FOUNDATION COURSES REQUIRED OF ALL MAJORS:

i. MATHEMATICS
   - The full sequence of Calculus I, II, III (MTH 121, MTH 122, MTH 223)
   - Differential Equations (MTH 227)

ii. PHYSICS
   - General Physics I (PHY 121)
   - General Physics II (PHY 122)
   - Thermal and Statistical Physics (PHY 241 or PHY 242)

iii. CHEMISTRY
   - General Chemistry I (CHM 103)

iv. COMPUTER SCIENCE
   - Computer Science II (CSI 111)
   - Principles of Macroecnomics (ECN 101) OR Principles of Microeconomics (ECN 102) AND
   - First Year Seminar (FYS XXX)

ECN 101 or ECN 102 may be included in the General Academic Requirements

REQUIRED FOR MAJORS IN:
(Notes in *italics* clarify requirements.)

APPLIED MATHEMATICS or APPLIED PHYSICS

PHYSICS
   - Modern Physics (PHY 213)

CHEMISTRY / BIOLOGY (choose one course listed below. Chemistry/Biology labs not required.)
   - Principals of Biology III (Bio 152)
   - General Chemistry I (CHM 103)

BIOMEDICAL ENGINEERING

ALL TRACKS

MATHEMATICS
   - Linear Algebra (MTH 226).

PHYSICS
   - Modern Physics (PHY 213)

CHEMISTRY
   - General Chemistry II (CHM 104)
   - Organic Chemistry I (CHM 201 or CHM 203)

ELECTRICAL ENGINEERING
   - Analog and Digital Circuits (PHY 216) *may be taken the summer before entering or while at Columbia*

ENGINEERING MECHANICS
• Analytical Mechanics (PHY 319) [Mechanics (ENME E3105) [may be taken the summer before entering or while at Columbia]

CHEMICAL ENGINEERING
MATHEMATICS
• Linear Algebra (MTH 226)
CHEMISTRY
• General Chemistry II (CHM 104)
• Organic Chemistry I (CHM 201 or CHM 203)

CIVIL ENGINEERING
MATHEMATICS
• Linear Algebra (MTH 226).
ENGINEERING MECHANICS
• Analytical Mechanics (PHY 319) [may be taken the summer before entering or while at Columbia]

COMPUTER ENGINEERING
MATHEMATICS
• Linear Algebra (MTH 226).
COMPUTER SCIENCE
• (Computer Programming in JAVA is required.)
• Transition to Abstract Mathematics (MTH 210)
• Combinatorics and Graph Theory (MTH 345)
ELECTRICAL ENGINEERING
• Analog and Digital Circuits (PHY 216) [may be taken the summer before entering or while at Columbia]

COMPUTER SCIENCE
COMPUTER SCIENCE
• (Computer Programming in JAVA is required.)
• Data Structures and Algorithms (CSI 220)
MATHEMATICS
• Transitions to Abstract Mathematics (MTH 240)
• Combinatorics and Graph Theory (MTH 345)

EARTH AND ENVIRONMENTAL ENGINEERING
MATHEMATICS
• Linear Algebra (MTH 226).
CHEMISTRY
• General Chemistry II (CHM 104)
OTHER SCIENCE ELECTIVE (choose one course listed below)
• Organic Chemistry (CHM 201 or CHM 203)
• Modern Physics (PHY 213)
• Principles of Biology III (BIO 152)
EARTH AND ENVIRONMENTAL SCIENCES (choose one course listed below)
Muhlenberg College does not have equivalents to these courses so they should be taken while at Columbia)

- Advanced General Geology (EESC W4001) [may be taken while at Columbia.]
- The Climate System (EESC V2100) [may be taken while at Columbia.]
- The Solid Earth System (EESC V2200) [may be taken while at Columbia.]

EARTH AND ENVIRONMENTAL ENGINEERING

- Alternative Energy Resources (EAEE E2002) [may be taken at Columbia]

ELECTRICAL ENGINEERING

MATHEMATICS

- Linear Algebra (MTH 226)

PHYSICS

- Modern Physics (PHY 213)

COMPUTER SCIENCE

*Computer Programming in JAVA (W1007) is recommended.*

ELECTRICAL ENGINEERING

- Analog and Digital Circuits (PHY 216) [may be taken the summer before entering or while at Columbia]

IEOR: ENGINEERING MANAGEMENT SYSTEMS

MATHEMATICS

- Linear Algebra (MTH 226)

COMPUTER SCIENCE

- Computer Science II (CSI 111)
- Data Structures and Algorithms (CSI 220)

ECONOMICS

- Financial Accounting (ACT 101)

PROBABILITY AND STATISTICS

- Mathematical Statistics I (MTH 331)
- Mathematical Statistics II (MTH 332)

IEOR: FINANCIAL ENGINEERING

Students cannot apply directly to IEOR: Financial Engineering because this concentration in Operations Research requires an application after one semester of study at Columbia. Students interested in this concentration must adhere to the following pre-requisite requirements:

MATHEMATICS

- Linear Algebra (MTH 226)
- Differential Equations (MTH 227)

COMPUTER SCIENCE

- Computer Science II (CSI 111)
- Data Structures and Algorithms (CSI 220)

ECONOMICS

- Financial Accounting (ACT 101)

PROBABILITY AND STATISTICS

- Mathematical Statistics I (MTH 331)
- Mathematical Statistics II (MTH 332)
IEOR: INDUSTRIAL ENGINEERING
MATHEMATICS
- Linear Algebra (MTH 226)

COMPUTER SCIENCE
- Computer Science II (CSI 111)
- Data Structures and Algorithms (CSI 220)

ECONOMICS
- Financial Accounting (ACT 101)

PROBABILITY AND STATISTICS
- Mathematical Statistics I (MTH 331)
- Mathematical Statistics II (MTH 332)

IEOR: OPERATIONS RESEARCH
MATHEMATICS
- Linear Algebra (MTH 226)

COMPUTER SCIENCE
- Computer Science II (CSI 111)
- Data Structures and Algorithms (CSI 220)

ECONOMICS
- Financial Accounting (ACT 101)

PROBABILITY AND STATISTICS
- Mathematical Statistics I (MTH 331)
- Mathematical Statistics II (MTH 332)

ENGINEERING MECHANICS
ENGINEERING MECHANICS
- Analytical Mechanics (PHY 319) \( [\text{may be taken the summer before entering or while at Columbia}] \)

MATERIALS SCIENCE AND ENGINEERING
PHYSICS
- Modern Physics (PHY 213)

CHEMISTRY
- General Chemistry II (CHM 104)

MECHANICAL ENGINEERING
MATHEMATICS
- Linear Algebra (MTH 226).

PHYSICS/ BIOLOGY \( (\text{choose one course listed below}) \)
- Modern Physics (PHY 213)
- Principals of Biology III (Bio 152)

ENGINEERING MECHANICS
- Analytical Mechanics (PHY 319) \( [\text{may be taken while at Columbia}] \)

ELECTRICAL ENGINEERING
- Analog and Digital Circuits \( [\text{may be taken while at Columbia}] \)