

REQUIRED MAJOR SPECIFIC COURSES

(Notes in *italics* clarify requirements.)

APPLIED MATHEMATICS or APPLIED PHYSICS

MATHEMATICS

- ❑ Ordinary Differential Equations (E1210)

PHYSICS

- ❑ Classical and Quantum Waves (C1403)
- ❑ Physics Lab (C1493/4)

CHEMISTRY / BIOLOGY (Choose one course listed below. Chemistry/Biology labs are not required.)

- ❑ General Chemistry I (C1403)
- ❑ Environmental Biology: Molecules to Cells (EEEE W2001)
- ❑ Introduction to Molecular and Cellular Biology (C2005)

BIOMEDICAL ENGINEERING (ALL TRACKS)

MATHEMATICS

- ❑ Introduction to applied mathematics – Ordinary Differential Equations & Linear Algebra (APMA E2101). *Students who take an ODE course must also take a Linear Algebra course.*
- ❑ Introduction to Statistics (with Calculus) (STAT W1211) [*may be taken the summer before entering or while at Columbia*]

PHYSICS

- ❑ Classical and Quantum Waves (C1403)

CHEMISTRY

- ❑ General Chemistry II (C1404)
- ❑ General Chemistry Lab (C1500)
- ❑ Organic Chemistry I (C3443)

ELECTRICAL ENGINEERING

- ❑ Introduction to Electrical Engineering (ELEN E1201) [*may be taken the summer before entering or while at Columbia*]

ENGINEERING MECHANICS

- ❑ Mechanics (ENME E3105) [*may be taken the summer before entering or while at Columbia*]

COMPUTER SCIENCE

Introduction to Computer Science and Programming in MATLAB (COMS W1005) preferred

CHEMICAL ENGINEERING

MATHEMATICS (*choose one course listed below*)

- ❑ Ordinary Differential Equations (E1210)
- ❑ Introduction to applied mathematics – Ordinary Differential Equations & Linear Algebra (APMA E2101)

PHYSICS

- ❑ Physics Lab (C1493/4)

CHEMISTRY

- ❑ General Chemistry II (C1404)
- ❑ General Chemistry Lab (C1500)
- ❑ Organic Chemistry I (C3443)
- ❑ Organic Chemistry Lab (C3543)

CIVIL ENGINEERING

MATHEMATICS

- ❑ Introduction to applied mathematics – Ordinary Differential Equations & Linear Algebra (APMA E2101).
Students who take an ODE course must also take a Linear Algebra course.

PHYSICS/CHEMISTRY LAB (*choose one course listed below*)

- ❑ Physics Lab (C1493/4)
- ❑ General Chemistry Lab (C1500)

ENGINEERING MECHANICS

- ❑ Mechanics (ENME E3105) [*may be taken the summer before entering or while at Columbia*]

COMPUTER SCIENCE

Introduction to Computer Science and Programming in MATLAB (COMS W1005) preferred

COMPUTER ENGINEERING

MATHEMATICS

- ❑ Introduction to applied mathematics – Ordinary Differential Equations & Linear Algebra (APMA E2101).
Students who take an ODE course must also take a Linear Algebra course.

PHYSICS/CHEMISTRY LAB (*choose one course listed below*)

- ❑ Physics Lab (C1493/4)
- ❑ General Chemistry Lab (C1500)

COMPUTER SCIENCE (*Computer Programming in JAVA is required.*)

- ❑ Discrete Mathematics (COMS W3203)

ELECTRICAL ENGINEERING

- ❑ Introduction to Electrical Engineering (ELEN E1201) [*may be taken the summer before entering or while at Columbia*]

COMPUTER SCIENCE

PHYSICS/CHEMISTRY LAB (*choose one course listed below*)

- ❑ Physics Lab (C1493/4)
- ❑ General Chemistry Lab (C1500)

COMPUTER SCIENCE (*Computer Programming in JAVA is required.*)

- ❑ Data Structures and Algorithms (COMS W3137)
- ❑ Discrete Mathematics (COMS W3203)

EARTH AND ENVIRONMENTAL ENGINEERING

MATHEMATICS

- ❑ Introduction to applied mathematics – Ordinary Differential Equations & Linear Algebra (APMA E2101).
Students who take an ODE course must also take a Linear Algebra course.

CHEMISTRY

- ❑ General Chemistry II (C1404)
- ❑ General Chemistry Lab (C1500)

OTHER SCIENCE ELECTIVE (*choose one course listed below*)

- ❑ Organic Chemistry (CHEM C3443)
- ❑ Classical & quantum waves (PHYS C1403)
- ❑ Introduction to Molecular and Cellular Biology (BIOL C2005)

EARTH AND ENVIRONMENTAL SCIENCES (*choose one course listed below*)

- ❑ 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

- ❑ Introduction to applied mathematics – Ordinary Differential Equations & Linear Algebra (APMA E2101).
Students who take an ODE course must also take a Linear Algebra course.

