Pre-Combined Plan Curriculum Guide for Wittenberg University Students

Admission into the binary program with The Fu Foundation School of Engineering and Applied Science at Columbia University requires taking a series of courses at Wittenberg that are equivalent to courses that are offered at Columbia. The equivalent courses that are offered at Wittenberg University are listed below.

You should meet with the combined plan program liaison, Associate Professor of Physics Jeremiah Williams (jwilliams@wittenberg.edu), as early as possible in the process to plan your schedule and to make sure that all of these requirements are satisfied.

FOUNDATION COURSES REQUIRED OF ALL MAJORS:

MATHEMATICS

☐ A full sequence of Calculus (MATH 201, 202 and 212)

PHYSICS

☐ Mechanics and Waves (PHYS 200)
☐ Thermodynamics and Optics (PHYS 213)
☐ Introductory Electromagnetism (PHYS 218)

CHEMISTRY

☐ Models of Chemical Systems (CHEM 121)

Please see individual programs below for details. Some programs require an additional second semester of General Chemistry (CHEM 162) or have possible substitutions.

LAB REQUIREMENT

One-semester of either physics or chemistry laboratory is generally required and is satisfied when taking the laboratories associated with Mechanics and Waves (PHYS 200) or Models of Chemical Systems (CHEM 121). Please see individual programs below for more details.

COMPUTER SCIENCE

☐ Computer Programming I (COMP 150)

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

HUMANITIES AND SOCIAL SCIENCES

☐ Principles of Economics (ECON 190)
☐ Expository Writing (ENG 101)
☐ 27 non-technical credit hours. These courses are often fulfilled through the major and general education credits at Wittenberg, but you should meet the Prof. Williams to ensure that you have fulfilled this requirement.
REQUIRED FOR MAJORS IN:

APPLIED MATHEMATICS or APPLIED PHYSICS

MATHEMATICS
- Differential Equations (MATH 215)

PHYSICS
- Modern Physics (PHYS 220)
- Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).

CHEMISTRY/BIOLOGY (choose one course listed below.)
- Models of Chemical Systems (CHEM 121)
- Concepts of Biology: Biological Information, Reproduction, and Evolution (BIO 170)
- Concepts of Biology: Energy and Resources in Biology (BIO 180)
BIOMEDICAL ENGINEERING (ALL TRACKS)

MATHEMATICS
- Differential Equations (MATH 215)
- Linear Algebra (MATH 360)

PHYSICS
- Modern Physics (PHYS 220)

CHEMISTRY
- Chemical Structure and Analysis (CHEM 162)

Note: The Chemistry laboratory requirements for this program are satisfied when taking the laboratories associated with Models of Chemical Systems (CHEM 121) and Chemical Structure and Analysis (CHEM 162).

ELECTRICAL ENGINEERING
- Electronics (PHYS 313)
- Computational Physics (PHYS 320)

Note: Introduction to Electrical Engineering (ELEN E1201) may also be taken the summer before entering or while at Columbia instead of these two courses.

COMPUTER SCIENCE
This program prefers that you take a course in PYTHON, which is used in Computer Programming I (COMP 150).
CHEMICAL ENGINEERING

MATHEMATICS
- Differential Equations (MATH 215)
- Linear Algebra (MATH 360)

PHYSICS
- Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).

CHEMISTRY
- Chemical Structure and Analysis (CHEM 162)
- Introduction to Organic Chemistry (CHEM 201)

*Note:* The Chemistry laboratory requirements for this program are satisfied when taking the laboratories associated with Models of Chemical Systems (CHEM 121), Chemical Structure and Analysis (CHEM 162) and Introduction to Organic Chemistry (CHEM 201).
CIVIL ENGINEERING

MATHEMATICS

- Differential Equations (MATH 215)
- Linear Algebra (MATH 360)

PHYSICS/CHEMISTRY LAB (choose one course listed below)

- Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).
- The laboratory associated with Models of Chemical Systems (CHEM 121).

ENGINEERING MECHANICS

- Mechanics (ENME E3105) to be taken the summer before entering or while at Columbia.

COMPUTER SCIENCE

This program prefers that you take a course in MATLAB. The Department of Mathematics and Computer Science does not currently offer a course that uses MATLAB. COMP 150 provides the needed Introduction to Computer Science and Programming course, but a course in MATLAB would need to be taken elsewhere.
COMPUTER ENGINEERING

MATHMATICS
- Differential Equations (MATH 215)
- Linear Algebra (MATH 360)

PHYSICS/CHEMISTRY LAB (choose one course listed below)
- Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).
- The laboratory associated with Models of Chemical Systems (CHEM 121).

COMPUTER SCIENCE (Computer Programming in JAVA is required.)
- Discrete Mathematics (MATH 171)
- Computer Programming II (COMP 250).

Note: This program requires Computer Programming in JAVA, which requires that you also take Computer Programming II (COMP 250).

ELECTRICAL ENGINEERING
- Electronics (PHYS 313)
- Computational Physics (PHYS 320)

Note: Introduction to Electrical Engineering (ELEN E1201) may also be taken the summer before entering or while at Columbia instead of these two courses.
COMPUTER SCIENCE

PHYSICS/CHEMISTRY LAB (choose one course listed below)
- Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).
- The laboratory associated with Models of Chemical Systems (CHEM 121).

