

# COMPUTER SCIENCE (BA)

Department Website (<http://cs.nyu.edu/>)

**NYSED:** 07835 **HEGIS:** 0701.00 **CIP:** 11.0101

## Program Description

Computing plays an increasingly important role in almost all fields. It is a very diverse discipline that comprises both theory and applications and incorporates the design and analysis of computing technology. The Department of Computer Science is part of the Courant Institute of Mathematical Sciences, a world-renowned center for the study of mathematics and computer science.

The department offers four major programs: the Computer Science major, the joint Computer Science/Data Science major, the joint Economics/Computer Science major, and the joint Mathematics/Computer Science major. The department also offers three minor programs: the Computer Science minor, the Web Programming and Applications minor, and the joint Mathematics/Computer Science minor. The goal of the majors is to train students in fundamental principles of computer science as well as many practical aspects of software development. Courses combine practical programming experience with techniques for analyzing problems and designing computer algorithms. The goal of the minors is to train students to be proficient users of computers and computer software with less emphasis on the underlying technology and mathematical tools.

Advanced undergraduate students can work on a variety of research projects with the faculty. Outstanding undergraduates may pursue a master's degree through an accelerated five-year program.

## Honors Program

Students interested in graduate or professional school are especially urged to pursue honors. They must consult with the directors of undergraduate studies in the Departments of both Computer Science and Mathematics for advisement and for permission to enter the honors program (ideally early in their sophomore year). A minimum GPA of 3.65 both overall and in the major is required. Research work must culminate in a thesis (typically 40 to 60 pages in length) to be presented at the College's Undergraduate Research Conference, held every April.

The honors track requires fifteen 4-credit courses (60 credits), which is three courses (12 credits) more than the non-honors track, as outlined below.

Course	Title	Credits
<b>Computer Science Courses</b>		
CSCI-UA 101	Intro to Computer Science	4
CSCI-UA 102	Data Structures	4
CSCI-UA 201	Computer Systems Org	4
CSCI-UA 202	Operating Systems	4
CSCI-UA 310	Basic Algorithms	4
CSCI-UA 421	Numerical Computing <sup>1</sup>	4
CSCI-UA 453	Theory of Computation	4
CSCI-UA 520	Undergraduate Research	4
CSCI-UA 521	Undergraduate Research	4
<b>Advanced Computer Science Electives</b>		
Select two 400 level advanced computer science electives		8

### Mathematics Courses

MATH-UA 120	Discrete Mathematics	4
Select one of the following:		4
MATH-UA 121	Calculus I	
MATH-UA 131	Mathematics for Economics I	
Select one of the following: <sup>2</sup>		4
MATH-UA 122	Calculus II	
MATH-UA 132	Mathematics for Economics II	
MATH-UA 140	Linear Algebra	4
<b>Total Credits</b>		<b>60</b>

<sup>1</sup> Note that students who have taken MATH-UA 352 Numerical Analysis must contact the director of undergraduate studies before registering for CSCI-UA 421 Numerical Computing.

<sup>2</sup> Students must choose one calculus track or the other to follow and cannot mix courses from the two tracks.

## Admissions

New York University's Office of Undergraduate Admissions supports the application process for all undergraduate programs at NYU. For additional information about undergraduate admissions, including application requirements, see How to Apply (<https://www.nyu.edu/admissions/undergraduate-admissions/how-to-apply.html>).

## Program Requirements

The major in Computer Science requires twelve 4-credit courses (48 credits) as outlined below.

Course	Title	Credits
<b>General Education Requirements</b>		
First-Year Seminar		4
EXPOS-UA 1	Writing as Inquiry	4
Foreign Language <sup>1</sup>		16
Physical Science		4
Life Science		4
Texts and Ideas		4
Cultures and Contexts		4
Societies and the Social Sciences		4
Expressive Culture		4
<b>Major Requirements</b>		
<i>Computer Science Courses</i>		
CSCI-UA 2	Introduction to Computer Programming (No Prior Experience) <sup>2</sup>	4
CSCI-UA 101	Intro to Computer Science	4
CSCI-UA 102	Data Structures	4
CSCI-UA 201	Computer Systems Org	4
CSCI-UA 202	Operating Systems	4
CSCI-UA 310	Basic Algorithms	4
<i>Mathematics Courses</i>		
MATH-UA 120	Discrete Mathematics	4
Select one of the following: <sup>3</sup>		4
MATH-UA 121	Calculus I	
MATH-UA 131	Mathematics for Economics I	
<b>Electives</b>		

