PRE-COMBINED PLAN CURRICULUM GUIDE

In order to be considered for guaranteed admission, students must successfully complete the equivalents of the following Columbia courses at AU. This document is intended to be used in conjunction with Columbia University’s Combined Plan Curriculum Guide. Here you will find the equivalent courses that can be taken at AU that will satisfy Columbia’s requirements. Please see the AU Course Catalog for course descriptions. You should touch base with the Dr. Teresa Larkin (tlarkin@american.edu), Program Director at AU if you have any questions about any of the classes listed below. This curriculum guide will be updated periodically and is subject to minor changes in conjunction with any changes made to Columbia’s area-specific course requirements.

Please note that all courses in this guide (except for the 27 non-technical credit hours) count towards the calculated pre-engineering GPA.

For more information, please visit our website at http://www.studentaffairs.columbia.edu/admissions/engineering/combined or e-mail us at combinedplan@columbia.edu.

FOUNDATION COURSES REQUIRED OF ALL MAJORS:

i. MATHEMATICS
   - The full sequence of Calculus I, II, III (Math 221, 222, 313)

ii. PHYSICS
    - PHYS-110, Principles of Physics I
    - PHYS-210, Principles of Physics II

iii. CHEMISTRY
    - CHEM-110, General Chemistry I
      Please see individual programs below for details. Some programs require an additional second semester of General Chemistry (Chem-210) or have possible substitutions.

iv. LAB REQUIREMENT
   Either one-semester physics lab or one-semester chemistry lab is generally required. Please see individual programs below for more details.

   Note: A laboratory experience is integral to all AU Chemistry and Physics courses. Students who take PHYS-110, PHYS-210, CHEM-110, AND/OR CHEM-210 will automatically have a laboratory experience in each course.

v. COMPUTER SCIENCE
   - CSC-280, Introduction to Computer Science I
     Some majors require a specific programming language (see requirements for majors below).
vi. HUMANITIES AND SOCIAL SCIENCES
   - Twenty-seven-(27) non-technical credit hours. Please speak with your program director in regards to which courses fulfill this requirement, as coursework taken for the bachelor’s degree awarded by the home institution often fulfills this requirement. Among these courses the students must include:
     - ECON-100, Macroeconomics
     - LIT-100, College Writing

REQUIRED MAJOR SPECIFIC COURSES
(Notes in italics clarify requirements.)

APPLIED MATHEMATICS or APPLIED PHYSICS

MATHEMATICS
   - MATH-321, Differential Equations

PHYSICS
   - PHYS-331, Modern Physics
   - PHYS-351, Waves and Optics
   - PHYS-110, Principles of Physics I and PHYS-210, Principles of Physics II Lab

CHEMISTRY / BIOLOGY (choose one course listed below. Chemistry/Biology labs not required.)
   - CHEM-110, General Chemistry I
   - BIO-110, General Biology I
   - BIO-210, General Biology II (Note: This is comparable to EEEB W2001, but requires BIO-110 as a prerequisite).

BIOMEDICAL ENGINEERING (ALL TRACKS)

MATHEMATICS
   - MATH-310, Linear Algebra
   - MATH-321, Differential Equations

PHYSICS
   - PHYS-331, Modern Physics
   - PHYS-351, Waves and Optics

CHEMISTRY
   - CHEM-210, General Chemistry II
   - CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab
   - CHEM-310, Organic Chemistry I

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
   - CSC-280, Introduction to Computer Science I
CHEMICAL ENGINEERING

MATHEMATICS *(choose one course listed below)*
- MATH-310, Linear Algebra
- MATH-321, Differential Equations

PHYSICS
- PHYS-110, Principles of Physics I & PHYS-210, Principles of Physics II Lab

CHEMISTRY
- CHEM-210, General Chemistry II
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab
- CHEM-310, Organic Chemistry I
- CHEM-312, Organic Chemistry I Laboratory

CIVIL ENGINEERING

MATHEMATICS
- MATH-310, Linear Algebra
- MATH-321, Differential Equations

PHYSICS/CHEMISTRY LAB *(choose one course listed below)*
- PHYS-110, Principles of Physics I and PHYS-210, Principles of Physics II Lab
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

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

COMPUTER SCIENCE
- CSC-280, Introduction to Computer Science I

COMPUTER ENGINEERING

MATHEMATICS
- MATH-310, Linear Algebra
- MATH-321, Differential Equations

PHYSICS/CHEMISTRY LAB *(choose one course listed below)*
- PHYS-110, Principles of Physics I FA5 (4) and PHYS-210, Principles of Physics II Lab
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

COMPUTER SCIENCE (*Computer Programming in JAVA is required.*)
- CSC-350, Introduction to Discrete Structures

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)
- PHYS-110, Principles of Physics I and PHYS-210, Principles of Physics II Lab
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

COMPUTER SCIENCE (Computer Programming in JAVA is required).
- CSC-520, Algorithms and Data Structures* (*Language used: JAVA)
- CSC-350, Introduction to Discrete Structures
- CSC-360, Tools of Scientific Computing

EARTH AND ENVIRONMENTAL ENGINEERING

MATHEMATICS
- MATH-310, Linear Algebra
- MATH-321, Differential Equations

CHEMISTRY
- CHEM-210, General Chemistry II
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

OTHER SCIENCE ELECTIVE (choose one course listed below)
- CHEM-310, Organic Chemistry I
- PHYS-331, Modern Physics
- BIO-110, General Biology I

