

MATHEMATICS/CIVIL ENGINEERING (BS/BS)

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

NYSED: 33279 HEGIS: 1701.00 CIP: 27.0101

Program Description

Since the fall of 2010, the College's dual degree program with the NYU Tandon School of Engineering, formerly known as the Polytechnic School of Engineering, has offered highly qualified and motivated students who are technically oriented the opportunity to pursue both a liberal arts program with a major in science, mathematics, or computer science and a traditional engineering program. Upon completion of this five-year program, students receive both a BS degree from the College of Arts and Science and a BS degree from the NYU Tandon School of Engineering. Students with this combination of degrees are likely to find excellent employment opportunities.

It is crucial that students begin the required dual-degree coursework in their first year.

The available dual degree combinations are as follows:

- BS in Biology/BS in Chemical and Biomolecular Engineering
- BS in Chemistry/BS in Chemical and Biomolecular Engineering
- BS in Computer Science/BS in Computer Engineering
- BS in Computer Science/BS in Electrical Engineering
- BS in Mathematics/BS in Civil Engineering
- BS in Mathematics/BS in Computer Engineering
- BS in Mathematics/BS in Electrical Engineering
- BS in Mathematics/BS in Mechanical Engineering
- BS in Physics/BS in Civil Engineering
- BS in Physics/BS in Computer Engineering
- BS in Physics/BS in Electrical Engineering
- BS in Physics/BS in Mechanical Engineering

Students in the program complete all of the CAS College Core Curriculum requirements, with the exception of the foreign language requirement, from which they are exempted. (Their required mathematics and science courses automatically satisfy the Core's Foundations of Scientific Inquiry requirements.) There is usually some flexibility concerning the semester in which a given course can be taken. Detailed programs of study for each of the degree combinations are available on the program website for reference.

Accelerated BA/MS Program in Mathematics

The College and the Graduate School of Arts and Science offer students the opportunity to obtain both bachelor's and master's degrees in mathematics in five years. Qualifying students are accepted into the program toward the end of the sophomore year or during the junior year before they reach 96 credits. Students must have a minimum 3.50 GPA in order to qualify for acceptance. During their last few undergraduate semesters, students must accelerate by taking one quarter of their graduate courses during regular terms and/or during the summer. Students in the program must satisfy all requirements of both the bachelor's and master's degrees; there is no double-counting of courses.

In the graduate portion of the program, they can qualify for a scholarship covering up to 50 percent of the tuition for the master's degree. For more information, please contact the College Advising Center, 726 Broadway, 7th floor; 212-998-8130.

Joint BS/BS Program in Mathematics and Engineering

The College of Arts and Science, in cooperation with the NYU Tandon School of Engineering, offers a joint BS/BS program in engineering. Students in the program receive the BS degree in mathematics from CAS and the BS degree in either civil, computer, electrical, or mechanical engineering from the Tandon School of Engineering. Further information and advisement are available from the College Advising Center, 726 Broadway, 7th floor; 212-998-8130.

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

Course	Title	Credits
CAS Core + Tandon General Education Requirements		
EXPOS-UA 1	Writing The Essay:	4
	First-Year Seminar	4
	Texts and Ideas	4
	Cultures and Contexts	4
	Societies and the Social Sciences	4
	Expressive Culture	4
Major Requirements		
MATH-UA 121	Calculus I	4
MATH-UA 122	Calculus II	4
MATH-UA 123	Calculus III	4
MATH-UA 140	Linear Algebra	4
MATH-UA 235	Probability & Statistics	4
MATH-UA 262	Ordinary Diff Equations	4
MATH-UA 325	Analysis	4
MATH-UA 343	Algebra	4
PHYS-UA 91	Physics I	3
PHYS-UA 93	Physics II	3
PHYS-UA 95	Physics III	3
PHYS-UA 71	Introductory Experimental Physics I	2
PHYS-UA 72	Introductory Experimental Physics II	2
PHYS-UA 73	Intermediate Experimental Physics I	2
CS-UY 1113	PROBLEM SOLVING AND PROGRAMMING I	3
CM-UY 1003	General Chemistry for Engineers	3
CM-UY 1001	General Chemistry for Engineers Laboratory	1
EG-UY 1004	Introduction to Engineering and Design	4
CE-UY 1002	Introduction to Civil Engineering	2
CE-UY 2133	ENGINEERING MECHANICS	3
CE-UY 2143	ANALYSIS OF DETERMINATE STRUCTURES	3
CE-UY 2213	FLUID MECHANICS AND HYDRAULICS	3

