

DEPARTMENT OF PHYSICS
65-30 KISSENA BOULEVARD
FLUSHING, NEW YORK 11367-1597
TEL.: (718) 997-3174/FAX: (718) 997-3349
E-MAIL: Luat.Vuong@qc.cuny.edu

August 1, 2015
Subject: Pre-Engineering Program

Dear Prospective Engineering Student,

Queens College does not have an engineering program of its own, but it does have one of the finest pre-engineering programs in the country. The program is administered by the Physics Department. The basis of the pre-engineering program is the formal articulation agreements it has with the Columbia University engineering school. I am the liaison officer of the program, and also a professor in the Physics Department.

The Columbia plan is a 3-2 plan. After completing your degree requirements, generally within three years at Queens College, you are automatically transferred to the engineering school at Columbia University, provided that you have satisfied the articulated course requirements and have maintained at least a 3.30 GPA while at Queens. You then spend two years at Columbia to complete the engineering program of your choice. At the end of this five-year program you will earn an engineering B.S. degree from Columbia and a B.A. degree in any one of the disciplines from Queens College.

Specific requirements to be satisfied to guarantee admission to Columbia are discussed in the following pages. You may still get accepted to Columbia even if you do not meet the GPA requirements, but acceptance is not guaranteed. We have had several students who have not been accepted their first year, and reapplied successfully. Others have been accepted and later chosen to defer to a Master's or PhD program elsewhere. The curriculum requirements for pre-engineering satisfy a range of future careers and provides a smart student cohort at Queens College.

Yet the advantages for this route to an engineering degree from Columbia are cost and location. The tuition at Queens College is a fraction of the tuition at Columbia, so the cost of your engineering degree will be significantly less than if you enter Columbia as a freshman. Further, most of our 3-2 Columbia plan students live in Queens or Nassau County, therefore the cost and time of commuting are greatly reduced.

Once you have read the following information for the **program requirements**, please look at the requirements and **the sequence of classes for the Pre-engineering program** available:

<http://www.physics.qc.edu/undergraduate-programs/>

You will want to take Physics 145/146 and get your non-physics requirements completed as soon as possible.

If you are still interested in the Pre-engineering program, please sign up for an appointment during my listed office hours (on my door). **Prior to meeting you should have your transfer credit already evaluated, either by the college, or by the physics transfer credit advisor.**

If you are planning to major in physics and **need the "declaration of major" form signed, you should see the department major advisor**, who will provide further information about department-specific activities.

Good luck, and believe in the many opportunities available to you at Queens College!

Dr. Luat T. Vuong
Assistant Professor in Physics

The Pre-engineering Program

Queens College does not offer a degree in engineering, but, like many liberal arts colleges in the United States, it has a collection of courses that are the equivalent of the majority of those taken in the first years of an engineering curriculum. In addition to these traditional offerings, Queens College offers a number of more specialized courses designed primarily for engineering students. Thus, by choosing a proper selection of courses, **Queens College students can usually transfer into third or fourth semester of most engineering programs in the United States.**

Students who might wish to transfer to an engineering school with which Queens College does not have an articulated transfer plan should consult the catalog of that school when planning their academic programs at Queens. You should also plan to visit any institution you think may match your interests. In any case, it is important for you to begin considering different engineering schools and start collecting their catalogs early in your career at Queens College. Articulated transfer agreement has been worked out with Columbia University, one of the leading engineering schools in the country so that Queens College students, after completing three years of course work at the College, can transfer to Columbia with minimum difficulty.

The Columbia plan is a 3-2 plan. In this program, the student takes additional liberal arts courses and spends three years at Queens and two at the Columbia engineering school. At the completion of the program, the student receives two degrees: a bachelor's degree in engineering from Columbia, and the B.A. degree in his/her chosen major from Queens College. **Most students opt for majoring in Physics at QC due to the considerable overlap between the BA Applied Physics option and the Pre-Engineering requirements. Moreover, the level of rigor associated with the physics degree often aids students who do not meet the GPA requirements for automatic transfer.** In addition to the pre-engineering course requirements, the student should complete the major degree course requirements towards his/her BA degree while at QC.

Guaranteed admission into The Fu Foundation School of Engineering and Applied Science's undergraduate Combined Plan Program will now be offered to applicants who have met the following requirements. **Due to the increase in applicants to the program, Columbia has started implementing all the rules on the agreement to be guaranteed admission. Here are the rules:**

1. Applicants must have been enrolled at QC as a full-time student for at least the past 2 years.
2. **Applicants must receive an overall GPA and a pre-engineering GPA of 3.30 or higher as calculated by Columbia.**
3. **Minimum grade in each pre-engineering science and mathematics pre-requisite course must be a B or the equivalent – the first time the course was taken.**
4. Applicants must receive 3 favorable recommendations: from the Combined Plan liaison officer and one each from a science and math instructor at QC.
5. Applicants must have successfully completed, by the end of the spring semester, **all prerequisite courses listed in the Pre-Combined Plan Curriculum** for one's intended major.
6. Applicants must have successfully finished the **major and distribution requirements** prescribed by QC for graduation before entering Columbia.

