Prerequisite Coursework

A Davidson College student should successfully complete, at Davidson College, the equivalents (shown in red) of the following Columbia courses:

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 Multivariable Calculus for Engineers and Applied Scientists (Math UN1101, MATH UN1102, and APMA E2000) MAT111 or 112, MAT113, and MAT160

Physics

Introduction to Mechanics and Thermodynamics (PHYS UN1401) PHY 125
Introduction to Electricity, Magnetism and Optics (PHYS UN1402) PHY 235

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) PHY125/PHY235 or CHE115
Note that some majors require a specific lab in either chemistry or physics, or both.

Computer Science

Introduction to Computer Science and Programming in C/C++, Java (COMS W1004) or Python (ENGI E1006)
CSC121 or PHY240
Note that some majors require a specific programming language.

Humanities and Social Sciences

Principles of Economics (ECON UN1105) ECO 101 and University Writing (ENGL CC1010) Writing Requirement
27 non-technical credit hours (includes ECO and WRI)
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. Please note that non-technical electives are subject to the review of Undergraduate Admissions. Examples of these courses can be found on our website (https://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
Ordinary Differential Equations (MATH UN2030) MAT235
Physics
Intro to Classical & Quantum Waves (PHYS UN1403) PHY305
Additional
Introduction to Experimental Physics Lab (PHYS UN1493/4)
Students may take a lab other than Physics lab: Astronomy, Astrophysics, Biology or Chemistry.
Choose one of the following three:
General Chemistry I Lecture (CHEM UN1403) CHE115 *or*
Environmental Biology I: Elements to Organisms (EEEB UN2001) BIO112 *or*
Introductory Biology I: Biochemistry, Genetics and Molecular Biology (BIOL UN2005) BIO111
Computer Science
Introduction to Computing for Engineers and Applied Scientists in Python (ENGI E1006) CSC121 or PHY240
The department strongly recommends Python, but will accept C/C++, Java or MATLAB on a case-by-case basis.

Biomedical Engineering

Mathematics
Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101) PHY250
Or, students must take both an ODE and a Linear Algebra course. MAT150 and MAT235
Physics
Intro to Classical & Quantum Waves (PHYS UN1403) PHY305
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 PHY240
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) PHY315

Chemical Engineering

Mathematics
Choose one of the following two:
Ord. Differential Equations (MATH UN2030) MAT235 *or*
Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101) PHY250

(Chemical Engineering requirements cont. on next page)

Major-Specific Coursework

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

Chemical Engineering Cont.

Physics

Introduction to Experimental Physics Lab (PHYS UN1493/4) PHY125 or PHY235

Chemistry

General Chemistry II Lecture (CHEM UN1404) CHE220 or 240

General Chemistry Lab (CHEM UN1500) CHE115

Organic Chemistry I Lecture (CHEM UN2443) CHE250

*Organic Chemistry I Lab (CHEM UN2495) CHE250

*Organic Chemistry II Lab (CHEM UN2496) CHE350

Computer Science

Introduction to Computing for Engineers and Applied Scientists in Python (ENGI E1006) CSC121 or PHY240

The department strongly recommends Python, but will accept C/C++, Java or MATLAB on a case-by-case basis.

Civil Engineering

Mathematics

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101) PHY250

Or, students must take both an ODE and a Linear Algebra course. MAT150 and MAT235

Computer Science

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

The department strongly recommends Python over other languages, though it will accept any language.

Additional

Earth: Origin, Evolution, Processes and Future (EESC UN1011) or an equivalent introductory course in Geology/Geosciences

*Mechanics (ENME E3105) PHY330

Computer Engineering

Mathematics

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101) PHY250

Or, students must take both an ODE and a Linear Algebra course. MAT150 and MAT235

Computer Science

Discrete Mathematics (COMS W3203) MAT220

Introduction to Computer Science and Programming in Java (COMS W1004) CSC221

Please note that sufficient knowledge of computer programming is needed in order to take Data Structures in Java (COMS W3134).

Additional

Taking Introduction to Electrical Engineering (ELEN E1201) or an equivalent course for credit is not required, but obtaining roughly equivalent background, through courses or self study, is expected to prepare for the required follow-on courses. There will be an option to take a self-study course over the summer at Columbia. 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) CSC221 *or*

Honors Introduction to Computer Science in Java (COMS W1007)

Choose one of the following two:

Data Structures in Java (COMS W3134) *or*

Data Structures and Algorithms (COMS W3137) CSC221

The department strongly recommends Java and Python though it will accept other languages as long as a Data Structures course in that language has also been completed.

