

**Columbia University**  
**The Fu Foundation School of Engineering and Applied Science**

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**PRE- COMBINED PLAN CURRICULUM GUIDE**

Fall 2006

*The equivalents of the following Columbia courses are required. Please see the SEAS Bulletin for course and program descriptions in order to find out the course contents and more details about the specific program requirements: <http://www.engineering.columbia.edu/bulletin/>.*

**REQUIRED OF ALL MAJORS:**

- i. MATHEMATICS
- ❑ The full sequence of Calculus I, II, III, IV (V1101, V1102, V1201, V1202).
  - ❑ Ordinary Differential Equations (E1210)
- or* APMA E2101 Introduction to applied mathematics (ODE & linear algebra) - preferred by some programs.
- Please note that Computer Science majors are exempt from ODE requirement.

- ii. PHYSICS
- ❑ Mechanics and Thermodynamics (C1401)
  - ❑ Electricity, Magnetism, and Optics (C1402)

- iii. CHEMISTRY
- ❑ General Chemistry I (C1403)
- Some programs require an additional second semester of General Chemistry (C1404). For Applied Physics and Applied Mathematics programs, General Chemistry I can be substituted by one semester of Biology (W2001). Furthermore, either one-semester physics lab or one-semester chemistry lab is generally required. Please see individual programs below for details.

- iv. COMPUTER SCIENCE
- ❑ Introduction to computer science and programming in C, JAVA, or MATLAB (W1003, W1004, or W1005)

Some majors require a specific programming language (see requirements for majors below).

- v. HUMANITIES AND SOCIAL SCIENCES
- ❑ Twenty-seven-(27)-point nontechnical requirement is satisfied by the course work taken for the bachelor's degree awarded by the home institution. Among those courses the students must include:
    - Principles of Economics (ECON W1105)
    - English Composition (ENGL C1010 University Writing).

## ***REQUIRED FOR MAJORS IN:***

(Notes in *italics* clarify general requirements, listed on p. 1. Additional, major-specific, requirements are bulleted (□).)

### **APPLIED MATHEMATICS or APPLIED PHYSICS**

#### PHYSICS

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

#### CHEMISTRY / BIOLOGY

*Either 1) one-term lecture CHEM C1403, CHEM C1404, or higher, or 2) one-term lecture BIOL W2001 or higher. Chemistry / Biology labs are not required.*

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### **BIOMEDICAL ENGINEERING**

#### **CELLULAR AND TISSUE ENGINEERING TRACK**

##### PHYSICS

- Classical and Quantum Waves (C1403)

##### CHEMISTRY

- General Chemistry II (C1404)
- General Chemistry Lab (C1500)
- Organic Chemistry I ~~and II~~ (C3443 ~~and C3444~~)

##### ELECTRICAL ENGINEERING

Intro. to Electrical Engineering (ELEN E1201) or equivalent

##### ENGINEERING MECHANICS

- Mechanics (ENME E3105)

#### **BIOMECHANICS TRACK**

##### PHYSICS

- Classical and Quantum Waves (C1403)

##### CHEMISTRY

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

##### ELECTRICAL ENGINEERING

- Intro. to Electrical Engineering (ELEN E1201) or equivalent

##### ENGINEERING MECHANICS

- Mechanics (ENME E3105)

#### **BIOMEDICAL IMAGING TRACK**

##### PHYSICS

- Classical and Quantum Waves (C1403)

##### CHEMISTRY

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

- ❑ Organic Chemistry I (C3443)

COMPUTER SCIENCE

- ❑ Data Structures and Algorithms (W3137)

ELECTRICAL ENGINEERING

- ❑ Intro. to Electrical Engineering (ELEN E1201) or equivalent

ENGINEERING MECHANICS

- ❑ Mechanics (ENME E3105)
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**CHEMICAL ENGINEERING**

PHYSICS

- ❑ Physics Lab (C1493/4)

CHEMISTRY

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

COMPUTER SCIENCE

*Programming in MATLAB (W3101)*

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**CIVIL ENGINEERING**

- ❑ Physics Lab (C1493/4)

or

- ❑ General Chemistry Lab (C1500)

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

COMPUTER SCIENCE

*Programming in MATLAB preferred.*

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**COMPUTER ENGINEERING**

- ❑ Physics Lab (C1493/4)