CE-UY 2343	Transportation Engineering	3
CE-UY 2533	CONSTRUCTION PROJECT MANAGEMENT	3
CE-UY 3013	COMPUTING IN CIVIL ENGINEERING	3
CE-UY 3153	Geotechnical Engineering	3
CE-UY 3163	Materials for the Built Environment	3
CE-UY 3183	STRUCTURAL ENGINEERING	3
CE-UY 3223	INTRO TO ENVIRONMENTAL ENGINEERING	3
CE-UY 3243	WATER RESOURCES ENGINEERING	3
CE-UY 4092	Leadership, Business Principles, Policy and Ethics in Civil Engineering	2
CE-UY 4803	Civil Engineering Capstone	3
Civil Engineering Concentration Capstone		3
CE-UY 4990	Fundamentals of Engineering Exam Registration for CUE	0
Electives		
Civil Engineering Electives (3)		9
Free Electives		13
Humanities/Social Science Electives (2)		8
Mathematics Electives (2)		8
Science Elective (must be approved by adviser)		3
Total Credits		166

Study Away

Students majoring and minoring in the Department of Mathematics can spend a semester studying abroad at one of the many academic centers run by NYU Global Programs. Currently, mathematics can be studied at NYU Abu Dhabi, NYU London, NYU Paris, and NYU Shanghai. Students planning study away should make their plans and speak to an adviser early in their NYU careers.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
MATH-UA 121	Calculus I	4
PHYS-UA 91	Physics I	3
PHYS-UA 71	Introductory Experimental Physics I	2
EXPOS-UA 1	Writing The Essay:	4
First-Year Seminar		4
Credits		17
2nd Semester/Term		
MATH-UA 122	Calculus II	4
PHYS-UA 93	Physics II	3
PHYS-UA 72	Introductory Experimental Physics II	2
MATH-UA 140	Linear Algebra	4
Cultures and Contexts		4
Credits		17
3rd Semester/Term		
MATH-UA 123	Calculus III	4
Texts and Ideas		4
PHYS-UA 95	Physics III	3
PHYS-UA 73	Intermediate Experimental Physics I	2
EG-UY 1004	Introduction to Engineering and Design	4
Credits		17
4th Semester/Term		
MATH-UA 262	Ordinary Diff Equations	4
Societies and the Social Sciences		4
MATH-UA 235	Probability & Statistics	4

