**MATHEMATICS/COMPUTER ENGINEERING (BS/BS)**

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

**NYSED:** 33280  **HEGIS:** 1701.00  **CIP:** 27.0101

**Program Requirements**

**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**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAS Core + Tandon General Education Requirements</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPOS-UA 1</td>
<td>Writing as Inquiry</td>
<td>4</td>
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</tbody>
</table>

**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.

**Sample Plan of Study**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First-Year Seminar</strong></td>
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<td>4</td>
</tr>
<tr>
<td><strong>Texts and Ideas</strong></td>
<td></td>
<td>4</td>
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<tr>
<td><strong>Cultures and Contexts</strong></td>
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<td>4</td>
</tr>
<tr>
<td><strong>Societies and the Social Sciences</strong></td>
<td></td>
<td>4</td>
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<tr>
<td><strong>Expressive Culture</strong></td>
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<tr>
<td><strong>Humanities/Social Science Electives</strong></td>
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<td>8</td>
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<tr>
<td><strong>Major Requirements</strong></td>
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<tr>
<td>CSCH-UA 101</td>
<td>Intro to Computer Science</td>
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<tr>
<td>MATH-UA 120</td>
<td>Discrete Mathematics</td>
<td>4</td>
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<tr>
<td>MATH-UA 121</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH-UA 122</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH-UA 123</td>
<td>Calculus III</td>
<td>4</td>
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<tr>
<td>MATH-UA 140</td>
<td>Linear Algebra</td>
<td>4</td>
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<td>MATH-UA 262</td>
<td>Ordinary Diff Equations</td>
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<td>MATH-UA 233</td>
<td>Theory of Probability</td>
<td>4</td>
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<tr>
<td>MATH-UA 325</td>
<td>Analysis</td>
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<td>MATH-UA 343</td>
<td>Algebra</td>
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<td>PHYS-UA 91</td>
<td>Physics I</td>
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<td>PHYS-UA 95</td>
<td>Physics III</td>
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<td>PHYS-UA 71</td>
<td>Introductory Experimental Physics</td>
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<td>PHYS-UA 72</td>
<td>Introductory Experimental Physics</td>
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<tr>
<td>PHYS-UA 73</td>
<td>Intermediate Experimental Physics</td>
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<tr>
<td>CS-U1 1134</td>
<td>Data Structures and Algorithms</td>
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<tr>
<td>CS-U1 2204</td>
<td>DIGITAL LOGIC AND STATE MACHINE DESIGN</td>
<td>4</td>
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<tr>
<td>CS-U1 2124</td>
<td>Object Oriented Programming</td>
<td>4</td>
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<tr>
<td>CS-U1 2214</td>
<td>COMPUTER ARCHITECTURE AND ORGANIZATION</td>
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<tr>
<td>ECE-U1 1004</td>
<td>Introduction to Engineering and Design</td>
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<td>ECE-U1 2004</td>
<td>FUND. OF ELECTRIC CIRCUITS</td>
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<tr>
<td>ECE-U1 3114</td>
<td>Fundamentals of Electronics</td>
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<tr>
<td>ECE-U1 4001</td>
<td>ECE Professional Development &amp; Presentation</td>
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<tr>
<td><strong>Design Project I</strong></td>
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<tr>
<td><strong>Design Project II</strong></td>
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<tr>
<td>CM-U1 1003</td>
<td>General Chemistry for Engineers</td>
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<td>CM-U1 1001</td>
<td>General Chemistry for Engineers Laboratory</td>
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<td><strong>Electives</strong></td>
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<td>ECE-U1 Elective</td>
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<td>ECE/C-U1 Elective</td>
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<td>Advanced Mathematics Elective</td>
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<tr>
<td>Computer Engineering Restricted Electives (4)</td>
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<td>Mathematics Electives (2)</td>
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<td><strong>Total Credits</strong></td>
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Credits 17
Mathematics/Computer Engineering (BS/BS)

2nd Semester/Term
MATH-UA 122  Calculus II  4
EXPOS-UA 1  Writing as Inquiry  4
MATH-UA 140  Linear Algebra  4
PHYS-UA 93  Physics II  3
PHYS-UA 71  Introductory Experimental Physics I  2

Credits  17

3rd Semester/Term
MATH-UA 123  Calculus III  4
PHYS-UA 93  Physics II  3
PHYS-UA 71  Introductory Experimental Physics I  2
Texts and Ideas  4
EG-UY 1004  Introduction to Engineering and Design  4

Credits  17

4th Semester/Term
MATH-UA 262  Ordinary Diff Equations  4
MATH-UA 325  Analysis  4
Cultures and Contexts  4
MATH-UA 120  Discrete Mathematics  4

Credits  16

5th Semester/Term
MATH-UA 233  Theory of Probability  4
MATH-UA 343  Algebra  4
CS-UY 1134  Data Structures and Algorithms  4
ECE-UY 2004  FUND. OF ELECTRIC CIRCUITS  4

Credits  16

6th Semester/Term
Mathematics Elective  4
CS-UY 2124  Object Oriented Programming  4
CS-UY 2204  DIGITAL LOGIC AND STATE MACHINE DESIGN  4
ECE-UY 3114  Fundamentals of Electronics I  4

Credits  16

7th Semester/Term
Societies and the Social Sciences  4
Mathematics Elective  4
CS-UY 2214  COMPUTER ARCHITECTURE AND ORGANIZATION  4
CompE Restricted Elective  4

Credits  16

8th Semester/Term
CM-UY 1003  General Chemistry for Engineers  4
& CM-UY 1001  and General Chemistry for Engineers Laboratory  4
Mathematics Advanced Elective  4
Expressive Culture  4
CompE Restricted Elective  4

Credits  16

9th Semester/Term
Design Project I  3
ECE-UY 4001  ECE Professional Development & Presentation  1
ECE/CS-UY Elective  3
ECE/UY Elective  3-4
HU/SS Elective  4

Credits  14

10th Semester/Term
Design Project II  3
CompE Restricted Elective  4
ECE/CS-UY Elective  3
CompE Restricted Elective  4
HU/SS Elective  4

Credits  18

Total Credits  163

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
Students will be able to demonstrate the following (per ABET):
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Policies

Students may elect to withdraw from the dual-degree program in engineering and complete only the College of Arts and Science Core and major requirements, thus earning one undergraduate degree from CAS. If students elect to withdraw from the dual-degree program and remain in CAS, they are no longer exempt from the CAS foreign language requirement and must factor this into their academic planning.

Also, if students elect to withdraw from the dual degree program and remain in CAS, any Tandon courses taken will count against each student's 16-point allowance in the other divisions of NYU, and also cannot be applied toward the 64-point UA residency requirement.

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/).