

# PHYSICS/MECHANICAL ENGINEERING (BS/BS)

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

NYSED: 33286 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 1113	Problem Solving and Programming I	3
MA-UY 2224	Probability and Statistics for Engineers	4
EG-UY 1004	Introduction to Engineering and Design	4
ME-UY 1012	Introduction to Mechanical Engineering	2
ME-UY 2112	Computer Aided Design	2
ME-UY 2213	Statics	3
ME-UY 3333	Thermodynamics	3
ME-UY 2813	Introduction to Materials Science	3
ME-UY 3811	Materials Science Laboratory	1
ME-UY 3213	Mechanics of Materials	3
ME-UY 3513	Measurement Systems	3
ME-UY 2223	Dynamics	3
ME-UY 3511	Measurement Systems Laboratory	1
ME-UY 3233	Machine Design	3
ME-UY 3313	Fluid Mechanics	3
ME-UY 3311	Fluid Mechanics Laboratory	1
ME-UY 3413	Automatic Control	3
ME-UY 3411	Automatic Control Laboratory	1
ME-UY 4113	Senior Design II	3
ME-UY 4103	Senior Design I	3
ME-UY 4214	Finite Element Modeling, Design and Analysis	4
ME-UY 4313	Heat Transfer	3
ME-UY 4311	Heat Transfer Laboratory	1
CM-UY 1003	General Chemistry for Engineers	3
CM-UY 1001	General Chemistry for Engineers Laboratory	1
<b>Electives</b>		
Free Electives (2)		6
Humanities/Social Science Electives (2)		8
Physics Electives (0110 and above)		6

STEM Electives (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
Texts and Ideas		4
First-Year Seminar		4
PHYS-UA 91	Physics I	3
PHYS-UA 71	Introductory Experimental Physics I	2
<b>Credits</b>		<b>17</b>
<b>2nd Semester/Term</b>		
MATH-UA 122	Calculus II	4
PHYS-UA 93	Physics II	3
PHYS-UA 72	Introductory Experimental Physics II	2
EXPOS-UA 1	Writing as Inquiry	4
Cultures and Contexts		4
<b>Credits</b>		<b>17</b>
<b>3rd Semester/Term</b>		
MATH-UA 123	Calculus III	4
PHYS-UA 95	Physics III	3
PHYS-UA 73	Intermediate Experimental Physics I	2
Expressive Culture		4
EG-UY 1004	Introduction to Engineering and Design	4
<b>Credits</b>		<b>17</b>
<b>4th Semester/Term</b>		
PHYS-UA 120	Dynamics	3
PHYS-UA 74	Intermediate Experimental Physics II	2
PHYS-UA 106	Mathematical Physics	3
Societies and the Social Sciences		4
CM-UY 1003 & CM-UY 1001	General Chemistry for Engineers and General Chemistry for Engineers Laboratory	4
<b>Credits</b>		<b>16</b>
<b>5th Semester/Term</b>		
PHYS-UA 123	Quantum Mechanics I	3
PHYS-UA 131	Electricity & Magnet I	3
CS-UY 1113	Problem Solving and Programming I	3
ME-UY 2112	Computer Aided Design	2
ME-UY 1012	Introduction to Mechanical Engineering	2
ME-UY 2813	Introduction to Materials Science	3
ME-UY 3811	Materials Science Laboratory	1
<b>Credits</b>		<b>17</b>
<b>6th Semester/Term</b>		
PHYS-UA 112	Advanced Experimental Physics	3
PHYS-UA 140	Thermal & Statistical Physics	3
Physics Elective (0110 and up)		3
MA-UY 2224	Probability and Statistics for Engineers	4
ME-UY 2213	Statics	3
<b>Credits</b>		<b>16</b>
<b>7th Semester/Term</b>		
ME-UY 3333	Thermodynamics	3
ME-UY 3213	Mechanics of Materials	3
ME-UY 3513	Measurement Systems	3
ME-UY 2223	Dynamics	3
ME-UY 3511	Measurement Systems Laboratory	1
Physics Elective (0110 and up)		3
<b>Credits</b>		<b>16</b>
<b>8th Semester/Term</b>		
ME-UY 3233	Machine Design	3
ME-UY 3313	Fluid Mechanics	3

ME-UY 3311	Fluid Mechanics Laboratory	1
ME-UY 3413	Automatic Control	3
ME-UY 3411	Automatic Control Laboratory	1
STEM Elective		3
<b>Credits</b>		<b>14</b>
<b>9th Semester/Term</b>		
ME-UY 4214	Finite Element Modeling, Design and Analysis	4
ME-UY 4103	Senior Design I	3
ME-UY 4313	Heat Transfer	3
ME-UY 4311	Heat Transfer Laboratory	1
Other Elective Credits		3
<b>Credits</b>		<b>17</b>
<b>10th Semester/Term</b>		
ME-UY 4113	Senior Design II	3
STEM Elective		3
HU/SS Elective		4
HU/SS Elective		4
<b>Credits</b>		<b>14</b>
<b>Total Credits</b>		<b>161</b>

## 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/>).