CM-UY 1003 & CM-UY 1001	General Chemistry for Engineers and General Chemistry for Engineers Laboratory	4
Credits		16
5th Semester/Term		
MATH-UA 325	Analysis	4
Mathematics Elective		4
Expressive Culture		4
CE-UY 1002	Introduction to Civil Engineering	2
CE-UY 2133	ENGINEERING MECHANICS	3
Credits		17
6th Semester/Term		
MATH-UA 343	Algebra	4
Mathematics Elective		4
CE-UY 2143	ANALYSIS OF DETERMINATE STRUCTURES	3
CE-UY 2213	FLUID MECHANICS AND HYDRAULICS	3
CS-UY 1113	PROBLEM SOLVING AND PROGRAMMING I	3
Credits		17
7th Semester/Term		
CE-UY 2533	CONSTRUCTION PROJECT MANAGEMENT	3
CE-UY 2343	Transportation Engineering	3
CE-UY 3223	INTRO TO ENVIRONMENTAL ENGINEERING	3
CE-UY 3243	WATER RESOURCES ENGINEERING	3
HU/SS Elective		4
Credits		16
8th Semester/Term		
CE-UY 3153	Geotechnical Engineering	3
CE-UY 3183	STRUCTURAL ENGINEERING	3
CE-UY 3013	COMPUTING IN CIVIL ENGINEERING	3
Civil Engineering Elective		3
Civil Engineering Elective		3
Credits		15
9th Semester/Term		
CE-UY 4803	Civil Engineering Capstone	3
CE-UY 3163	Materials for the Built Environment	3
CE-UY 4092	Leadership, Business Principles, Policy and Ethics in Civil Engineering	2
HU/SS Elective		4
CE-UY 4990	Fundamentals of Engineering Exam Registration for CUE	0
Science Elective		3
Credits		15
10th Semester/Term		
Civil Engineering Concentration Capstone		3
Other Elective Credits		4
Other Elective Credits		4
Other Elective Credits		4
Civil Engineering Elective		4
Credits		19
Total Credits		166

Recommended Sequence for Majors in Mathematics

For students placing into Calculus I (MATH-UA 121):

- First semester: Calculus I (MATH-UA 121), possibly with Discrete Mathematics (MATH-UA 120)
- Second semester: Calculus II (MATH-UA 122), and Discrete Mathematics if not yet taken

- Third semester Calculus III (MATH-UA 123) and Linear Algebra or Honors Linear Algebra (MATH-UA 140 or 148)
- Fourth semester: Analysis or Honors Analysis I (MATH-UA 325 or 328)

For students placing into Calculus II (MATH-UA 122):

- First semester: Calculus II (MATH-UA 122) and Discrete Mathematics (MATH-UA 120)
- Second semester: Calculus III or Honors Calculus III (MATH-UA 123 or 129), and Linear Algebra or Honors Linear Algebra (MATH-UA 140 or 148)
- Third semester: Analysis or Honors Analysis I (MATH-UA 325 or 328)

For students placing into Calculus III (MATH-UA 123):

- First semester: Calculus III or Honors Calculus III (MATH-UA 123 or 129), possibly with Discrete Mathematics (MATH-UA 120)
- Second semester: Linear Algebra or Honors Linear Algebra (MATH-UA 140 or 148), and Discrete Mathematics (MATH-UA 120) if not yet taken
- Third semester: Analysis or Honors Analysis I (MATH-UA 325 or 328)

Learning Outcomes

College of Arts and Science

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

1. Proficiency in the foundations of modern mathematics, including discrete mathematics, calculus, analysis, and algebra.
2. The ability to communicate mathematically, including understanding, developing, and critiquing mathematical arguments and rigorous proofs.
3. The ability to apply mathematical ideas and methods to questions and problems both within and outside of the mathematical sciences.
4. Advanced knowledge in some specific areas of mathematics, such as differential equations, geometry and topology, complex analysis, probability and statistics, number theory, or numerical analysis.
5. Experience in using appropriate technology to calculate, visualize, and model problems.

Tandon School of Engineering

1. Apply scientific principles, interdisciplinary knowledge, critical thinking skills, cutting-edge technology, and a passion for civil engineering to solve complex engineering and societal problems.
2. Demonstrate leadership in professional careers, pursue continuous and lifelong learning, and progress towards professional licensure.
3. Communicate and collaborate effectively with industry professionals, decision-makers, and community stakeholders.
4. Work in an ethical and professional manner towards sustainable and resilient civil and urban infrastructure systems.
5. Successfully perform functions of civil engineering practice, including analysis, design, project management, experimentation, interpretation of data, application of new knowledge, and use of sound engineering judgment to draw conclusions.

