

# PHYSICS/ELECTRICAL ENGINEERING (BS/BS)

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

NYSED: 33285 HEGIS: 1902.00 CIP: 40.0801

## 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

| Course  | Title              | Credits |
|---|--------------------|---------|
| <b>CAS Core + Tandon General Education Requirements</b> |                    |         |
| EXPOS-UA 1  | Writing as Inquiry | 4       |

|  |   |   |
|--|---|---|
| First-Year Seminar   | 4   |   |
| Texts and Ideas  | 4   |   |
| Cultures and Contexts  | 4   |   |
| Societies and the Social Sciences  | 4   |   |
| Expressive Culture   | 4   |   |
| <b>Major Requirements</b>  |   |   |
| MATH-UA 121  | Calculus I                                    | 4 |
| MATH-UA 122  | Calculus II                                   | 4 |
| MATH-UA 123  | Calculus III                                  | 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 |
| PHYS-UA 120  | Dynamics                                      | 3 |
| PHYS-UA 74   | Intermediate Experimental Physics II          | 2 |
| PHYS-UA 106  | Mathematical Physics                          | 3 |
| PHYS-UA 123  | Quantum Mechanics I                           | 3 |
| PHYS-UA 131  | Electricity & Magnet I                        | 3 |
| PHYS-UA 112  | Advanced Experimental Physics                 | 3 |
| PHYS-UA 140  | Thermal & Statistical Physics                 | 3 |
| CS-UY 1114   | Intro To Programming & Problem Solving        | 4 |
| MA-UY 2034   | Linear Algebra and Differential Equations     | 4 |
| MA-UY 3113   | Advanced Linear Algebra and Complex Variables | 3 |
| CS-UY 2163   | Introduction to Programming in C              | 3 |
| CS-UY 2204   | Digital Logic and State Machine Design        | 4 |
| EG-UY 1004   | Introduction to Engineering and Design        | 4 |
| ECE-UY 2004  | Fund. Of Electric Circuits                    | 4 |
| ECE-UY 3114  | Fundamentals of Electronics I                 | 4 |
| ECE-UY 3054  | Signals and Systems                           | 4 |
| ECE-UY 3604  | Electromagnetic Waves                         | 4 |
| ECE-UY 4001  | ECE Professional Development & Presentation   | 1 |
| ECE-UY 4XX3 (Design Project I)   |   | 3 |
| ECE-UY 4XX3 (Design Project II)  |   | 3 |
| MA-UY 2233   | Introduction to Probability                   | 3 |
| CM-UY 1003   | General Chemistry for Engineers               | 3 |
| CM-UY 1001   | General Chemistry for Engineers Laboratory    | 1 |
| <b>Electives</b>   |   |   |
| ECE-UY XXXX (Electrical Engineering Restricted Electives)                        | 12  |   |
| ECE-UY/EL-GY XXXX (Electrical Engineering Electives) (3)                         | 9   |   |
| ECE/CS-UY or EL/CS-GY XXXX (Electrical Engineering or Computer Science Elective) | 3   |   |
| Humanities/Social Science Electives (2)  | 8   |   |
| Physics Electives (0110 and above) (2)   | 6   |   |
| <b>Total Credits</b>   | <b>161</b>                                    |   |

## Sample Plan of Study

| Course                   | Title              | Credits |
|--------------------------|--------------------|---------|
| <b>1st Semester/Term</b> |                    |         |
| MATH-UA 121              | Calculus I         | 4       |
| EXPOS-UA 1               | Writing as Inquiry | 4       |
| First-Year Seminar       |                    | 4       |