Earth and Environmental Engineering

Mathematics

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101) PHY250

Or, students must take both an ODE and a Linear Algebra course. MAT150 and MAT235

*Introduction to Probability & Statistics (STAT GU4001)

The course must have calculus, including multivariable integration, as a prerequisite. MAT340 and MAT341

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 of PHY240

The department requires Python for the introductory Computer Science requirement. Only students attending affiliates that do not offer Python may substitute another language.

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

Intro to Classical & Quantum Waves (PHYS UN1403) PHY305

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

Electrical Engineering

Mathematics

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101) PHY250

Or, students must take both an ODE and a Linear Algebra course. MAT150 and MAT235

Physics

Intro to Classical & Quantum Waves (PHYS UN1403) PHY305

Computer Science

Sufficient knowledge of computer programming is needed in order to take Data Structures with C/C++ (COMS W3136) or Data Structures in Java (COMS W3134).

Additional

Taking Introduction to Electrical Engineering (ELEN E1201) or an equivalent course for credit is not required, but obtaining roughly equivalent background, through courses or self study, is expected to prepare for the required follow-on courses. There will be an option to take a self-study course over the summer at Columbia. PHY310

Engineering Mechanics

Mathematics

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101) PHY250

Or, students must take both an ODE and a Linear Algebra course. MAT150 and MAT235

Computer Science

Introduction to Computing for Engineers and Applied Scientists in Python (ENGI E1006) CSC121 of PHY240

The department strongly recommends Python over other languages, though it will accept any language.

Additional

*Mechanics (ENME E3105) PHY330

Major-Specific Coursework

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

Industrial Engineering, Engineering Management Systems or Operations Research

Mathematics

Choose one of the following three:

Linear Algebra (MATH UN2010) MAT150 or
Applied Mathematics I: Linear Algebra (APMA E3101) or
Computational Linear Algebra (COMS 3251)

Choose one of the following two:

Probability for Engineers (IEOR E3658) or
Probability Theory (STAT GU4203) MAT340

The department wants to emphasize that this course needs to be a full semester of a probability course, not a combined probability and statistics course. This course should be calculus-based and cover how to work with multivariate distributions.

Computer Science A (choose one of the following)

Introduction to Computer Science and Programming in Java (COMS W1004) CSC221

Introduction to Computer Science and Programming in Python (ENGI E1006) CSC121 or PHY240

The department strongly recommends Python over other programming languages.

Computer Science B (choose one of the following)

Data Structures in Java (COMS W3134) CSC221
Essential Data Structures in C/C++ (COMS W3136) Not offered

This course can be covered in any programming language.

Materials Science and Engineering

Mathematics

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101) PHY250

Or, students must take both an ODE and a Linear Algebra course. MAT150 and MAT235

Physics

Intro to Classical & Quantum Waves (PHYS UN1403) PHY305

Computer Science

Introduction to Computing for Engineers and Applied Scientists in Python (ENGI E1006) CSC121 or PHY240

The program strongly recommends Python.

Mechanical Engineering

Mathematics

Linear Algebra (APMA E3101 *or* MATH UN2010)
and Ordinary Differential Equations (MATH UN2030 *or* Math UN3027) MAT150 and MAT235

or

Introduction to Applied Mathematics: Ordinary Differential Equations and Linear Algebra (APMA E2101) PHY250

The department strongly recommends taking ODE and Linear Algebra separately.

Computer Science

Foundations of Data Science (ORCA E2500)

Students must take a substantial equivalent to ORCA E2500 before coming to Columbia. Only students attending affiliates that do not offer an equivalent may take the course at Columbia.

Choose one of the following three:

Introduction to Computer Science and Programming in Java (COMS 1004) or MATLAB (COMS W1005) or Python (ENGI E1006) CSC121 or PHY240

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) PHY305 *or*
Environmental Biology I: Elements to Organisms (EEEB UN2001) BIO112 *or*
Introductory Biology I: Biochemistry, Genetics and Molecular Biology (BIOL UN2005) BIO111

This curriculum guide is only applicable to students who began college in Fall 2024. Students who began college in a different term are subject to different admissions policies and a different curriculum guide. Courses listed are accurate as of November 2024.