Policies

Major Policies

1. Mathematics for Economics I, II, III (MATH-UA 131, 132, 133; formerly MATH-UA 211, 212, 213) do not count toward the major

in mathematics as substitutions for the Calculus I, II, III sequence (MATH-UA 121, 122, 123). Exceptions may be made for students who have already taken Mathematics for Economics for their declared or intended second or joint major in economics; they must seek the approval of the Department of Mathematics for this substitution. All other students must follow the regular calculus sequence. Students may not register simultaneously for separate courses within the two sequences.

2. Up to two computer science courses at the level of Introduction to Computer Science (CSCI-UA 101) or higher, or up to two graduate data science (DS-GA) courses, may be counted toward the thirteen courses required for the major. The prerequisites for DS-GA courses are Calculus III (MATH-UA 123), Linear Algebra (MATH-UA 140), and programming experience in Python (preferred) or MATLAB. Probability is a recommended prerequisite.
3. Students who complete the prehealth program may substitute at most two MATH-UA courses by any two of the following: General Physics I, II (PHYS-UA 11, 12) or Physics I, II (PHYS-UA 91, 93).
4. However, if these physics courses are used towards the mathematics major, the computer science or data science courses above will not apply towards the major, and vice-versa.
5. Students may double-count no more than two courses toward both the mathematics major and the requirements of another major or minor
6. Courses taken under the Pass/Fail option cannot count toward the major. A grade of C or higher is required in all courses used to fulfill major requirements. In addition, majors must maintain a 2.0 mathematics GPA.
7. Students may petition to enroll in graduate mathematics courses and apply them to the undergraduate major. Permission is not granted until the student has completed Analysis (MATH-UA 325) and the available undergraduate course(s) on the same topic. Please see the undergraduate section of the department's website for more information and to request permission to enroll in a graduate course.
8. All mathematics majors and minors are required to see an undergraduate faculty adviser to review their course of study and be advised on appropriate courses for each term. Inquire at the department office, Warren Weaver Hall, 251 Mercer Street, Room 625 or 627, or call 212-998-3005 for more information.

CAS Mathematics Requirement (Quantitative Reasoning)

Please note that all SAT Subject Examinations are discontinued as of January 2021 in the U.S. and after June 2021 internationally.

1. To satisfy the College Core Curriculum requirement in Quantitative Reasoning (QR), all College of Arts and Science students must either take one semester of an approved course with mathematical content, or present qualifying advanced standing credit or SAT Subject Examination scores to exempt from the requirement. (There is no CAS examination to exempt students from QR.)
2. Advanced Placement (AP), International Baccalaureate (IB; HL only), and Advanced Level (A Level; not AS) credit in calculus, statistics, and mathematics satisfies the QR requirement, as does similar credit in selected international examinations. Consult the admission section of this Bulletin or a CAS adviser for details on which approved examinations and minimum scores confer credit. In addition, a score of 700 or higher on the SAT Subject Examination in Mathematics

(either level 1 or 2) satisfies the Core QR requirement (no credit is awarded).

- Students in the following majors or tracks of study are required to take courses which also satisfy the Core QR requirement: computer science, data science, economics, engineering, global public health, international relations, mathematics, the natural sciences, the prehealth track, psychology, and sociology. (These areas of study differ in whether and how they accept advanced standing credit toward their quantitative requirements; consult the appropriate sections of this Bulletin.)
- CAS students who are not pursuing one of these courses of study, and who cannot present advanced standing credit or SAT Subject Examination scores for exemption from the QR requirement, must take one of the Quantitative Reasoning (CORE-UA 1XX) courses offered in the College Core Curriculum.
- Alternatively, students who meet the prerequisites or take a placement exam may register for an appropriate calculus course at the level of Calculus I (MATH-UA 121) or above. Other CAS courses that satisfy the QR requirement (in statistics, e.g.) are posted on the Core Curriculum website, core.cas.nyu.edu.

Placement into Calculus and other Foundational Courses

Please note that all SAT Subject Examinations are discontinued as of January 2021 in the U.S. and after June 2021 internationally.

