COMPUTER SCIENCE TANDON (MS)

Department Website (https://engineering.nyu.edu/academics/programs/computer-science-ms/)

NYSED: 85149 **HEGIS:** 0701.00 **CIP:** 11.0101

Program Description

We offer a highly adaptive M.S. in Computer Science program that lets you shape the degree around your interests. Besides our core curriculum in the fundamentals of computer science, you have a wealth of electives to choose from. You can tailor your degree to your professional goals and interests in areas such as cybersecurity, data science, information visualization, machine learning and AI, graphics, game engineering, responsible computing, algorithms, and web search technology.

Job opportunities in computer science are challenging and diverse, and we expect to see steady demand for highly qualified graduates at all levels. As a graduate, you can explore careers in areas such as applications programming, big data, software engineering, game design and programming, peer-to-peer networks, computer vision and imaging, machine learning and AI, urban computing, and interactive data visualization.

With our M.S. program in Computer Science, you will have significant curriculum flexibility, allowing you to adapt your program to your ambitions and goals as well as to your educational and professional background. You will gain a solid grounding in the fundamentals of computer science, along with access to professional-level courses, and an opportunity to specialize in selected technology areas of your choice.

Admissions

Admission to this program requires you to have an undergraduate degree in computer science, mathematics, science, or engineering, with a superior undergraduate record from an accredited institution. Applicants with degrees in other fields are considered individually for admission.

Additional Entrance Requirements

- At least 1 year of university-level science.
- A working knowledge of a high-level, general-purpose programming language (preferably C++).
- A basic understanding of computer fundamentals such as computer organization and operation, data structures, and computer architecture.
- Demonstrated ability to communicate in written and spoken English is required for regular status (see below). Foreign students and others for whom English is a second language may be required to undertake preparatory work to improve their language skills.

Students entering with a bachelor's in computer science or with a bachelor's in a technical area and a strong minor in computer science should be able to satisfy entrance requirements for the master's degree program. Generally, entering students are expected to know mathematics through calculus.

Admission with advanced standing is accepted in accordance with the School of Engineering regulations. A maximum of 9 credits may be applied to the M.S. degree from previous graduate work at an acceptable institution.

Students who are lacking the computer science skills needed for the Computer Science Master's Degree are encouraged to enroll into the preparatory Bridge to NYU Tandon program (http://engineering.nyu.edu/academics/online/programs/bridge/computer-science/). Pending satisfactory completion, students would be considered for admission towards the master's degree program.

GRE Requirements

Applicants who satisfy one of the following conditions are not required but encouraged to submit a GRE score:

1. M.S. Applicants without a Computer Science or similar background who successfully complete the NYU Tandon Bridge (http://engineering.nyu.edu/academics/online/programs/bridge/).
2. Applicant completes 9 credits under Visiting Student Registration (http://engineering.nyu.edu/admissions/graduate/apply/visiting-students/) from an approved list of CSE courses and maintains an average grade of B+ or better.
3. Applicant has a B.A. or B.S. degree in computer science or computer engineering from NYU, with a GPA of 3.0 or higher.

Program Requirements

To satisfy the requirements for the master's degree, the student must complete 30 credits, as described below, with an overall average of B. In addition, a B average is required across the required algorithms course and the four core courses, and a grade of B or better is required for the capstone course, as indicated below. The master's curriculum has four components: 3 credits of algorithms, 12 credits of core elective courses (one of which may also count as the capstone course), one 3 credit capstone course, and 12 credits of general elective courses.

For students who enroll in the program with full-time status, the M.S. program is designed to be a 2-year program. Since not all courses are offered every semester, your course options are likely to be more limited if you elect to finish the program in less than 2 years.