PHYSICS

- ❑ Classical and Quantum Waves (C1403)
- ❑ Physics Lab (C1493/4)

COMPUTER SCIENCE

Computer Programming in JAVA (W1007) is recommended.

ELECTRICAL ENGINEERING

- ❑ Introduction to Electrical Engineering (ELEN E1201) [*may be taken the summer before entering or while at Columbia*]

IEOR: ENGINEERING MANAGEMENT SYSTEMS

MATHEMATICS (*choose one course listed below*)

- Linear Algebra (MATH V2010 or APAM E3101)

PHYSICS/CHEMISTRY LAB (*choose one course listed below*)

- Physics Lab (C1493/4)
- General Chemistry Lab (C1500)

COMPUTER SCIENCE (*choose one set of courses below*)

- Computer Programming in C (W1003)
 - Data Structures in C (W3133)
- or-
- Computer Programming in JAVA (W1007)
 - Data Structures in JAVA (W3134)

*The Department **strongly** recommends JAVA over C.*

ECONOMICS

- Introduction to Accounting and Finance (E2261)

PROBABILITY AND STATISTICS

- Introduction to Probability and Statistics (W3600)

*Please note that the course must have calculus as a prerequisite. The Department **strongly** suggests taking two separate courses: one in Probability and one in Statistics.*

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. Entrance into this program is extremely competitive. Students who are interested in this major should consider the Operations Research, Industrial Engineering or Engineering Management Systems which are housed in the same department (IEOR) as Financial Engineering.

IEOR: INDUSTRIAL ENGINEERING

MATHEMATICS (*choose one course listed below*)

- Linear Algebra (MATH V2010 or APAM E3101)

PHYSICS/CHEMISTRY LAB (*choose one course listed below*)

- Physics Lab (C1493/4)
- General Chemistry Lab (C1500)

COMPUTER SCIENCE (*choose one set of courses below*)

- Computer Programming in C (W1003)
- Data Structures in C (W3133)
- or-
- Computer Programming in JAVA (W1007)
- Data Structures in JAVA (W3134)

The Department ***strongly*** recommends JAVA over C.

ECONOMICS

- Introduction to Accounting and Finance (E2261)

PROBABILITY AND STATISTICS

- Introduction to Probability and Statistics (W3600)

*Please note that the course must have calculus as a prerequisite. The Department ***strongly*** suggests taking two separate courses: one in Probability and one in Statistics.*

IEOR: OPERATIONS RESEARCH

MATHEMATICS

- Linear Algebra (MATH V2010 or APAM E3101)

PHYSICS/CHEMISTRY LAB (*choose one course listed below*)

- Physics Lab (C1493/4)
- General Chemistry Lab (C1500)

COMPUTER SCIENCE (*choose one set of courses below*)

- Computer Programming in C (W1003)
- Data Structures in C (W3133)
- or-
- Computer Programming in JAVA (W1007)
- Data Structures in JAVA (W3134)

The Department ***strongly*** recommends JAVA over C.

ECONOMICS

- Introduction to Accounting and Finance (E2261)

PROBABILITY AND STATISTICS

- Introduction to Probability and Statistics (W3600)

*Please note that the course must have calculus as a prerequisite. The Department ***strongly*** suggests taking two separate courses: one in Probability and one in Statistics.*

ENGINEERING MECHANICS

MATHEMATICS

- ❑ Ordinary Differential Equations (E1210)

PHYSICS/CHEMISTRY LAB (*choose one course listed below*)

- ❑ Physics Lab (C1493/4)
- ❑ General Chemistry Lab (C1500)

ENGINEERING MECHANICS

- ❑ Mechanics (ENME E3105) [*may be taken the summer before entering or while at Columbia*]
-

MATERIALS SCIENCE AND ENGINEERING

MATHEMATICS

- ❑ Ordinary Differential Equations (E1210)

PHYSICS

- ❑ Classical and Quantum Waves (C1403)
- ❑ Physics Lab (C1493/4)

CHEMISTRY

- ❑ General Chemistry II (C1404)
 - ❑ General Chemistry Lab (C1500)
-

MECHANICAL ENGINEERING

MATHEMATICS

- ❑ Introduction to applied mathematics – Ordinary Differential Equations & Linear Algebra (APMA E2101).
Students who take an ODE course must also take a Linear Algebra course.

PHYSICS/ BIOLOGY (*choose one course listed below*)

- ❑ Classical and Quantum Waves (PHYS C1403)
- ❑ Environmental Biology: Molecules to Cells (EEEE W2001)
- ❑ Introduction to Molecular and Cellular Biology (C2005)

PHYSICS/CHEMISTRY LAB (*choose one course listed below*)

- ❑ Physics Lab (C1493/4)
- ❑ General Chemistry Lab (C1500)

ENGINEERING MECHANICS

- ❑ Mechanics (ENME E3105) [*may be taken while at Columbia*]

ELECTRICAL ENGINEERING

- ❑ Intro. to Electrical Engineering (ELEN E1201) or equivalent [*may be taken while at Columbia*]
-