



## **If You're Thinking of Majoring in Engineering. . .**

For those interested in studying Engineering, a great many options exist. These range from schools that admit students with mostly B's and few if any honors classes in high school, to highly selective universities that will only admit applicants who have already taken calculus and attained high scores on Math 2 and either Chemistry or Physics SAT subject tests.

Articulated 3-plus-2 programs are an alternative for students who want to study something else as well as engineering and earn two Bachelor's degrees in five years, the first at a liberal arts school and the second at an Engineering program elsewhere. Participation in these programs requires students to declare their intention early, plan their schedules carefully, and maintain a pre-designated minimum grade point average. Columbia University, Washington University in St. Louis, and Dartmouth are among the schools whose engineering programs have articulation agreements with such liberal arts school as Brandeis, Clark, Franklin & Marshall, and Wesleyan, to name just a few.

To be a licensed engineer, you must pass an exam, and in order to sit for that exam, you must have attended an ABET accredited engineering program. Since ABET mandates the bulk of the curriculum, much of what you study will be the same wherever you go. ABET requires approximately 30 credit hours in math and science and 45 credit hours in engineering topics, followed by a culminating engineering design project that requires one or two semesters and addresses a real-world problem, usually as part of a team. The math courses are Calculus I and II, Differential Equations, Probability and Statistics, and an elective. The science courses are two semesters each of calculus-based physics and chemistry. Needless to say, a student needs to be good at math, and calculus in particular, to succeed in engineering.

Generally speaking, the courses required for an engineering degree are so sequenced and extensive that students wishing to graduate on time must begin taking some of them as early as the first semester of their freshman year. This is true even where they are not required to declare the major in engineering until their third or fourth semester.

At the many universities that require students to apply for engineering directly from high school, that program is almost always among the university's most selective, easier to switch out of than into, should the student have a change of heart later on. In some cases when filling out their initial application, applicants must even select a specific concentration within the department, such as mechanical, civil, electrical, or computer, and some of these will be harder to get into than others. At the schools that offer it, biomedical engineering is invariably particularly selective.

Another way in which undergraduate engineering programs differ from one another is in the amount of exposure students have to multiple different types of engineering apart from the one they concentrate in. There are pros and cons to the broad curriculum approach even for the student who knows from the outset what he or she wishes to study, considering that the projects engineers work on often require members of the team to have different areas of expertise. Programs that require a broad engineering education tout the benefit of understanding all components of one's team's efforts, whereas students at schools where they begin their concentration earlier may ultimately learn it in greater depth.

Also, some programs are more focused on preparing students for employment immediately after college, whereas others are more geared toward preparing them for graduate school. However, many of those students who enter the work force directly upon graduation will pursue further studies later on, frequently with their tuition paid by their employers. Furthermore, engineers who go on to graduate school are as apt to pursue an advanced degree in business as in engineering since having a background in this combination of disciplines prepares them well for positions managing projects and teams.

When choosing an engineering program, first and foremost, make sure that it is ABET accredited because there are still some programs out there which are not. Then look at the course offerings in the major as well as the general education core, mindful that engineers also need good written and oral communication skills. Look at the facilities and average class size because of their impact on how much hands-on experience you will get, and look at the experience level of those who will teach your classes. Close working relationships with industry and the local community facilitate opportunities for students to work on real-world challenges both in and out of class.

Investigate how many of the school's students enter their design projects in external competitions each year (and how they fare when they do), and what other opportunities exist to gain beneficial experience. For instance, during breaks, many schools routinely send teams of students to work with Engineers Without Borders on projects in third world countries.

While engineering programs are invariably rigorous, gone are the days when they were known to pit students against one another in competition. Nowadays it is well recognized that projects require teams of workers, so schools are looking for

students who are good team players, more cooperative than competitive with one another.