Select five elective credits from courses numbered CSCI-UA 4XX <sup>4</sup>	20
<b>Other Elective Credits</b>	<b>28</b>
<b>Total Credits</b>	<b>128</b>

- <sup>1</sup> The foreign language requirement is satisfied upon successful completion through the Intermediate level of a language. This may be accomplished in fewer than 16 credits, but those credits must then be completed as elective credit.
- <sup>2</sup> This course does not count towards the major but is a prerequisite for CSCI-UA 101 Intro to Computer Science. Students who place directly into CSCI-UA 101 simply replace this with an elective.
- <sup>3</sup> Students must choose one calculus track or the other and cannot mix courses from the two tracks.
- <sup>4</sup> Students may replace a 400-level elective with one of the following mathematics classes (a maximum of two MATH-UA classes can be substituted for 400-level electives):
- MATH-UA 122 Calculus II (only for students following the Calculus track) **or** MATH-UA 132 Mathematics for Economics II (only for students following the Mathematics for Economics track). Students must choose one calculus track or the other and cannot mix courses from the two tracks.
  - MATH-UA 140 Linear Algebra
  - MATH-UA 185 Probability & Statistics

## Sample Plan of Study

Course	Title	Credits
<b>1st Semester/Term</b>		
CSCI-UA 2	Introduction to Computer Programming (No Prior Experience) <sup>1</sup>	4
MATH-UA 121	Calculus I	4
Texts and Ideas		4
First-Year Seminar		4
<b>Credits</b>		<b>16</b>
<b>2nd Semester/Term</b>		
CSCI-UA 101	Intro to Computer Science	4
MATH-UA 120	Discrete Mathematics	4
EXPOS-UA 1	Writing as Inquiry	4
Cultures and Contexts		4
<b>Credits</b>		<b>16</b>
<b>3rd Semester/Term</b>		
CSCI-UA 102	Data Structures	4
Physical Science		4
Foreign Language I		4
Expressive Culture		4
<b>Credits</b>		<b>16</b>
<b>4th Semester/Term</b>		
CSCI-UA 201	Computer Systems Org	4
Life Science		4
Foreign Language II		4
Societies and the Social Sciences		4
<b>Credits</b>		<b>16</b>
<b>5th Semester/Term</b>		
CSCI-UA 202	Operating Systems	4
CSCI-UA 310	Basic Algorithms	4
Foreign Language III		4
Other Elective Credits		4
<b>Credits</b>		<b>16</b>
<b>6th Semester/Term</b>		
Computer Science Major Elective (400-Level)		4

Computer Science Major Elective (400-Level)	4
Foreign Language IV	4
Other Elective Credits	4
<b>Credits</b>	<b>16</b>
<b>7th Semester/Term</b>	
Computer Science Major Elective (400-Level)	4
Computer Science Major Elective (400-Level)	4
Other Elective Credits	4
Other Elective Credits	4
<b>Credits</b>	<b>16</b>
<b>8th Semester/Term</b>	
Computer Science Major Elective (400-Level)	4
Other Elective Credits	4
Other Elective Credits	4
Other Elective Credits	4
<b>Credits</b>	<b>16</b>
<b>Total Credits</b>	<b>128</b>

- <sup>1</sup> This course does not count towards the major but is a prerequisite for CSCI-UA 101 Intro to Computer Science. Students who place directly into CSCI-UA 101 simply replace this with an elective.

## Learning Outcomes

Upon completion of program requirements, students are expected to have acquired:

1. Skills in writing computer programs and designing software systems.
2. An understanding of the foundational algorithms and data structures used in computer software.
3. An understanding of what is going on "under the hood" of computer software in terms of the underlying computer architecture and operating systems.
4. Deeper knowledge of some specific areas of computer science and its applications.

