

# 2011-2012 PRE-COMBINED PLAN CURRICULUM GUIDE for SUNY FREDONIA STUDENTS

In order to be considered for guaranteed admission to Columbia, students must successfully complete the following SUNY Fredonia courses, with a combined pre-engineering GPA of 3.3, *and* a minimum grade of B in all pre-engineering courses the first time taken. 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 consult SUNY Fredonia Engineering Program Coordinator Dr. Michael Grady (716)673-3301, [grady@fredonia.edu](mailto:grady@fredonia.edu), and also visit the Combined Plan website at <http://www.studentaffairs.columbia.edu/admissions/engineering/combined> or e-mail at [combinedplan@columbia.edu](mailto:combinedplan@columbia.edu). Note: Underlined requirements not given at Fredonia. These have Columbia course numbers. Otherwise course numbers are Fredonia course numbers. The first course name listed is the Columbia name. If the Fredonia name differs it follows the Fredonia course number.

## FOUNDATION COURSES REQUIRED OF ALL MAJORS:

### i. MATHEMATICS

- ❑ The full sequence of Calculus I-III, (MATH 122,123,223)

### ii. PHYSICS

- ❑ Mechanics and Thermodynamics (PHYS 230 – University Physics I)
- ❑ Electricity, Magnetism, and Optics (PHYS 231 – University Physics II)

### iii. CHEMISTRY

- ❑ General Chemistry I (CHEM115)

Please see individual programs below for details. Some programs require an additional second semester of

General Chemistry (CHEM 116) or have possible substitutions.

### iv. LAB REQUIREMENT

Either one-semester physics lab (PHYS 232), or one-semester chemistry lab (CHEM 125) is generally required. Please see individual programs below for more details.

### v. COMPUTER SCIENCE

- ❑ Introduction to computer science and programming in C++ (CSIT 121 – Computer Science I)
- Some majors require a specific programming language such as Java (see requirements for majors below).

### vi. HUMANITIES AND SOCIAL SCIENCES

- ❑ Twenty-seven-(27) non-technical credit hours. generally fulfilled by general education courses required for the Fredonia degree. Among these courses students must include:
  - Principles of Economics (ECON 201 – Principles of Macroeconomics)
  - English Composition (ENGL 100).

## REQUIRED MAJOR SPECIFIC COURSES

(Notes in italics clarify requirements.)

### APPLIED MATHEMATICS or APPLIED PHYSICS

#### MATHEMATICS

- ❑ Ordinary Differential Equations (MATH 224)

#### PHYSICS

- ❑ Classical and Quantum Waves (PHYS 234 – Modern Physics)
- ❑ Physics Lab (PHYS 232 and PHYS 233, Univ. Phys. I and II labs)

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

- General Chemistry I (CHEM 115)
- Environmental Biology: Molecules to Cells (BIOL 115 – Environmental Biology)
- Introduction to Molecular and Cellular Biology (BIOL 133 – Principles of Biology II)

## BIOMEDICAL ENGINEERING (ALL TRACKS)

### MATHEMATICS

- Math 224 – Ordinary Differential Equations and MATH 231 – Linear Algebra

### PHYSICS

- Classical and Quantum Waves (PHYS 234 – Modern Physics)

### CHEMISTRY

- General Chemistry II (CHEM 116)
- General Chemistry Lab (CHEM 125 and CHEM 126)
- Organic Chemistry I (CHEM 215)

### ELECTRICAL ENGINEERING

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

### ENGINEERING MECHANICS

- PHYS 321 – Engineering Statics and PHYS 329 – Engineering Dynamics

### COMPUTER SCIENCE

Introduction to Computer Science and Programming in MATLAB (COMS W1005) preferred (may be available in summer at consortium colleges) otherwise take CSIT 121 –Computer Science I.

## CHEMICAL ENGINEERING

### MATHEMATICS

- Ordinary Differential Equations (MATH 224)

### PHYSICS

- Physics Lab (PHYS 232 and PHYS 233)

### CHEMISTRY

- General Chemistry II (CHEM 116)
- General Chemistry Lab (CHEM 125 and CHEM 126)
- Organic Chemistry I (CHEM 215)
- Organic Chemistry Lab (CHEM 225)

## CIVIL ENGINEERING

### MATHEMATICS

- Math 224 - Ordinary Differential Equations and MATH 231 - Linear Algebra.