|                                   |  |    |                         |            |
|-----------------------------------|--|----|-------------------------|------------|
| PHYS-UA 91                        | Physics I                                      | 3  | ECE Restricted Elective | 4          |
| PHYS-UA 71                        | Introductory Experimental Physics I            | 2  | ECE Restricted Elective | 4          |
|                                   | Credits  | 17 | ECE/CS-UY Elective      | 3          |
| <b>2nd Semester/Term</b>          |  |    | <b>Credits</b>          | <b>14</b>  |
| MATH-UA 122                       | Calculus II                                    | 4  |                         |            |
| Societies and the Social Sciences |  | 4  |                         |            |
| Cultures and Contexts             |  | 4  |                         |            |
| PHYS-UA 93                        | Physics II                                     | 3  |                         |            |
| PHYS-UA 72                        | Introductory Experimental Physics II           | 2  |                         |            |
|                                   | Credits  | 17 |                         |            |
| <b>3rd Semester/Term</b>          |  |    | <b>Total Credits</b>    | <b>161</b> |
| PHYS-UA 95                        | Physics III                                    | 3  |                         |            |
| PHYS-UA 73                        | Intermediate Experimental Physics I            | 2  |                         |            |
| MATH-UA 123                       | Calculus III                                   | 4  |                         |            |
| Texts and Ideas                   |  | 4  |                         |            |
| EG-UY 1004                        | Introduction to Engineering and Design         | 4  |                         |            |
|                                   | Credits  | 17 |                         |            |
| <b>4th Semester/Term</b>          |  |    |                         |            |
| PHYS-UA 120                       | Dynamics                                       | 3  |                         |            |
| PHYS-UA 74                        | Intermediate Experimental Physics II           | 2  |                         |            |
| PHYS-UA 106                       | Mathematical Physics                           | 3  |                         |            |
| Expressive Culture                |  | 4  |                         |            |
| Physics Elective (0110 and up)    |  | 3  |                         |            |
|                                   | Credits  | 15 |                         |            |
| <b>5th Semester/Term</b>          |  |    |                         |            |
| PHYS-UA 123                       | Quantum Mechanics I                            | 3  |                         |            |
| PHYS-UA 131                       | Electricity & Magnet I                         | 3  |                         |            |
| ECE-UY 2004                       | Fund. Of Electric Circuits                     | 4  |                         |            |
| MA-UY 2034                        | Linear Algebra and Differential Equations      | 4  |                         |            |
| CS-UY 1114                        | Intro To Programming & Problem Solving         | 4  |                         |            |
|                                   | Credits  | 18 |                         |            |
| <b>6th Semester/Term</b>          |  |    |                         |            |
| PHYS-UA 112                       | Advanced Experimental Physics                  | 3  |                         |            |
| PHYS-UA 140                       | Thermal & Statistical Physics                  | 3  |                         |            |
| ECE-UY 3114                       | Fundamentals of Electronics I                  | 4  |                         |            |
| CS-UY 2204                        | Digital Logic and State Machine Design         | 4  |                         |            |
| MA-UY 3113                        | Advanced Linear Algebra and Complex Variables  | 3  |                         |            |
|                                   | Credits  | 17 |                         |            |
| <b>7th Semester/Term</b>          |  |    |                         |            |
| Physics Elective (0110 and up)    |  | 3  |                         |            |
| ECE-UY 3054                       | Signals and Systems                            | 4  |                         |            |
| MA-UY 2233                        | Introduction to Probability                    | 3  |                         |            |
| ECE Elective                      |  | 3  |                         |            |
|                                   | Credits  | 13 |                         |            |
| <b>8th Semester/Term</b>          |  |    |                         |            |
| ECE-UY 3604                       | Electromagnetic Waves                          | 4  |                         |            |
| CS-UY 2163                        | Introduction to Programming in C               | 3  |                         |            |
| ECE Restricted Elective           |  | 4  |                         |            |
| ECE Elective                      |  | 3  |                         |            |
| HU/SS Elective                    |  | 4  |                         |            |
|                                   | Credits  | 18 |                         |            |
| <b>9th Semester/Term</b>          |  |    |                         |            |
| Design Project I                  |  | 3  |                         |            |
| ECE-UY 4001                       | ECE Professional Development & Presentation    | 1  |                         |            |
| ECE Elective                      |  | 3  |                         |            |
| CM-UY 1003                        | General Chemistry for Engineers                | 4  |                         |            |
| & CM-UY 1001                      | and General Chemistry for Engineers Laboratory | 4  |                         |            |
| HU/SS Elective                    |  | 4  |                         |            |
|                                   | Credits  | 15 |                         |            |
| <b>10th Semester/Term</b>         |  |    |                         |            |
| Design Project II                 |  | 3  |                         |            |

## Learning Outcomes

### College of Arts and Science

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

1. A fundamental command of physics, as well as of the subdisciplines of classical mechanics and electromagnetism, special relativity, quantum mechanics, and statistical and thermal physics.
2. Facility in advanced topics (chosen from among general relativity, condensed matter physics, biophysics, and others) relevant to modern research.
3. The mathematical skills required to describe and predict the behavior of physical systems from first principles.
4. The experimental and analytical skills needed to test the application of physical laws to real systems.
5. Facility in advanced topics in mathematics, chemistry, and/or biology, and an understanding of their relation to concepts in physics.

## 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

### Program 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-credit allowance in the other divisions of NYU, and also cannot be applied toward the 64-credit 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/>).