Prerequisite Coursework

A student must successfully complete the equivalents of the following Columbia courses at his/her home institution. Liaisons at each school are responsible for determining which classes (listed in red below) fulfill these Columbia prerequisite courses and will advise students accordingly.

Foundational Courses Required of All Majors

Note that some majors may require additional specific courses replacing or adding to the following requirements, detailed in the major-specific course lists.

Mathematics
Calculus I, II and III (MATH UN1101, MATH UN1102 and MATH UN1201): (MAT111 or 112), MAT113, and MAT160
Physics
Introduction to Mechanics and Thermodynamics (PHYS UN1401): PHY125 or PHY130
Introduction to Electricity, Magnetism and Optics (PHYS UN1402): PHY230
Chemistry
General Chemistry I Lecture (CHEM UN1403): CHE115
Lab Requirement (choose one of the following two)
Introduction to Experimental Physics Lab (PHYS UN1493/4) *or* General Chemistry Lab (CHEM UN1500)
Note that some majors require a specific lab in either chemistry or physics, or both: PHY125/130/230 or CHE115
Computer Science
Introduction to Computer Science and Programming in C/C++, Java, Python or MATLAB (COMS W1004, W1005 or W1007 or ENGI E1006): CSC121 or PHY200
Note that some majors require a specific programming language.
Humanities and Social Sciences
Principles of Economics (ECON UN1105): ECO101
University Writing (ENGL CC1010): Writing Requirement
27 non-technical credit hours (includes courses that fulfill Economics and University Writing): Ways of Knowing Requirements
Non-technical credit hours should help a student to learn perspectives and principles of the humanities and social sciences through discussion, debate and writing. Examples of these courses can be found on our website (bulletin.engineering.columbia.edu/b-elective-nontechnical-courses).

Major-Specific Coursework

Courses noted with a * may be taken either before or during enrollment at Columbia.

Applied Mathematics or Applied Physics
Mathematics
Calculus IV (MATH UN1202): Not Offered
Ordinary Differential Equations (MATH UN2030): MAT235
Physics
Introduction to Classical and Quantum Waves (PHYS UN1403): PHY320
Introduction to Experimental Physics Lab (PHYS UN1493/4): PHY125/130/230
Additional
Choose one of the following three:
General Chemistry I Lecture (CHEM UN1403): CHE115
Environmental Biology I: Elements to Organisms (EEEB UN2001): BIO112 *or*
Introductory Biology I: Biochemistry, Genetics and Molecular Biology (BIOL UN2005): BIO111

Biomedical Engineering

Mathematics

Calculus IV (MATH UN1202): Not Offered

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101): PHY201 *Or, students must take both an ODE and a Linear Algebra course:* MAT150 and MAT235

Physics

Introduction to Classical and Quantum Waves (PHYS UN1403): PHY320

Chemistry

General Chemistry II Lecture (CHEM UN1404): CHE220 or CHE240

General Chemistry Lab (CHEM UN1500): CHE115

Computer Science

Introduction to Computing for Engineers and Applied Scientists in Python (ENGI E1006): CSC121 or PHY200

Additional

Introductory Biology I: Biochemistry, Genetics and Molecular Biology (BIOL UN2005): BIO111

Introductory Biology II: Cell Biology, Development and Physiology (BIOL UN2006): BIO112

*Introduction to Electrical Engineering (ELEN E1201): PHY310

Chemical Engineering

Mathematics

Calculus IV (MATH UN1202): Not Offered

Choose one of the following two:

Ordinary Differential Equations (UN2030): MAT235 *or*

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101): PHY200

Physics

Introduction to Experimental Physics Lab (PHYS UN1493/4): PHY125/130/230

Chemistry

General Chemistry II Lecture (CHEM UN1404): CHE220 or CHE240

General Chemistry Lab (CHEM UN1500): CHE115

Organic Chemistry I Lecture (CHEM UN2443): CHE250

*Organic Chemistry I Lab (CHEM UN2943): CHE250

Computer Science

Introduction to Computing for Engineers and Applied Scientists in Python (ENGI E1006): CSC121 or PHY200

Civil Engineering

Mathematics

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101): PHY201 *Or, students must take both an ODE and a Linear Algebra course:* MAT150 and MAT235

Computer Science

Introduction to Computer Science and Programming in MATLAB (COMS W1005) *The department strongly recommends MATLAB over other languages, though it will accept any language:* CSC315

Additional

Earth: Origin, Evolution, Processes and Future (EESC UN1011)

*Mechanics (ENME E3105): PHY330

Computer Engineering

Mathematics

Calculus IV (MATH UN1202): Not Offered

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101): PHY201 *Or, students must take both an ODE and a Linear Algebra course:* MAT150 and MAT235

Computer Science

Discrete Mathematics (COMS W3203): MAT220

Choose one of the following two:

Introduction to Computer Science and Programming in Java (COMS W1004) *Or* Honors Introduction to Computer Science in Java (COMS W1007): CSC221

Additional

*Introduction to Electrical Engineering (ELEN E1201): PHY310

Computer Science

Computer Science

Discrete Mathematics (COMS W3203): MAT220

Choose one of the following two:

Introduction to Computer Science and Programming in Java (COMS W1004) *or* Honors Introduction to Computer Science in Java (COMS W1007): CSC121/221

Choose one of the following two:

Data Structures in Java (COMS W3134) *or* Data Structures and Algorithms (COMS W3137): CSC221

Earth and Environmental Engineering

Mathematics

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101): PHY201 *Or, students must take both an ODE and a Linear Algebra course:* MAT150 and MAT235

*Introduction to Probability and Statistics (SIEO W3600): MAT340 and MAT341

The course must have calculus, including multivariable integration, as a prerequisite.

Chemistry

General Chemistry II Lecture (CHEM UN1404): CHE220 or CHE240

General Chemistry Lab (CHEM UN1500): CHE115

Additional

*A Better Planet by Design (EAEE E2100)

Choose one of the following two:

*Earth's Environmental Systems: The Climate System (EESC UN2100) *or* *Earth's Environmental Systems: The Solid Earth System (EESC UN2200)

Choose one of the following three:

Organic Chemistry I Lecture (CHEM UN2443): CHE250 Introduction to Classical and Quantum Waves (PHYS UN1403): PHY320 *or* Introductory Biology I: Biochemistry, Genetics and Molecular Biology (BIOL UN2005): BIO111

Electrical Engineering

Mathematics

Calculus IV (MATH UN1202): Not Offered

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101): PHY201 *Or, students must take both an ODE and a Linear Algebra course:* MAT150 and MAT235

Physics

Introduction to Classical and Quantum Waves (PHYS UN1403): PHY320

Computer Science

Sufficient knowledge of computer programming is needed in order to take Data Structures in Java (COMS W3134) or Data Structures and Algorithms (COMS W3137) at Columbia: CSC221

Additional

*Introduction to Electrical Engineering (ELEN E1201): PHY310

Engineering Mechanics

Mathematics

Calculus IV (MATH UN1202): Not Offered

Ordinary Differential Equations (MATH UN2030): MAT235

Additional

*Mechanics (ENME E3105): PHY330

Industrial Engineering, Engineering Management Systems or Operations Research

Mathematics

*Ordinary Differential Equations (MATH UN2030): MAT235

This course must be taken prior to Columbia for any student with interests in the Financial Engineering major. Students cannot apply to this major until they are already enrolled at Columbia (after the first semester in Columbia Engineering).

Choose one of the following two:

Linear Algebra (MATH UN2010): MAT150 *or*

Applied Mathematics I: Linear Algebra (APMA E3101): PHY201

Choose one of the following two:

Probability for Engineers (IEOR E3658) *or*

Probability Theory (STAT GU4203): MAT340

Choose one of the following two:

Applied Statistical Models in Operations Research (IEOR E4307) *or*

Statistical Inference (STAT GU4204): MAT341

Computer Science (choose one language pair)

Introduction to Computer Science and Programming in Java (COMS W1004) and Data Structures in Java (COMS W3134): CSC221

or

Introduction to Computing for Engineers and Applied Scientists in Python (ENGI E1006): CSC121 or PHY200 and Essential Data Structures in C/C++ (COMS W3136): Not Offered

The department strongly *recommends Java over C/C++ with Python.*

Economics

*Introduction to Accounting and Finance (IEOR E2261): ECO211 and ECO214

This course must be taken prior to Columbia for any student with interests in the Financial Engineering major. Students cannot apply to this major until they are already enrolled at Columbia (after the first semester in Columbia Engineering).

Materials Science and Engineering

Mathematics

Calculus IV (MATH UN1202): Not Offered

Ordinary Differential Equations (MATH UN2030): MAT235

Physics

Introduction to Classical and Quantum Waves (PHYS UN1403): PHY320

Chemistry

Choose one of the following two:

General Chemistry I Lecture (CHEM UN1403): CHE115 *or*

General Chemistry II Lecture (CHEM UN1404): CHE220 or CHE240

Mechanical Engineering

Mathematics

Calculus IV (MATH UN1202): Not Offered

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101): PHY201 *Or, students must take both an ODE and a Linear Algebra course:* MAT150 and MAT235

Additional

*Introduction to Electrical Engineering (ELEN E1201): PHY310

*Mechanics (ENME E3105): PHY330

Choose one of the following three:

Introduction to Classical and Quantum Waves (PHYS UN1403): PHY320

Environmental Biology I: Elements to Organisms (EEEB UN2001): BIO112 *or* Introductory Biology I: Biochemistry, Genetics and Molecular: BIO111