MATH 414	4
Additional 400-level MATH or CS course from Groups I-V	3
General Education course	3
Free Elective course or CS 4XX (if CS 340 was chosen)	3
	13

Total Hours 13

Total Hours: 120

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Mathematics faculty (<https://math.illinois.edu/directory/faculty/>)
 Overview of LAS Admissions & Requirements (<http://catalog.illinois.edu/schools/las/academic-units/>)
 College of Liberal Arts and Sciences website (<https://las.illinois.edu/>)
 The Grainger College of Engineering website (<https://grainger.illinois.edu>)
 Math email (mathadvising@illinois.edu)
 Computer Science email (undergrad@cs.illinois.edu)

By the time of graduation, students will have the ability to:

Computer Science:

1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

Mathematics:

1. Construct proofs and recognize when proofs are complete
2. Use theorems in order to solve problems
3. Demonstrate technical proficiency in calculus and linear algebra

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Mathematics & Computer Science

Mathematics & Computer Science: Math website (<https://math.illinois.edu/academics/undergraduate-program/mathematics-computer-science-major/>)

Mathematics & Computer Science: Computer Science website (<https://siebelschool.illinois.edu/academics/undergraduate/degree-program-options/cs-x-degree-programs/bs-mathematics-computer-science/>)

Mathematics Department website (<https://math.illinois.edu/>)