COMPUTER SCIENCE
- Computer Programming II (COMP 250)
- Discrete Mathematics (MATH 171)

Note: This program requires Computer Programming in JAVA, which is satisfied by taking Computer Programming II (COMP 250).
EARTH AND ENVIRONMENTAL ENGINEERING

MATHEMATICS
- Differential Equations (MATH 215)
- Linear Algebra (MATH 360)
- Univariate Probability (MATH 228)
- Mathematical Statistics (MATH 328)

Note: Introduction to Probability and Statistics (W3600) may also be taken at Columbia instead of Univariate Probability (MATH 228) and Mathematical Statistics (MATH 328).

CHEMISTRY
- Chemical Structure and Analysis (CHEM 162)

Note: The laboratory requirement is satisfied when taking the laboratories associated with Models of Chemical Systems (CHEM 121) and Chemical Structure and Analysis (CHEM 162).

OTHER SCIENCE ELECTIVE (choose one course listed below)
- Introduction to Organic Chemistry (CHEM 201)
- Modern Physics (PHYS 220)
- Concepts of Biology: Biological Information, Reproduction, and Evolution (BIO 170) and Concepts of Biology: Energy and Resources in Biology (BIO 180)

EARTH AND ENVIRONMENTAL SCIENCES (choose one course listed below)
- Physical Geology (GEOL 150)
  - Advanced General Geology (EESC W4001) may be taken while at Columbia instead of this course.
- Weather and Climate (GEOG 222)
  - The Climate System (EESC V2100) may be taken while at Columbia instead of this course.
- Physical Geology (GEOL 150) and Environmental Geology (GEOL 160)
  - The Solid Earth System (EESC V2200) may be taken while at Columbia instead of these two courses.

EARTH AND ENVIRONMENTAL ENGINEERING
- Better Planet by Design (EAEE E2200) to be taken at Columbia.
ELECTRICAL ENGINEERING

MATHEMATICS
- Differential Equations (MATH 215)
- Linear Algebra (MATH 360)

PHYSICS
- Modern Physics (PHYS 220)
- Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).

COMPUTER SCIENCE
    Computer Programming I (COMP 150) provides the background necessary to take Data Structures (COMS W3134 or W3136)

ELECTRICAL ENGINEERING
- Electronics (PHYS 313)
- Computational Physics (PHYS 320)

Note: Introduction to Electrical Engineering (ELEN E1201) may also be taken the summer before entering or while at Columbia instead.
ENGINEERING MECHANICS

MATHEMATICS
   - Differential Equations (MATH 215)

PHYSICS/CHEMISTRY LAB (choose one course listed below)
   - Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).
   - The laboratory section associated with Models of Chemical Systems (CHEM 121).

ENGINEERING MECHANICS
   - Mechanics (ENME E3105) to be taken the summer before entering or while at Columbia
IEOR: INDUSTRIAL ENGINEERING, ENGINEERING MANAGEMENT SYSTEMS, OR OPERATIONS RESEARCH

MATHEMATICS
- Linear Algebra (MATH 360)
- Data Analysis (MATH 227)
- Univariate Probability (MATH 228)

PHYSICS/CHEMISTRY LAB (choose one course listed below)
- Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).
- The laboratory associated with Models of Chemical Systems (CHEM 121).

COMPUTER SCIENCE
- Computer Programming II (COMP 250)

ECONOMICS
- Managerial Accounting (ACCT 226)

Note: 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.
MATERIALS SCIENCE AND ENGINEERING

MATHEMATICS
- Differential Equations (MATH 215)

PHYSICS
- Modern Physics (PHYS 220)
- Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).

CHEMISTRY
- Chemical Structure and Analysis (CHEM 162)

Note: The Chemistry laboratory requirements for this program are satisfied when taking the laboratories associated with Models of Chemical Systems (CHEM 121) and Chemical Structure and Analysis (CHEM 162).
MECHANICAL ENGINEERING

MATHEMATICS
- Differential Equations (MATH 215)
- Linear Algebra (MATH 360)

PHYSICS/BIOLOGY (choose one course listed below)
- Modern Physics (PHYS 220)
- Concepts of Biology: Biological Information, Reproduction, and Evolution (BIO 170)
- Concepts of Biology: Energy and Resources in Biology (BIO 180)

PHYSICS/CHEMISTRY LAB (choose one course listed below)
- Intermediate Physics Lab (PHYS 214) and the laboratories associated with Mechanics and Waves (PHYS 200) and Introductory Electromagnetism (PHYS 218).
- The laboratory section associated with Models of Chemical Systems (CHEM 121).

ENGINEERING MECHANICS
- Mechanics (ENME E3105) to be taken at Columbia.

ELECTRICAL ENGINEERING
- Electronics (PHYS 313)
- Computational Physics (PHYS 320)

Note: Introduction to Electrical Engineering (ELEN E1201) may also be taken the summer before entering or while at Columbia instead of these two courses.