Basic requirements:

- Full time enrollment at Richmond for the past 3 years
- Completion of foundational and major specific prerequisite course work by the end of spring semester of application
- Overall GPA of 3.3
- GPA of pre-engineering prerequisites of 3.3 and a B or better in all pre-engineering prerequisites
- Completion of the degree and major requirements for UR by the end of the spring semester
- Favorable recommendation letters from math and science faculty and pre-engineering liaison
- Proficiency in English
- Columbia will not accept prerequisite classes taken online before Spring 2020 or after Spring 2021

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
Introductory physics with calculus and Lab II – Phys 132

Chemistry

General Chemistry I – Chem 141

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
English Composition – FYS
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. These fulfill Columbia's general education requirements and can overlap with URs. 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 Biology I – BIOL 200 (prerequisite BIOL 199)
Introduction to Biology II – BIOL 200 (prerequisite BIOL 199)
*Introduction to Electrical Engineering - PHYS 216
(Python required)

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 and Lab – CHEM 206
*Optional: Linear Algebra – MATH 245
(Python – strongly recommended)

Civil Engineering

Differential Equations – MATH 312
Linear Algebra – MATH 245
Earth: Origin, Evolution, Processes and Future or similar Geology course- not offered at UR, must be taken at another university
*Engineering Mechanics - not offered at UR may be taken the summer before or during first semester at Columbia
(Python – strongly recommended)

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
(Python – strongly recommended)

Electrical Engineering

Differential Equations – MATH 312
Linear Algebra – MATH 245
Intro to classical and quantum waves – PHYS 205
Introduction to Electrical Engineering – PHYS 216

Engineering Mechanics

Differential Equations – MATH 312
Linear Algebra – MATH 245
*Engineering Mechanics - not offered at UR may be taken the summer before or during first semester at Columbia
(Python – strongly recommended)

Industrial Engineering, Engineering Management Systems or Operations Research

Linear Algebra – MATH 245
Probability – MATH 329
Data Structures – CMSC 221

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
(Python – strongly recommended)

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)
*Introduction to Electrical Engineering – PHYS 216 or may be taken the summer before or during first semester at Columbia
*Engineering Mechanics - not offered at UR may be taken the summer before or during first semester at Columbia