MATHEMATICS/COMPUTER ENGINEERING (BS/BS)

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

NYSED: 33280 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.

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>
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<tbody>
<tr>
<td>CAS Core + Tandon General Education Requirements</td>
<td></td>
<td></td>
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<tr>
<td>EXPOS-UA 1</td>
<td>Writing The Essay:</td>
<td>4</td>
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</table>

| First-Year Seminar | 4 |
| Texts and Ideas    | 4 |
| Cultures and Contexts | 4 |
| Societies and the Social Sciences | 4 |
| Expressive Culture | 4 |
| Humanities/Social Science Electives | 8 |

Major Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSCI-UA 101</td>
<td>Intro to Computer Science</td>
<td>4</td>
</tr>
<tr>
<td>MATH-UA 120</td>
<td>Discrete Mathematics</td>
<td>4</td>
</tr>
<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>
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<tr>
<td>MATH-UA 123</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH-UA 140</td>
<td>Linear Algebra</td>
<td>4</td>
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<tr>
<td>MATH-UA 262</td>
<td>Ordinary Diff Equations</td>
<td>4</td>
</tr>
<tr>
<td>MATH-UA 233</td>
<td>Theory of Probability</td>
<td>4</td>
</tr>
<tr>
<td>MATH-UA 325</td>
<td>Analysis</td>
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<tr>
<td>MATH-UA 343</td>
<td>Algebra</td>
<td>4</td>
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<tr>
<td>PHYS-UA 91</td>
<td>Physics I</td>
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<tr>
<td>PHYS-UA 93</td>
<td>Physics II</td>
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<td>PHYS-UA 95</td>
<td>Physics III</td>
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<tr>
<td>PHYS-UA 71</td>
<td>Introductory Experimental Physics I</td>
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<tr>
<td>PHYS-UA 72</td>
<td>Introductory Experimental Physics II</td>
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<td>PHYS-UA 73</td>
<td>Intermediate Experimental Physics I</td>
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<tr>
<td>CS-U1 1134</td>
<td>Data Structures and Algorithms</td>
<td>4</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>
<td>4</td>
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<tr>
<td>EG-U1 1004</td>
<td>Introduction to Engineering and Design</td>
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<tr>
<td>ECE-U1 2004</td>
<td>FUND. OF ELECTRIC CIRCUITS</td>
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<td>ECE-U1 3114</td>
<td>Fundamentals of Electronics I</td>
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<tr>
<td>ECE-U1 4001</td>
<td>ECE Professional Development &amp; Presentation</td>
<td>1</td>
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<tr>
<td>Design Project I</td>
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<tr>
<td>Design Project II</td>
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<tr>
<td>CM-U1 1003/1001</td>
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<td>Electives</td>
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<td>ECE-U1 Elective</td>
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<td>ECE/CS-U1 Elective</td>
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<tr>
<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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Total Credits: 163

Sample Plan of Study

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1st Semester/Term</td>
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<tr>
<td>CSCI-UA 101</td>
<td>Intro to Computer Science</td>
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</tr>
<tr>
<td>MATH-UA 121</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>First-Year Seminar</td>
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<td>4</td>
</tr>
<tr>
<td>PHYS-UA 91</td>
<td>Physics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS-UA 71</td>
<td>Introductory Experimental Physics I</td>
<td>2</td>
</tr>
</tbody>
</table>

Credits: 17
### 2nd Semester/Term

- **MATH-UA 122** Calculus II 4
- **EXPOS-UA 1** Writing The Essay: 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** Fundamentals 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** 3-4

#### Credits
15

### 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** 3-4

#### Credits
16

### 9th Semester/Term

- **Design Project I** 3
- **ECE-UY 4001** ECE Professional Development & Presentation 1
- **ECE/CS-US Elective** 3
- **ECE/UY Elective** 3-4
- **HU/SS Elective** 4

#### Credits
14

### 10th Semester/Term

- **Design Project II** 3
- **CompE Restricted Elective** 3-4
- **ECE/CS-US Elective** 3
- **CompE Restricted Elective** 3-4
- **HU/SS Elective** 4

#### Credits
16

#### Total Credits
160

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### 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**

**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/).