COMPUTER AND DATA SCIENCE (BA)

NYSED: 40655  HEGIS: 1702.00  CIP: 30.7001

Program Description
The joint major in computer and data science trains students to use data science systems, the automated systems that effectively predict outcomes of interest and that extract insights from increasingly large data sets. This training enables students to participate in harnessing the power of data and in influencing policies that will govern the rollout of data science technologies. In addition, students gain the ability to build such systems.

This is an interdisciplinary major comprised of eighteen courses (72 credits) offered by the Department of Computer Science and the Center for Data Science.

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 joint major in computer and data science requires eighteen 4-credit courses (72 credits) as outlined below.

The prerequisite for declaring this major is completion of (1) either CSCI-UA 101 Intro to Computer Science or CSCI-UA 102 Data Structures (depending on placement) and (2) either DS-UA 111 Data Science for Everyone or DS-UA 112 Principles of Data Science (depending on placement) with a C or better.

Course   Title                  Credits
General Education Requirements
First-Year Seminar                             4
EXPOS-UA 1   Writing as Inquiry                4
Foreign Language 1                             16
Physical Science                               4
Life Science                                    4
Texts and Ideas                                 4
Cultures and Contexts                          4
Societies and the Social Sciences              4
Expressive Culture                             4
Major Requirements
Computer Science Requirements
CSCI-UA 2   Introduction to Computer Programming (No Prior Experience) 2  4
CSCI-UA 101 Intro to Computer Science          4
CSCI-UA 102 Data Structures                    4
CSCI-UA 201 Computer Systems Org               4
CSCI-UA 310 Basic Algorithms                   4
CSCI-UA 473 Fundamentals of Machine Learning   4
CSCI-UA 475 Predictive Analytics               4
or CSCI-UA 476 Processing Big Data for Analytics Applications 4
CSCI-UA 479 Data Management and Analysis       4
Data Science Requirements
DS-UA 111  Data Science for Everyone           4
DS-UA 112  Principles of Data Science           4
DS-UA 201  Causal Inference                    4
DS-UA 202  Responsible Data Science            4
DS-UA 301  Advanced Topics in Data Science     4
Mathematics Requirements
MATH-UA 120 Discrete Mathematics               4
MATH-UA 121 Calculus I 3
or MATH-UA 131 Mathematics for Economics I     4
MATH-UA 122 Calculus II
or MATH-UA 132 Mathematics for Economics II    4
MATH-UA 140 Linear Algebra
or MATH-UA 148 Honors Linear Algebra           4
MATH-UA 235 Probability & Statistics           4
Electives
Select one Computer Science elective:         4
CSCI-UA 202 Operating Systems                  4
CSCI-UA 469 Natural Language Processing        4
CSCI-UA 475 Predictive Analytics               4
CSCI-UA 476 Processing Big Data for Analytics Applications 4
CSCI-UA 480 Special Topics: (Computer Networks) 4
CSCI-UA 480 Special Topics: (Introduction to Numerical Optimization) 4
CSCI-UA 480 Special Topics: (Introduction to Social Networking) 4
CSCI-UA 480 Special Topics: (Parallel Computing) 4
Other Elective Credits                        4
Total Credits                                128

1 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.
2 This course does not count towards the joint major but is a required prerequisite for CSCI-UA 101 Intro to Computer Science.
3 Students must choose one of the two calculus tracks and cannot take courses from both tracks.

Note: Students interested in this major should consult with the directors of undergraduate studies in the departments and CDS for additional information. Please note that the CAS minor requirement associated with the major in data science is waived for the computer and data science joint major, just as it is waived for a data science major pursuing a double major.
Learning Outcomes

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

1. Fundamental theoretical and practical knowledge of the foundational areas of computer science, including algorithm design, machine learning, and programming.

2. Knowledge of current methods and tools used to analyze big data and inferences, and to explore data-driven decision making.

3. Knowledge of ethical issues regarding data science. These include the topics of fairness, diversity, and privacy.

4. The ability to build and use data science systems, the automated systems that effectively predict outcomes of interest and that extract insights from increasingly large data sets.

5. An understanding of what is going on "under the hood" of computer software in terms of the underlying computer architecture and operating systems.

Policies

Program Policies

Major Policies

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 Introduction to Computer Science (CSCI-UA 101) students must first fulfill the prerequisite Introduction to Computer Programming (No Prior Experience) (CSCI-UA 2) or Introduction to Computer Programming (Limited Prior Experience) (CSCI-UA 3). 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 (they are encouraged but not obliged to start with CSCI-UA 101), but they will forfeit the AP credit. Finally, students may take a placement test given by the department to enter CSCI-UA 101.

3. Advanced Placement (AP) credit for Computer Science A is the equivalent of CSCI-UA 101 and counts toward the major. 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 Data Structures (CSCI-UA 102) but are not obliged to; they may choose to take CSCI-UA 101 before CSCI-UA 102 (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 through CSCI-UA 201 in sequence.

7. Note that Albert will automatically block: students who complete CSCI-UA 2 with a C or better from registering for CSCI-UA 3; students who complete CSCI-UA 467 with a C or better from registering for CSCI-UA 61; and students who complete CSCI-UA 479 with a C or better from registering for CSCI-UA 60.

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 spending a semester away should work out their schedule with an adviser as early as possible.

Policy on Declaration of Major

Students must complete either CSCI-UA 101 or 102 (depending on placement) and also complete either DS-UA 111 or 112 (depending on placement) with a grade of C or better before declaring the joint major in computer and data science. This policy applies to all NYU students, not just to those matriculated in CAS.

Students are not able to double major in Computer Science and Data Science. To pursue both disciplines, students must declare the joint computer science and data science major.
NYU Policies
University-wide policies can be found on the New York University Policy pages (https://bulletins.nyu.edu/nyu/policies/).

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/).