Course	Title	Credits
Major Requirements		
Algorithms		
CS-GY 6033	Design and Analysis of Algorithms I [1]	3
or CS-GY 6043	Design and Analysis of Algorithms II	
Core Requirements		
Select at least four of the following: [2]		12
CS-GY 6063	Software Engineering I	
CS-GY 6083	Principles of Database Systems	
CS-GY 6133	Computer Architecture I	
CS-GY 6233	Introduction to Operating Systems	
CS-GY 6313	INFORMATION VISUALIZATION	
CS-GY 6373	Programming Languages	
CS-GY 6513	Big Data	
CS-GY 6533	Interactive Computer Graphics	
CS-GY 6613	Artificial Intelligence I	
CS-GY 6643	COMPUTER VISION	
CS-GY 6763	ALGORITHMIC MACHINE LEARNING AND DATA SCIENCE	

CS-GY 6813	Information, Security and Privacy	
CS-GY 6843	Computer Networking	
CS-GY 6923	Machine Learning	
Capstone		
Select one of the following: [3]		3
CS-GY 6053	Foundation of Data Science	
CS-GY 6063	Software Engineering I	
CS-GY 6243	Operating Systems II	
CS-GY 6253	Distributed Operating Systems	
CS-GY 6413	Compiler Design and Construction	
CS-GY 6513	Big Data	
CS-GY 6533	Interactive Computer Graphics	
CS-GY 6573	Penetration Testing and Vulnerability Analysis	
CS-GY 6613	Artificial Intelligence I	
CS-GY 6643	COMPUTER VISION	
CS-GY 6823	Network Security	
CS-GY 6943	Artificial Intelligence for Games	
CS-GY 9163	Application Security	
CS-GY 9223		
General Electives		
Select four of the following: [4]		12
CS-GY 6003	Foundations of Computer Science	
CS-GY 6033	Design and Analysis of Algorithms I	
CS-GY 6043	Design and Analysis of Algorithms II	
CS-GY 6053	Foundation of Data Science	
CS-GY 6063	Software Engineering I	
CS-GY 6083	Principles of Database Systems	
CS-GY 6093	Advanced Database Systems	
CS-GY 6133	Computer Architecture I	
CS-GY 6233	Introduction to Operating Systems	
CS-GY 6243	Operating Systems II	
CS-GY 6253	Distributed Operating Systems	
CS-GY 6313	INFORMATION VISUALIZATION	
CS-GY 6323	LARGE-SCALE VISUAL ANALYTICS	
CS-GY 6373	Programming Languages	
CS-GY 6413	Compiler Design and Construction	
CS-GY 6513	Big Data	
CS-GY 6533	Interactive Computer Graphics	
CS-GY 6543	Human Computer Interaction	
CS-GY 6553	Game Design	
CS-GY 6573	Penetration Testing and Vulnerability Analysis	
CS-GY 6613	Artificial Intelligence I	
CS-GY 6643	COMPUTER VISION	
CS-GY 6703	Computational Geometry	
CS-GY 6753	Theory of Computation	
CS-GY 6763	ALGORITHMIC MACHINE LEARNING AND DATA SCIENCE	
CS-GY 6803	Information Systems Security Engineering and Management	
CS-GY 6813	Information, Security and Privacy	
CS-GY 6823	Network Security	
CS-GY 6843	Computer Networking	
CS-GY 6903	Applied Cryptography	
CS-GY 6913	Web Search Engines	
CS-GY 6923	Machine Learning	
CS-GY 6943	Artificial Intelligence for Games	
CS-GY 6953	DEEP LEARNING	
CS-GY 6963	Digital Forensics	
CS-GY 9053		
CS-GY 9163	Application Security	
CS-GY 9223		
CS-GY 9963	ADVANCED PROJECT IN COMPUTER SCIENCE	
CS-GY 997X	MS THESIS IN COMPUTER SCIENCE	
Total Credits		**30**

1

Most students will take the Algorithms I course to satisfy the algorithms course requirement. Students are expected to have knowledge of Discrete Math equivalent to CS-GY 6003 Foundations of Computer Science prior to taking the Algorithms I course. Students lacking that knowledge may be required to take CS-GY 6003 Foundations of Computer Science. Advanced students who previously took an equivalent Algorithms I course, and received a grade of at least A-, may want to take the Algorithms II course to satisfy the requirement.