## Policies

### Program Policies

#### Policy on Declaration of Major or Minor

Students must complete either CSCI-UA 101 Intro to Computer Science or CSCI-UA 102 Data Structures (depending on placement) with a grade of C or better before they can declare the major or minor in Computer Science; the joint majors with both Economics and Mathematics; or the joint minor with Mathematics. To declare the joint major in Computer and Data Science, students must first meet this prerequisite and also complete either DS-UA 111 Principles of Data Science I or DS-UA 112 Principles of Data Science II (depending on placement) with a grade of C or better. To declare the minor in Web Programming and Applications, students must first complete their choice of either (1) CSCI-UA 2 Introduction to Computer Programming (No Prior Experience) or CSCI-UA 3 Introduction to Computer Programming (Limited Prior Experience) (depending on placement) or (2) CSCI-UA 4 Introduction to Web Design and Computer Principles with a grade of C or better. These policies apply to all NYU students, not just to those matriculated in CAS.

### Required Coursework in CAS (-UA) for all Majors and Minors in Courant

At least half of the courses applied to the Courant requirements of the CAS majors and minors in Computer Science and in Mathematics (including joint programs) must be CSCI-UA and MATH-UA courses taken in New York or at NYU study away sites. This is a built-in limit on how

many courses students may take in these subjects that are (for example) sponsored by NYU Abu Dhabi and NYU Shanghai under CS-UH, MATH-UH, CENG-SHU, CSCI-SHU, and MATH-SHU. Internal and external transfers must pay close attention to this policy, but it also applies to students who matriculate as first-years. The usual CAS policies on -UA residency for the baccalaureate degree still apply.

### Other Policies Applying to the Major

1. A grade of C or better is necessary in all courses used to fulfill major requirements; courses graded Pass/Fail do not count toward the major.
2. To enroll in CSCI-UA 101 Intro to Computer Science students must first fulfill the prerequisite CSCI-UA 2 Introduction to Computer Programming (No Prior Experience) or CSCI-UA 3 Introduction to Computer Programming (Limited Prior Experience). Alternatively, they must first present a score of 3 on the AP Computer Science exam; students with a score of 4 or 5 may also register for CSCI-UA 101 Intro to Computer Science (they are encouraged but not obliged to start with CSCI-UA 102 Data Structures), but they will forfeit the AP credit. Finally, students may take a placement test given by the department to enter CSCI-UA 101 Intro to Computer Science.
3. Advanced Placement (AP) credit for Computer Science A is the equivalent of CSCI-UA 101 Intro to Computer Science and counts toward the major. A score of 4 or 5 on AP Computer Principles can be used as an equivalent to either CSCI-UA 2 Introduction to Computer Programming (No Prior Experience) or CSCI-UA 3 Introduction to Computer Programming (Limited Prior Experience). However, the AP exam in Computer Science Principles cannot count toward any major or minor in this department.
4. Students who score a 4 or 5 on the AP Computer Science exam are encouraged to register for CSCI-UA 102 Data Structures but are not obliged to; they may choose to take CSCI-UA 101 Intro to Computer Science before CSCI-UA 102 Data Structures (and forfeit the AP credit).
5. Students will also lose AP credit if they take certain other courses in the department; this is noted in the relevant course descriptions.
6. Students are required to take CSCI-UA 101 Intro to Computer Science through CSCI-UA 201 Computer Systems Org in sequence.
7. Note that Albert will automatically block: students who complete CSCI-UA 2 Introduction to Computer Programming (No Prior Experience) with a C or better from registering for CSCI-UA 3 Introduction to Computer Programming (Limited Prior Experience); students who complete CSCI-UA 467 Applied Internet Technology with a C or better from registering for CSCI-UA 61 Web Development and Programming; and students who complete CSCI-UA 479 Data Management and Analysis with a C or better from registering for CSCI-UA 60 Database Design and Implementation.
8. CAS students (in any major or minor) are not permitted to take computer science courses in the Tandon School of Engineering.
9. Those interested in the honors program should start the major early enough to take major electives starting in the first semester of junior year.
10. Those interested in spending a semester away should work out their schedule with an adviser as early as possible.

## College of Arts and Science Policies

A full list of relevant academic policies can be found on the CAS Academic Policies page (<https://bulletins.nyu.edu/undergraduate/arts-science/academic-policies/>).

## NYU Policies

University-wide policies can be found on the New York University Policy pages (<https://bulletins.nyu.edu/nyu/policies/>).