

## Information for A.B. Students Interested in Switching into the B.S.E. Program

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### What is Engineering?

Engineering is the application of the principles of math and science to solve problems that affect humanity. These solutions may involve the design of a new structure, machine, process, or network, or they may require a more conceptual approach involving the computing, information, and decision sciences. As such, engineering is less about making scientific discoveries and more about designing novel and creative ways to address the needs of society. Studying engineering at Princeton is an excellent way to combine a rigorous education in engineering science and design with the breadth of the liberal arts.

### The B.S.E. Program of Study

**First year:** Courses in physics, chemistry, calculus, computing prepare you for fundamental departmental courses in sophomore year; the University writing seminar and humanities and social science courses give you a foundation for further study in the liberal arts; B.S.E. students choose a major at the end of the first year.

**Sophomore year:** Courses introduce the general principles of your field that you can apply in many different situations and which will enable you to pick up new material easily later on, even decades in the future; additional humanities and social science courses provide breadth in the liberal arts.

**Junior year:** Courses cover specific topics in greater depth and include one or more courses in engineering design, in which you use the principles to learn how to make useful things; technical electives broaden your knowledge in your field, and further humanities and social science courses enrich your education.

**Senior year:** You take further courses in your particular areas of interest plus do independent work in which you take an engineering problem and solve it by carrying out observations, experiments, designs, and calculations, then present it in a professional manner. Independent work counts as courses in the B.S.E. program. For example, a senior thesis will count as one course in the fall and one course in the spring.

### Staying on Track

If you are not yet ready to change into the B.S.E. program, you can stay on track during your first year by taking Math at the 103 level or higher and Physics 103-104 (not Physics 101-102) or the equivalent. If you are interested in Chemical and Biological Engineering and do not have AP in chemistry, you must complete two terms of general chemistry before the start of sophomore year. See the AP Credit Reference Table linked at <https://odoc.princeton.edu/advancedplacement> for current policies on AP credit in physics and chemistry. If you have AP in math, please continue with Math at the appropriate level (NOT 175, however.) In the spring of your first year, consider taking COS 126.

### The Process of Switching

The sooner you can get on track for the B.S.E. program the better. If you have a strong high school foundation in math and physics, you can begin the process of switching shortly after you accept Princeton's offer of admission. After that, the ease of switching depends on whether you are on track with B.S.E. requirements and departmental requirements, according to the following timeline:

**1. Before you start at Princeton:** apply for transfer to the B.S.E. program during the "Confirmation of Degree Candidacy" that is part of the matriculation process by June 10; we will review your application and if you have strong preparation in math and physics, we can usually transfer you into engineering right away. As of June 11, there is a moratorium on changes until the start of classes. NOTE: if you did not take physics in your last two years of high school, you may not transfer to the B.S.E. program at this time. Contact Dean Bogucki to discuss options.

- 2. During course selection:** choose a program of study that includes at least Physics 103-104 and calculus at the 103 level or higher in consultation with your A.B. adviser. If you don't have AP in chemistry, then that is good to include as well. Make an appointment to see Dean Bogucki ([BSEprogram@princeton.edu](mailto:BSEprogram@princeton.edu)) on the first day of classes; he will review your preparation, and if adequate, permit a transfer to the B.S.E. program of study.
- 3. During the first year:** see Dean Bogucki and make sure you take calculus and Physics 103-104; if you don't take physics, you'll have to take a summer course; if you're interested in CBE, you need chemistry. Note: B.S.E. students may NOT take: Math 101, 102, 175; Physics 101-102, nor can math and science be taken PDF. Math 104 must be completed before the beginning of sophomore year in all B.S.E. majors.
- 4. After the start of sophomore year:** unless you've taken a B.S.E. program in the first year and have started a departmental program of study in engineering, it can be difficult, but see Dean Bogucki to discuss options.
- 5. After the middle of sophomore year:** in most cases, the B.S.E. train has left the station and you're still on the platform, but in Computer Science and ORFE, it might be possible to catch up depending on how much math and computing you've done so far. Contact Dean Bogucki to discuss your options.

If in doubt, consult with Dean Bogucki sooner rather than later, ideally before May of your first year. If you find your calling to engineering too late to switch into the B.S.E. program, consider taking math through differential equations, physics, and some of the basic engineering-science courses, and then trying to find a masters degree program that will permit you to do a "conversion" degree.

### **But First ...**

Please make sure that engineering is really what you are interested in studying. It requires dedication, hard work, a good sense of humor, and the ability to deal with occasional frustration. Good reasons to study engineering include a curiosity about how things work, a desire to improve the world, and an interest in solving important technological problems. Wrong reasons to study engineering include that a relative insisted that you do so, that you believe it to be an automatic ticket to wealth and prestige, or to avoid the A.B. foreign language requirement. Visit the website of the [School of Engineering and Applied Science](#) to learn more about the community of over 1,500 students and 170 faculty in six engineering departments. Pay special attention to the undergraduate programs of study in the departments that interest you. Each one has a departmental handbook that details the requirements, electives, and junior and senior independent work options.

We must confront two common misunderstandings:

1. Chemical and Biological Engineering (CBE) is *not* applied Chemistry, and it is *not* Biology. It is a separate engineering discipline that involves the study of chemical and biological processes. Majoring in CBE requires the study of Thermodynamics, Bioseparations, and Mass and Energy Transport. Please study the [CBE Undergraduate Handbook](#) available online before deciding to switch into the B.S.E. program to major in CBE.
2. Operations Research and Financial Engineering (ORFE) is *not* Economics+, and it is *not* a secret Princeton major in Business. ORFE involves the application of statistics, probability, and optimization techniques to the analysis of decision-making under conditions of risk and uncertainty, complex logistical and transportation systems, and financial systems. Please study the latest [ORFE Undergraduate Academic Guide](#) available online before deciding to switch into the B.S.E. program to major in ORFE.

If you have any questions, don't hesitate to contact Dean Bogucki at [BSEprogram@princeton.edu](mailto:BSEprogram@princeton.edu) or 609-258-4554. Ms. Traci Miller, Undergraduate Affairs Administrator, can arrange an appointment.