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 prefer other programing languages such as python)

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. 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 or Applied Physics
- Calculus IV – MATH 235
- 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)

Biomedical Engineering
- Calculus IV – MATH 235
- 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
- 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
- Calculus IV – MATH 235
- Differential Equations – MATH 312
- General Chemistry II and Lab – CHEM 317 (prerequisite CHEM 206)
- Organic Chemistry I and Lab – CHEM 205
- Introduction to Scientific Computing… - CMSC 105 (although CSCM 150 will be accepted on a case by case basis)
*Optional: Linear Algebra – MATH 245

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
  Calculus IV – MATH 235
  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

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
  Calculus IV – MATH 235
  Differential Equations – MATH 312
  Linear Algebra – MATH 245
  Intro to classical and quantum waves – PHYS 205
  Introduction to Electrical Engineering - PHYS 216
  *Computer science proficiency to take advance courses at Columbia

Engineering Mechanics
  Calculus IV – MATH 235
  Differential Equations – MATH 312
  *Engineering Mechanics - not offered at UR may be taken the summer before or during first semester at Columbia

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**
Calculus IV – MATH 235
Differential Equations – MATH 312
Intro to classical and quantum waves – PHYS 205
General Chemistry I or II – CHEM 141

**Mechanical Engineering**
Calculus IV – MATH 235
Differential Equations – MATH 312
Linear Algebra – MATH 245
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