Students meeting any of the following criteria may enter Calculus I (MATH-UA 121) or Mathematics for Economics I (MATH-UA 131; formerly MATH-UA 211). In addition, students meeting any of the following criteria may register for Discrete Mathematics (MATH-UA 120), Linear Algebra (MATH-UA 140), or Honors Linear Algebra (MATH-UA 148), although in the case of MATH-UA 148 the required grade in Algebra, Trigonometry, and Functions (MATH-UA 9; formerly Algebra and Calculus) is an A- and not a C.

- SAT general test Mathematics score of 670 or higher (for SAT taken in and after March 2016)
- SAT Subject Examination in Mathematics (level 1 or level 2) score of 650 or higher
- ACT Mathematics score of 30 or higher
- Advanced Placement (AP) Calculus AB exam score of 3 or higher (must be 4 or 5 to earn credit)
- AB subscore on the AP Calculus BC exam of 3 or higher (must be 4 or 5 to earn credit)
- AP Calculus BC exam score of 3 or higher (must be 4 or 5 to earn credit)
- A Level Mathematics score of C or higher (must be B or higher to earn credit; anyone who took Further Mathematics should consult the mathematics department for placement)
- AS Level Mathematics score of B or higher (no credit is awarded for AS exams)
- International Baccalaureate (IB) HL Mathematics score of 5 or higher (must be 6 or higher to earn credit)
- IB Analysis and Approaches HL score of 5 or higher (must be 6 or higher to earn credit)
- IB Applications and Interpretations HL score of 5 or higher (must be 6 or higher to earn credit)

- IB Analysis and Approaches SL score of 7 (no credit is awarded for SL exams)
- Algebra, Trigonometry, and Functions (MATH-UA 9; formerly Algebra and Calculus) with a grade of C or higher (A-minus or higher for entry into MATH-UA 148), or equivalent
- Passing score on the departmental calculus placement exam

Students who do not meet any of these prerequisites must take Algebra, Trigonometry, and Functions (MATH-UA 9; formerly Algebra and Calculus) and meet the minimum grade requirement before proceeding to any of the courses listed above.

Advanced Placement with Credit

Freshmen seeking advanced placement in the mathematics major or minor may present results of the Advanced Placement (AP) Calculus AB or BC Examination.

- A student who earns a 4 or 5 on the Calculus AB exam (or AB subscore) or a 4 on the Calculus BC exam will receive 4 credits equivalent to Calculus I (MATH-UA 121) and will be placed into Calculus II (MATH-UA 122).
- A student who earns a score of 5 on the Calculus BC exam will receive 8 credits, equivalent to both Calculus I (MATH-UA 121) and Calculus II (MATH-UA 122), and will be placed into Calculus III (MATH-UA 123) or Honors Calculus III (MATH-UA 129).

For calculus equivalencies and placement for advanced standing credit in mathematics from International Baccalaureate (HL only), A Level, and other approved international examinations, please consult the admission section of this Bulletin or a CAS adviser.

Note that AP and other advanced standing credit by exam **cannot** be used to place into, or ahead in, the Mathematics for Economics I, II, III sequence (MATH-UA 131, 132, 133; formerly 211, 212, 213). These exam credits are not equivalent to any course in this sequence.

Advanced Placement without Credit

The department periodically gives its own advanced placement exams for students who know the material covered in Calculus I (MATH-UA 121), Calculus II (MATH-UA 122), Mathematics for Economics I (MATH-UA 131; formerly MATH-UA 211), and/or Mathematics for Economics II (MATH-UA 132; formerly MATH-UA 212) and who wish to enter Calculus II (MATH-UA 122), Calculus III (MATH-UA 123), Mathematics for Economics II (MATH-UA 132; formerly MATH-UA 212), or Mathematics for Economics III (MATH-UA 133; formerly MATH-UA 213). There is also an examination to pass out of Calculus III (MATH-UA 123). If a student passes any of these exams, he or she is placed into the next course of the sequence; however, no college credit is given for the courses that are skipped.

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/>).