

Foundational Courses required of all majors

Mathematics

- Calculus I – Math 211
- Calculus II – Math 212 (232)
- Calculus III – Math 235

Physics

- Introductory physics with calculus and Lab I – Phys 131 or IQS 191
- Introductory physics with calculus and Lab II – Phys 132

Chemistry

- General Chemistry I – Chem 141 or IQS 191

Computer Science

- Introduction to Computing of Scientific Computing – CMSC 150 (some majors may require CMSC 105)

Humanities and Social Sciences

Principles of Economics - ECON 101

English Composition – FYS

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6 other non-technical full unit courses: Non-technical courses should help a student to learn perspectives and principles of the humanities and social sciences through discussion, debate and writing. Courses considered professional, workshop, lab, project, scientific, studio, and music instruction do not count towards the non-technical requirement. Examples and exclusion can be found at:

<http://bulletin.engineering.columbia.edu/b-elective-nontechnical-courses>.

Ultimately the pre-engineering advisor, Dr. Helms (chelms@richmond.edu) must approve all nontechnical course work. Please contact Dr. Helms if you would like clarity on which courses count as nontechnical before taking the course.

Major-Specific Courses

Courses with an * may be taken either before or during enrollment at Columbia

Applied Mathematics and Applied Physics

Differential Equations – MATH 312

Intro to classical and quantum waves – PHYS 205

Choose one: General Chemistry - CHEM 141

Environmental Biology - BIO 202 (prerequisites BIOL 199, BIOL 200)

Introductory Biology - BIO 200 (prerequisites BIOL 199)

(Python - strongly recommended)

Biomedical Engineering

Differential Equations – MATH 312

Linear Algebra – MATH 245

Modern Physics – PHYS 205

General Chemistry II and Lab – CHEM 317 (prerequisite CHEM 206)

Introduction to Scientific Computing... - CMSC 105 preferred when available - Python

Introduction to Biology I – BIOL 200 (prerequisite BIOL 199)

Introduction to Biology II – BIOL 200 (prerequisite BIOL 199)

*Introduction to Electrical Engineering – PHYS 216

Chemical Engineering

Differential Equations – MATH 312

General Chemistry II and Lab – CHEM 317 (prerequisite CHEM 206)

Organic Chemistry I and Lab – CHEM 205

*Organic Chemistry II Lab – CHEM 206

*Optional: Linear Algebra – MATH 245

*Department strongly encourages experience with Python

Civil Engineering

Differential Equations – MATH 312

Linear Algebra – MATH 245

Earth: Origin, Evolution, Processes and Future - not offered at UR, must be taken the summer before enrollment or at another university prior to starting at Columbia

*Engineering Mechanics - not offered at UR may be taken the summer before or during first semester at Columbia

*Department strongly encourages experience with MATLAB

Computer Engineering

Differential Equations – MATH 312
Linear Algebra – MATH 245
Discrete Mathematics – CMSC 222
Introduction to Electrical Engineering - PHYS 216

Computer Science

Discrete Mathematics – CMSC 222
Data Structures – CMSC 221
*Optional: Data Structures and Algorithms – CMSC 315

Earth and Environmental Engineering

Differential Equations – MATH 312
Linear Algebra – MATH 245
*Intro to Probability and Statistics – MATH 329 and MATH 330
General Chemistry II and Lab – CHEM 317 (prerequisite CHEM 206)
Choose one: Organic Chemistry I – CHEM 205
Intro to classical and quantum waves – PHYS 205
Introduction to Biology I – BIOL 200 (prerequisite BIOL 199)
*A Better Planet by Design - not offered at UR may be taken the summer before or during first semester at Columbia
*Earth's environmental systems - not offered at UR may be taken the summer before or during first semester at Columbia

Electrical Engineering

Differential Equations – MATH 312
Linear Algebra – MATH 245
Intro to classical and quantum waves – PHYS 205
*Computer science proficiency to take advance courses at Columbia
Introduction to Electrical Engineering – PHYS 216 or taken at another university prior to starting at Columbia

Engineering Mechanics

Differential Equations – MATH 312
Optional - Linear Algebra – MATH 245
*Engineering Mechanics - not offered at UR may be taken the summer before or during first semester at Columbia
*Department strongly encourages experience with MATLAB

Industrial Engineering, Engineering Management Systems or Operations Research

*Differential Equations – MATH 312 (must be taken prior to Columbia if interested in Financial Engineering)

Linear Algebra – MATH 245

Probability – MATH 329

Statistics – MATH 330 or BUAD 202

Data Structures – CMSC 221

*Introduction to Accounting and Finance – ACCT 201 and FIN 360 (must be taken prior to Columbia if interested in Financial Engineering)

Materials Science and Engineering

Differential Equations – MATH 312

Linear Algebra – MATH 245

Intro to classical and quantum waves – PHYS 205

Choose one: General Chemistry I – CHEM 141

Organic Chemistry – CHEM 205

*Department strongly encourages experience with Python

Mechanical Engineering

Differential Equations – MATH 312

Linear Algebra – MATH 245

Introduction to Data Science - MATH 289

Choose one: Intro to classical and quantum waves – PHYS 205

Environmental Biology - BIO 202 (prerequisites BIOL 199, BIOL 200)

Introductory Biology - BIO 200 (prerequisites BIOL 199)

*Engineering Mechanics - not offered at UR may be taken the summer before or during first semester at Columbia

*Introduction to Electrical Engineering – PHYS 216