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

- Physics Lab (PHYS 232 and PHYS 233)
- General Chemistry Lab (CHEM 125 and CHEM 126)

### ENGINEERING MECHANICS

- PHYS 321 – Engineering Statics and PHYS 329 – Engineering Dynamics

### COMPUTER SCIENCE

Introduction to Computer Science and Programming in MATLAB (COMS W1005) preferred (may be available in summer at consortium colleges) otherwise take CSIT 121 –Computer Science I.

## COMPUTER ENGINEERING

### MATHEMATICS

- ❑ Math 224 - Ordinary Differential Equations and MATH 231 - Linear Algebra.

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

- ❑ Physics Lab (PHYS 232 and PHYS 233)
- ❑ General Chemistry Lab (CHEM 125 and CHEM 126)

COMPUTER SCIENCE (Computer Programming in JAVA is required.) CSIT 225 – Java Programming is only offered occasionally at Fredonia – may need to take at another institution.

- ❑ Discrete Mathematics (CSIT 241 – Discrete mathematics for Computer Science I)

### 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 (PHYS 232 and PHYS 233)
- ❑ General Chemistry Lab (CHEM 125 and Cham 126)

COMPUTER SCIENCE (Computer Programming in JAVA is required.) CSIT 225 – Java Programming is only offered occasionally at Fredonia – may need to take ant another institution.

- ❑ Data Structures and Algorithms (CSIT 341 – Data Structures)
- ❑ Discrete Mathematics (CSIT 241 – Discrete mathematics for Computer Science I)
- ❑ Scientific Computation (COMS W3210) – Not offered at Fredonia – may be available in summer at a consortium institution.

## EARTH AND ENVIRONMENTAL ENGINEERING

### MATHEMATICS

- ❑ Math 224 - Ordinary Differential Equations and MATH 231 - Linear Algebra.
- ❑ General Chemistry II (CHEM 116)
- ❑ General Chemistry Lab (CHEM 125 and CHEM 126)

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

- ❑ Organic Chemistry (CHEM 215)
- ❑ Classical & quantum waves (PHYS 234 – Modern Physics)
- ❑ Introduction to Molecular and Cellular Biology (BIOL 132 – Principles of Biology II)

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

- ❑ Advanced General Geology (EESC W4001) [may be taken while at Columbia.] (Geo 210 – Geology II)
- ❑ 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

- ❑ Math 224 - Ordinary Differential Equations and MATH 231 - Linear Algebra.

### PHYSICS

- ❑ Classical and Quantum Waves (PHYS 234 – Modern Physics)
- ❑ Physics Lab (PHYS 232 and PHYS 233)

### COMPUTER SCIENCE

Computer Programming in JAVA (W1007) is recommended. (CSIT 225 – Java Programming is only offered occasionally at Fredonia – may need to take at another institution. Otherwise take CSIT 121 –Computer Science I (C++)).

#### 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 231)

PHYSICS/CHEMISTRY LAB (choose one course listed below)

- ❑ Physics Lab (PHYS 232 and PHYS 233)
- ❑ General Chemistry Lab (CHEM 125 and CHEM 126)

COMPUTER SCIENCE (choose one set of courses below)

- ❑ Computer Programming in C (CSIT 121 –Computer Science I)
- ❑ Data Structures in C (CSIT 341)

-or-

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

The Department strongly recommends JAVA over C.

#### ECONOMICS

- ❑ Introduction to Accounting and Finance (ACCT 201 – Prin. Of Financial Accounting and ACCT 202 – Prin. Of Managerial Accounting)

#### PROBABILITY AND STATISTICS

- ❑ Introduction to Probability and Statistics (STAT 350 – Probability and 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: 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

- ❑ Linear Algebra (Math 231)
- ❑ Ordinary Differential Equations (MATH 224)

PHYSICS/CHEMISTRY LAB (choose one course listed below)

- ❑ Physics Lab (PHYS 232 and PHYS 233)
- ❑ General Chemistry Lab (CHEM 125 and CHEM 126)

COMPUTER SCIENCE (choose one set of courses below)

- ❑ Computer Programming in C (CSIT 121 – Computer Science I)
- ❑ Data Structures in C (CSIT 341)

-or-

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

The Department strongly recommends JAVA over C.