GPA Calculation Policy: The pre-engineering GPA will be calculated on a 4.0 scale using the foundational and major-specific courses listed in the Pre-Combined Plan Curriculum Guide (not including the non-technical requirements besides English composition and economics). All transcripts are required to be submitted with your application, and all technical pre-requisite requirements completed at other institutions should be listed on your Queens College transcript.

Use of Advanced Placement, International Baccalaureate, and other standardized exams for placement: Students using Advanced Placement, International Baccalaureate or other standardized exam results for credits for pre-engineering required courses must either (a) take further coursework in that subject to fulfill the requirement or (b) submit the test results to Columbia for evaluation just as other Columbia students must do. Please refer to the SEAS Bulletin for credit policies. Courses waived by your affiliated school will be evaluated by the Combined Plan Admissions Committee and applicants will not necessarily satisfy the prerequisites.

Pre-Combined Plan required courses not taken at the home institution: Any pre- Combined Plan foundational and major-specific courses taken at a non-affiliated college/university must be approved and granted credit by the applicant's affiliate school. All courses taken at non-affiliate schools must be taken at an American-style college/university.

General Application Schedule:

- **December 1, 2015** Application available online
- **February 15, 2016** Deadline to submit application materials
- **March 1, 2016** Deadline to submit financial aid materials
- **April 2016** Admissions decisions are released to candidates

More information about the program can be found at:

<http://undergrad.admissions.columbia.edu/apply/combined-plan>

FOUNDATION COURSES REQUIRED OF ALL MAJORS:

1. **MATHEMATICS** Note: Physics 233 also satisfies Math 202 requirement
 - a. The full sequence of Calculus (Math 151, 152, 201, 202).
 - b. Alternately: Math 141,142,143, 201 and 202.
2. **PHYSICS**
 - a. Mechanics and Thermodynamics (Phys 145)
 - b. Electricity, Magnetism, and Optics (Phys 146)
3. **CHEMISTRY**
 - a. General Chemistry I (Chem 113)

Please see individual programs below for details. Some programs require an additional second semester of General Chemistry (C114) or have possible substitutions.

4. **LAB REQUIREMENT**
 - a. Lab courses accompanying the lectures for Chemistry 113, Physics 145, and Physics 146 are required.
5. **COMPUTER SCIENCE**
 - a. Introduction to computer science and programming (CSCI 111).

Some majors require a specific language (Java) so students would prefer CSCI 112 instead of 111. See below.

6. 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:

- a. Principles of Economics (ECON 101)
- b. English Composition (ENGL 110).

The Economics 101 and English 110 count toward the 27. Also, the writing requirements for QC should be met.

7. Engineering-Major Course Requirements course list below.

In addition to these required courses for all engineering majors, the following are a list of additional courses that are required for specific engineering programs along with the QC course numbers.

Engineering-Major Course Requirements

APPLIED MATHEMATICS or APPLIED PHYSICS

MATHEMATICS

- Ordinary Differential Equations (Math 223 or Phys 233*);
Note: The Physics 233 requirement meets both the ordinary differential equations requirement for the pre-combined program as well as the Applied Physics BA requirement at QC

PHYSICS

- Classical and Quantum Waves (Phys 260)
- Physics Lab (Phys 235)

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

- General Chemistry I (Chem 113.4)
- Physiology and Cell Biology (105)

BIOMEDICAL ENGINEERING (ALL TRACKS)

MATHEMATICS

- Ordinary Differential Equations (Math 223 or Phys 233*)
- Linear Algebra (Math 231/237).

PHYSICS

- Classical and Quantum Waves (Phys 260 – Modern Physics)

CHEMISTRY

- General Chemistry II (Chem 114.4)
- General Chemistry Lab (Chem 114.1)

ELECTRICAL ENGINEERING

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

COMPUTER SCIENCE

- *Introduction to Computer Science and Programming in MATLAB* (NOT OFFERED AT QC – MAY BE TAKEN AT COLUMBIA)

CHEMICAL ENGINEERING

MATHEMATICS

- Ordinary Differential Equations (Math 223 or Phys 233)

PHYSICS

- Physics Lab (Phys 235)

CHEMISTRY

- General Chemistry II (Chem 114.4)
- General Chemistry Lab (Chem 114.1)
- Organic Chemistry I (Chem 251.4)
Organic Chemistry Lab (Chem 251.1)

CIVIL ENGINEERING

MATHEMATICS

- Ordinary Differential Equations (Math 223 or Phys 233)
- Linear Algebra (Math 231/237).

