

COMPUTER SCIENCE TANDON (MS)

Computer Science and Engineering Department (<https://engineering.nyu.edu/academics/departments/computer-science-and-engineering/>)

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

Program Description

We offer a highly adaptive MS in Computer Science program that lets students shape the degree around their interests. Besides our core curriculum in the fundamentals of computer science, students have a wealth of electives to choose from. Students can tailor their degree to their 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. Our graduates are prepared to 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 MS program in Computer Science, students will have significant curriculum flexibility, allowing them to adapt their program to their ambitions and goals as well as to their educational and professional background. Students will gain a solid grounding in the fundamentals of computer science, along with access to professional-level courses, and an opportunity to specialize in subareas of their choice.

Admissions

To apply for admission to any Tandon graduate program, please contact the Office of Graduate Admissions (<https://engineering.nyu.edu/admissions/graduate/>).

Required Background Knowledge

Admission to this program requires applicants 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 may also be considered 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. 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.

A maximum of 9 credits from previous graduate work at an accredited institution may be transferred to the MS degree.

Students with an undergraduate background in a field outside of computer science or a related area of study are encouraged to enroll into the preparatory NYU Tandon Bridge program (<http://engineering.nyu.edu/academics/online/programs/bridge/computer-science/>). Upon successfully completing the Bridge program, students could then be considered for admission to the master's.

GRE Requirements

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

1. MS 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 BA or BS degree in computer science or computer engineering from NYU, with a GPA of 3.0 or higher.

Program Requirements

Note: not all courses are offered every semester.

Course	Title	Credits
Algorithms Requirement		
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		
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		
CS-GY 6253		

CS-GY 6413	
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	Selected Topics in CS: Distributed Systems
CS-GY 997X	MS THESIS IN COMPUTER SCIENCE
Computer Science Electives	
Select two (6 credits) of the following: 6	
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	
CS-GY 6133	
CS-GY 6233	Introduction to Operating Systems
CS-GY 6243	
CS-GY 6253	
CS-GY 6313	INFORMATION VISUALIZATION
CS-GY 6323	LARGE-SCALE VISUAL ANALYTICS
CS-GY 6373	Programming Languages
CS-GY 6413	
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	Special Topics in Computer Science
CS-GY 9163	Application Security

CS-GY 9223	Selected Topics in CS
CS-GY 9963	ADVANCED PROJECT IN COMPUTER SCIENCE
CS-GY 997X	MS THESIS IN COMPUTER SCIENCE
Free Electives	
Select 6 credits courses of your choosing. ³ 6	
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 These can be additional courses from the previous lists, or courses from other departments and schools at NYU. However, these cannot be courses offered by the School of Professional Studies.

GPA Requirements

The MS in Computer Science has several specific GPA requirements. **1. Core GPA:** A core GPA of 3.0 or higher is required in the algorithms and core courses. The core GPA is calculated based on the grades earned in these five courses. **2. Capstone GPA:** A GPA of 3.0 or higher is required in the capstone course. This is achieved by earning a grade of B or higher in the capstone course. **3. Cumulative GPA:** A cumulative GPA (overall GPA) of 3.0 or higher is required in all graduate courses taken.

Capstone and Core Option

Some core courses may also count as capstone courses. These are those courses that appear on both the core and capstone lists above. Students may choose to use a core course to also satisfy the capstone requirement, if the grade earned in the course is B or higher. If the student chooses this option, the student must then take an additional computer science elective, so that the student may earn the required 30 credits needed for the MS degree. All students must earn 30 credits to graduate.

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 (computer science elective)	3
CS-GY 6083	Principles of Database Systems (core)	3
CS-GY 6373	Programming Languages (core)	3
Credits		9

2nd Semester/Term		
CS-GY 6033	Design and Analysis of Algorithms I (algorithms requirement)	3
CS-GY 6643	COMPUTER VISION (core)	3
Free Elective		3
Credits		9
3rd Semester/Term		
CS-GY 6063	Software Engineering I (core)	3
CS-GY 6513	Big Data (capstone)	3
CS-GY 6923	Machine Learning (computer science elective)	3
Credits		9
4th Semester/Term		
CS-GY 6813	Information, Security and Privacy (free elective)	3
Credits		3
Total Credits		30

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/>).

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 6083	Principles of Database Systems (core)	3
CS-GY 6373	Programming Languages (core)	3
Credits		9
2nd Semester/Term		
CS-GY 6063	Software Engineering I (core)	3
CS-GY 6643	COMPUTER VISION (core)	3
Free Elective		3
Credits		9
3rd Semester/Term		
CP-GY 9911	Internship for MS I (free elective, often taken in the summer term)	1.5
Credits		1.5
4th Semester/Term		
CS-GY 6513	Big Data (capstone)	3
CS-GY 6923	Machine Learning (free elective)	3
Computer Science Elective		3
Credits		9
5th Semester/Term		
CP-GY 9921	Internship for MS II (free 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.