-or-

- ❑ General Chemistry Lab (C1500)

MATHEMATICS

- ❑ Discrete Mathematics (COMS W3203)

COMPUTER SCIENCE

*Computer Programming in JAVA (W1007 or W1009) is required.*

ELECTRICAL ENGINEERING

- ❑ Intro. to Electrical Engineering (ELEN E1201) or equivalent
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**COMPUTER SCIENCE**

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

#### MATHEMATICS

*Ordinary Differential Equations (E1210) is NOT required.*

#### COMPUTER SCIENCE

*Computer Programming in JAVA (W1007 or W1009) is required. JAVA programming skills must be acquired before arriving at Columbia.*

- ❑ Scientific Computation (COMS W3210)
- ❑ Discrete Mathematics (COMS W3203)
- ❑ Data Structures and Algorithms (COMS W3139)

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### **EARTH AND ENVIRONMENTAL ENGINEERING**

#### MATHEMATICS

- ❑ Introduction to Probability and Statistics (SIEO W3600)

#### CHEMISTRY

- ❑ General Chemistry II (C1404)
- ❑ General Chemistry Lab (C1500)
- ❑ Organic Chemistry C3443 or Classical & quantum waves C1403 or Molecular and cellular biology I C2005

#### EARTH AND ENVIRONMENTAL SCIENCES

- ❑ Advanced General Geology (EESC W4001)  
*[may be taken while at Columbia.]*

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### **ELECTRICAL ENGINEERING**

#### PHYSICS

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

#### COMPUTER SCIENCE

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

#### ELECTRICAL ENGINEERING

- ❑ Intro. to Electrical Engineering (ELEN E1201) or equivalent

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### **ENGINEERING AND MANAGEMENT SYSTEMS**

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

#### MATHEMATICS

- ❑ Linear Algebra (MATH V2010 or APMA E3101)  
Please note that APMA E2101 Introduction to applied mathematics is \*not\* acceptable.

#### COMPUTER SCIENCE

- ❑ Computer Programming in C (W1003)
- ❑ Data Structures in C (W3133)

-or-

- ❑ Computer Programming in JAVA (W1007)
- ❑ Data Structures in JAVA (W3134)

ECONOMICS

- ❑ Introduction to Accounting and Finance (W2261)

PROBABILITY AND STATISTICS

- ❑ Introduction to Probability and Statistics (W3600)
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### **ENGINEERING MECHANICS**

- ❑ Physics Lab (C1493/4)

-or-

- ❑ General Chemistry Lab (C1500)

ENGINEERING MECHANICS

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

- ❑ Physics Lab (C1493/4)

-or-

- ❑ General Chemistry Lab (C1500)

MATHEMATICS

- ❑ Linear Algebra (MATH V2010 or APMA E3101)

Please note that APMA E2101 Introduction to applied mathematics is \*not\* acceptable.

COMPUTER SCIENCE

- ❑ Computer Programming in C (W1003)
- ❑ Data Structures in C (W3133)

-or-

- ❑ Computer Programming in JAVA (W1007)
- ❑ Data Structures in JAVA (W3134)

ECONOMICS

- ❑ Introduction to Accounting and Finance (W2261)

PROBABILITY AND STATISTICS

- ❑ Introduction to Probability and Statistics (W3600)
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### **MATERIALS SCIENCE AND ENGINEERING**

PHYSICS

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

CHEMISTRY

- ❑ General Chemistry II (C1404)
  - ❑ General Chemistry Lab (C1500)
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### **MECHANICAL ENGINEERING**

MATHEMATICS

- ❑ Linear Algebra (MATH V2010 or APMA E3101 or APMA E2101)
- CHEMISTRY
- ❑ General Chemistry Lab (C1500)

ENGINEERING MECHANICS

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

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

MATHEMATICS

- ❑ Linear Algebra (MATH V2010 or APMA E3101)  
Please note that APMA E2101 Introduction to applied mathematics is \*not\* acceptable.

COMPUTER SCIENCE

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

ECONOMICS

- ❑ Introduction to Accounting and Finance (W2261)

PROBABILITY AND STATISTICS

- ❑ Introduction to Probability and Statistics (W3600)
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