2

The list will be periodically updated by the CSE Department and certain courses may be substituted with departmental consent.

3

Certain courses in our department will be designated as capstone courses. Capstone courses are drawn from key technical areas in the M.S. program and they involve a substantial amount of programming effort. Students are required to take at least one capstone course with a grade of B or better. The list of capstone courses will be posted by the department and will be updated from time to time. If a course is listed both as a capstone course and as a core course, the course can be used to satisfy both the capstone and core course requirements. An M.S. thesis can also be used to satisfy the capstone course requirement.

4

In addition to the core electives, students are required to take four general elective courses with considerable flexibility; the only restriction is that no more than two of the courses may be taken from outside the Department of Computer Science and Engineering. In particular:

- Master's thesis (6 credits) and/or independent study courses may be part of a student's elective courses. Note that CS-GY 997X MS THESIS IN COMPUTER SCIENCE has an important requirement, as described here.
- Any of the core courses may be chosen as electives.
- Graduate-level courses from outside of the department (at most two) may be chosen as electives.
- Any CS graduate course not included in the core areas may be chosen as electives.

This list may be updated from time to time based on the current offerings of the department.

Sample Plan of Study

The particular courses that a student takes during the program will vary according to the student's interests and background, course offerings, and whether the student does an internship. The following are two

sample courses of study. These are just samples meant to help in planning the courses for the degree. Individual course plans may differ depending on when courses are offered.

Non-Internship Plan

Sample course plan for a student not doing an internship and taking CS-GY 6003 Foundations of Computer Science.

Course	Title	Credits
1st Semester/Term		
CS-GY 6003	Foundations of Computer Science	3
CS-GY 6373	Programming Languages (core)	3
CS-GY 6083	Principles of Database Systems (core)	3
	Credits	**9**
2nd Semester/Term		
CS-GY 6033	Design and Analysis of Algorithms I (algorithms requirement)	3
CS-GY Elective or non-CS Elective		3
CS-GY 6643	COMPUTER VISION (core)	3
	Credits	**9**
3rd Semester/Term		
CS-GY 6513	Big Data (capstone)	3
CS-GY 6063	Software Engineering I (core)	3
CS-GY 6923	Machine Learning (core)	3
	Credits	**9**
4th Semester/Term		
CS-GY 6813	Information, Security and Privacy (core or elective)	3
	Credits	**3**
	Total Credits	**30**

Internship Plan

Sample course plan for a student doing internships and not taking CS-GY 6003 Foundations of Computer Science.

Course	Title	Credits
1st Semester/Term		
CS-GY 6033	Design and Analysis of Algorithms I (algorithms requirement)	3
CS-GY 6373	Programming Languages (core)	3
CS-GY 6083	Principles of Database Systems (core)	3
	Credits	**9**
2nd Semester/Term		
CS-GY 6063	Software Engineering I (core)	3
CS-GY Elective or non-CS Elective		3
CS-GY 6643	COMPUTER VISION (core)	3
	Credits	**9**
3rd Semester/Term		
CP-GY 9911	Internship for MS I (elective)	1.5
	Credits	**1.5**
4th Semester/Term		
CS-GY 6513	Big Data (capstone)	3
CS-GY Elective		3
CS-GY 6923	Machine Learning (core)	3
	Credits	**9**
5th Semester/Term		
CP-GY 9921	Internship for MS II (elective)	1.5
	Credits	**1.5**
	Total Credits	**30**

Learning Outcomes

Upon successful completion of the program, graduates will:

1. Develop laboratory software skills for graduate level work.
2. Learn advanced fundamentals in computer systems.
3. Learn advanced fundamentals in computer science theory.
4. Learn advanced fundamentals in software/programming.
5. Broaden their backgrounds by taking important electives to further their special interest knowledge.

Policies

NYU Policies

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

Tandon Policies

Additional academic policies can be found on the Tandon academic policy page (https://bulletins.nyu.edu/graduate/engineering/academic-policies/).