#### ECONOMICS

- ❑ Introduction to Accounting and Finance (ACCT 201 – Prin. Of Financial Accounting and ACCT 202 – Prin. Of Managerial Accounting)

## PROBABILITY AND STATISTICS

- Probability (STAT 350 – Probability and Statistics)
- Statistical Inference (STAT351 – Applied Statistics)

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

## IEOR: INDUSTRIAL ENGINEERING

### MATHEMATICS

- Linear Algebra (MATH 231)

PHYSICS/CHEMISTRY LAB (choose one course listed below)

- Physics Lab (PHYS 232 and PHYS 233)
- General Chemistry Lab (CHEM 125 and CHEM 126)

COMPUTER SCIENCE (choose one set of courses below)

- Computer Programming in C (CSIT 121 – Computer Science I)
- Data Structures in C (CSIT 341)

-or-

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

The Department strongly recommends JAVA over C.

### ECONOMICS

- Introduction to Accounting and Finance (ACCT 201 – Prin. Of Financial Accounting and ACCT 202 – Prin. Of Managerial Accounting)

### PROBABILITY AND STATISTICS

- Introduction to Probability and Statistics (Stat 350 – Probability and 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

- Linear Algebra (MATH 231)

PHYSICS/CHEMISTRY LAB (choose one course listed below)

- Physics Lab (PHYS 232 and PHYS 233)
- General Chemistry Lab (CHEM 125 and CHEM 126)

COMPUTER SCIENCE (choose one set of courses below)

- Computer Programming in C (CSIT 121 – Computer Science I))
- Data Structures in C (CSIT 341)

-or-

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

The Department strongly recommends JAVA over C.

### ECONOMICS

- Introduction to Accounting and Finance (ACCT 201 – Prin. Of Financial Accounting and ACCT 202 – Prin. Of Managerial Accounting)

### PROBABILITY AND STATISTICS

- Introduction to Probability and Statistics (Stat 350 – Probability and 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

- Ordinary Differential Equations (PHYS 224)

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

- Physics Lab (PHYS 232 and PHYS 233)
- General Chemistry Lab (CHEM 125 and CHEM 126)

### ENGINEERING MECHANICS

- Mechanics (PHYS 321 – Engineering Statics and PHYS 329 – Engineering Dynamics)

## MATERIALS SCIENCE AND ENGINEERING

### MATHEMATICS

- Ordinary Differential Equations (MATH 224)

### PHYSICS

- Classical and Quantum Waves (PHYS 234 – Modern Physics)
- Physics Lab (PHYS 232 and PHYS 233)

### CHEMISTRY

- General Chemistry II (CHEM 116)
- General Chemistry Lab (CHEM 125 and CHEM 126)

## MECHANICAL ENGINEERING

### MATHEMATICS

- Math 224 - Ordinary Differential Equations and MATH 231 - Linear Algebra.

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

- Classical and Quantum Waves (PHYS 234 – Modern Physics)
- Environmental Biology: Molecules to Cells (BIOL 115 – Environmental Biology)
- Introduction to Molecular and Cellular Biology (BIOL 133 – Principles of Biology II)

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

- Physics Lab (PHYS 232 and PHYS 233)
- General Chemistry Lab (CHEM 125 and CHEM 126)

### ENGINEERING MECHANICS

- Mechanics (PHYS 321 – Engineering Statics and PHYS 329 – Engineering Dynamics)

### ELECTRICAL ENGINEERING

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

For further information on transfers, please consult SUNY Fredonia Engineering Program Coordinator Dr. Grady (716)673-3301, [grady@fredonia.edu](mailto:grady@fredonia.edu), and the Columbia Combined plan website given below.

## The Combined Plan

212 Hamilton Hall, MC 2807 [combinedplan@columbia.edu](mailto:combinedplan@columbia.edu)

1130 Amsterdam Avenue, New York, NY 10027

<http://www.studentaffairs.columbia.edu/admissions/engineering/combined>