EARTH AND ENVIRONMENTAL SCIENCES (choose one course listed below)
- Advanced General Geology (EESC W4001) [may be taken while at Columbia.]
- ENVS-360, Environment and the Atmosphere
- ENVS-350, Environmental Geology

EARTH AND ENVIRONMENTAL ENGINEERING
- ENVS-220, Energy and Resources

ELECTRICAL ENGINEERING

MATHEMATICS
- MATH-310, Linear Algebra
- MATH-321, Differential Equations

PHYSICS
- PHYS-331, Modern Physics
- PHYS-351, Waves and Optics
- PHYS-110, Principles of Physics I FA5 (4) and PHYS-210, Principles of Physics II Lab

COMPUTER SCIENCE
- CSC-280, Introduction to Computer Science I

ELECTRICAL ENGINEERING
- Introduction to Electrical Engineering (ELEN E1201) [may be taken the summer before entering or while at Columbia]
**IEOR: ENGINEERING MANAGEMENT SYSTEMS**

**MATHEMATICS**
- MATH-310, Linear Algebra

**PHYSICS/CHEMISTRY LAB** *(choose one course listed below)*
- PHYS-110, Principles of Physics I and PHYS-210, Principles of Physics II Lab
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

**COMPUTER SCIENCE**
- CSC-280, Introduction to Computer Science I
- CSC-281, Introduction to Computer Science II

*The Department strongly recommends JAVA over C.*

**ECONOMICS**
- ACCT-240, Principles of Financial Accounting

**PROBABILITY AND STATISTICS**
- MATH-501, Probability
- STAT-502, Introduction to Mathematical Statistics

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

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**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 very competitive.** Students interested in this concentration must adhere to the following pre-requisite requirements:

**MATHEMATICS**
- MATH-310, Linear Algebra
- MATH-321, Differential Equations

**PHYSICS/CHEMISTRY LAB** *(choose one course listed below)*
- PHYS-110, Principles of Physics I FA5 (4) and PHYS-210, Principles of Physics II Lab
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

**COMPUTER SCIENCE**
- CSC-280, Introduction to Computer Science I
- CSC-281, Introduction to Computer Science II

*The Department strongly recommends JAVA over C.*

**ECONOMICS**
- ACCT-240, Principles of Financial Accounting
PROBABILITY AND STATISTICS
- MATH-501, Probability
- STAT-502, Introduction to Mathematical Statistics

*Please note that the course must have calculus as a pre-requisite.*

**IEOR: INDUSTRIAL ENGINEERING**

**MATHEMATICS**
- MATH-310, Linear Algebra

**PHYSICS/CHEMISTRY LAB (choose one course listed below)**
- PHYS-110, Principles of Physics I FA5 (4) and PHYS-210, Principles of Physics II Lab
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

**COMPUTER SCIENCE**
- CSC-280, Introduction to Computer Science I
- CSC-281, Introduction to Computer Science II

*The Department strongly recommends JAVA over C.*

**ECONOMICS**
- ACCT-240, Principles of Financial Accounting

**PROBABILITY AND STATISTICS**
- MATH-501, Probability
- STAT-502, Introduction to Mathematical Statistics

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

**IEOR: OPERATIONS RESEARCH**

**MATHEMATICS**
- MATH-310, Linear Algebra

**PHYSICS/CHEMISTRY LAB (choose one course listed below)**
- PHYS-110, Principles of Physics I FA5 (4) and PHYS-210, Principles of Physics II Lab
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

**COMPUTER SCIENCE**
- CSC-280, Introduction to Computer Science I
- CSC-281, Introduction to Computer Science II

*The Department strongly recommends JAVA over C.*

**ECONOMICS**
- ACCT-240, Principles of Financial Accounting

**PROBABILITY AND STATISTICS**
- MATH-501, Probability
- STAT-502, Introduction to Mathematical Statistics
Please note that the course must have calculus as a pre-requisite. The Department strongly suggests taking two separate courses: one in Probability and one in Statistics.

ENGINEERING MECHANICS

MATHEMATICS
- MATH-321, Differential Equations

PHYSICS/ CHEMISTRY LAB (choose one course listed below)
- PHYS-110, Principles of Physics I FA5 (4) and PHYS-210, Principles of Physics II Lab
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

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

MATERIALS SCIENCE AND ENGINEERING

MATHEMATICS
- MATH-321, Differential Equations

PHYSICS
- PHYS-331, Modern Physics
- PHYS-351, Waves and Optics
- PHYS-110, Principles of Physics I FA5 (4) and PHYS-210, Principles of Physics II Lab

CHEMISTRY
- CHEM-210, General Chemistry II
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

MECHANICAL ENGINEERING

MATHEMATICS
- MATH-310, Linear Algebra
- MATH-321, Differential Equations

PHYSICS/ BIOLOGY (choose one course listed below)
- PHYS-331, Modern Physics
- PHYS-351, Waves and Optics
- BIO-110, General Biology I
- BIO-210, General Biology II (Note: This is comparable to EEEB W2001, but requires BIO-110 as a prequisite).

PHYSICS/ CHEMISTRY LAB (choose one course listed below)
- PHYS-110, Principles of Physics I FA5 (4) and PHYS-210, Principles of Physics II Lab
- CHEM-110, General Chemistry I and CHEM-210, General Chemistry II Lab

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]