PHYSICS

- Physics Lab (Phys 235)

ENGINEERING MECHANICS

- Mechanics (Phys 237) [*this course may also be taken the summer before entering or while at Columbia*]

COMPUTER SCIENCE

- *Introduction to Computer Science and Programming in MATLAB* (NOT OFFERED AT QC – MAY BE TAKEN AT COLUMBIA)

COMPUTER ENGINEERING

MATHEMATICS

- Ordinary Differential Equations (Math 223 or Phys 233)

- Linear Algebra (Math 231/237).
- Discrete Math (Math 220)

PHYSICS

- Physics Lab (Phys 235)

COMPUTER SCIENCE

- Object-oriented Programming in Java (CSCI 212)
- Data Structures (CSCI 313)

ELECTRICAL ENGINEERING

- Introduction to Electrical Engineering. – *[Not offered at QC may be taken the summer before entering or while at Columbia]*

COMPUTER SCIENCE

PHYSICS/CHEMISTRY LAB

- Physics Lab (Phys 235)

MATHEMATICS

- Discrete Math (Math 220)

COMPUTER SCIENCE

- Object-oriented Programming in Java (CSCI 212)
- Discrete Structures (CSCI 220)

EARTH AND ENVIRONMENTAL ENGINEERING

MATHEMATICS

- Ordinary Differential Equations (Math 223 or Phys233)
- Linear Algebra (Math 231/237).
- Introduction to Probability and Statistics (Math 241) *[may be taken while at Columbia.]*

CHEMISTRY

- General Chemistry II (Chem 114.4)
- General Chemistry Lab (Chem 114.1)

OTHER SCIENCE ELECTIVE (choose one course listed below)

- Organic Chemistry (251.4)
- Classical & quantum waves (PHYS 260 – Modern Physics)
- Physiology and Cell Biology (105)

EARTH AND ENVIRONMENTAL SCIENCES (choose one course listed below)

- Advanced General Geology *[may be taken while at Columbia.]*
- The Climate System *[may be taken while at Columbia.]*
- The Solid Earth System *[may be taken while at Columbia.]*

EARTH AND ENVIRONMENTAL ENGINEERING

- Alternative Energy Resources *[may be taken at Columbia]*

ELECTRICAL ENGINEERING

MATHEMATICS

- Ordinary Differential Equations (Math 223 or Phys233)
- Linear Algebra (Math 231/237).

PHYSICS

- Classical and Quantum Waves (Phys 260 – Modern Physics)
- Physics Lab (Phys 235 or Phys 145/146 lab)

COMPUTER SCIENCE

- Object-oriented Programming in Java (CSCI 212)

ELECTRICAL ENGINEERING

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

IEOR: ENGINEERING MANAGEMENT SYSTEMS

MATHEMATICS

- Linear Algebra (MATH 231/237)

PHYSICS

- Physics Lab (Phys 235)

COMPUTER SCIENCE

- Object-oriented Programming in Java (CSCI 212)
- Data Structures (CSCI313)

(NOTE: This course has the following prerequisites: CSCI-211, CS-212, CSCI-220).

ECONOMICS

- Introduction to Accounting and Finance (Acct 100)

PROBABILITY AND STATISTICS

- Introduction to Probability and Statistics (Math 241)

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. Students interested in this concentration must adhere to the pre-requisite requirements for IEOR Engineering Management Systems or IEOR Industrial Engineering.

IEOR: INDUSTRIAL ENGINEERING

MATHEMATICS

- Linear Algebra (MATH 231/237)

PHYSICS

- Physics Lab (Phys 235)

COMPUTER SCIENCE

- Data Structures (CSCI 313)

(NOTE: This course has the following prerequisites: CSCI-211, CSCI-212, CSCI-220).

ECONOMICS

- Introduction to Accounting and Finance (ACCT 100)

PROBABILITY AND STATISTICS

- Introduction to Probability and Statistics (Math 241)

IEOR: OPERATIONS RESEARCH

MATHEMATICS

- Linear Algebra (MATH 231/237)

PHYSICS/CHEMISTRY LAB

- Physics Lab (Phys 235)

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

- Data Structures (CSCI 313)

(NOTE: This course has the following pre-requisites: CSCI-211, CSCI-212, CS-220).

ECONOMICS

- Introduction to Accounting and Finance (ACCT 100)

PROBABILITY AND STATISTICS

- Introduction to Probability and Statistics (Math 241)

ENGINEERING MECHANICS

MATHEMATICS

- Ordinary Differential Equations (Phys 233 or Math 223)

PHYSICS

- Physics Lab (Phys 235)

ENGINEERING MECHANICS

- Mechanics (Phys 237) *May be taken the summer before entering or while at Columbia*

MATERIALS SCIENCE AND ENGINEERING

MATHEMATICS

- Ordinary Differential Equations (Phys 233 or Math 223)

PHYSICS

- Classical and Quantum Waves (Phys 260 – Modern Physics)
- Physics Lab (Phys 235)

CHEMISTRY

- General Chemistry II (Chem 114)

MECHANICAL ENGINEERING

MATHEMATICS

- Ordinary Differential Equations (Phys 233 or Math 223)
- Linear Algebra (Math 231).

PHYSICS/BIOLOGY

- Classical and Quantum Waves (Phys 260 – Modern Physics)
- Physiology and Cell Biology (105)

PHYSICS

- Physics Lab (Phys 235)

ENGINEERING MECHANICS

- Mechanics (Phys 237) [*may be taken while at Columbia*]

ELECTRICAL ENGINEERING

- Intro. to Electrical Engineering or equivalent [*may be taken while at Columbia*]