Basic requirements:
Full time enrollment for the past 3 years
Completion of foundational and major specific prerequisite course work
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 requirements for your UR major
Favorable recommendation letters from math and science faculty and pre-engineering liaison
Proficiency in English

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
   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:
   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

**Chemical Engineering**
- Differential Equations – MATH 312
- General Chemistry II and Lab – CHEM 317 (prerequisite CHEM 206)
- Organic Chemistry I and Lab – CHEM 205
  *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

**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
  *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, may be taken the summer before or during first semester at Columbia