

## 5. PROGRAM DESCRIPTIONS AND REQUIREMENTS FOR ENGINEERING MAJORS

Within the context of the broad, liberal-arts education that is the hallmark of all Stanford undergraduate programs, the School of Engineering strives to provide the scientific and technical education necessary for both a satisfying and productive engineering career and for a successful graduate school experience. The curricula of the School emphasize fundamental knowledge, tools, and skills, while allowing many opportunities for engineering students to take advantage of the excellent courses and programs offered by the other schools of the University. About 10 percent of all engineering majors choose to double-major, many study overseas for a quarter or more, and most are involved in extracurricular activities. While engineering curricula are among the most demanding at the University and require careful academic planning to take full advantage of the many opportunities at Stanford, we aim to strike a balance between the technical sophistication and the social and cultural breadth demanded of engineers in modern society.

Engineering courses, however, represent only a part of a liberal-arts education. To ensure that every engineer receives a well-rounded undergraduate experience, all students must meet the general requirements of the University in addition to the disciplinary requirements for a degree in engineering. These requirements are detailed in other University publications such as the *Stanford Bulletin* and *Approaching Stanford*.

### UNDERGRADUATE PROGRAM SHEETS

A student's undergraduate **Program Sheet** is an essential document for planning and for degree certification by the School of Engineering. In effect, it represents the student's "contract" with the School of Engineering, because completion of all courses listed on the sheet is a requirement for receiving the B.S. or B.A.S. degree with a major in the School. Each department has their own requirements regarding program sheets but, in general, a student is advised to complete a form as they prepare to declare their major or, in some cases, as they enter their senior year.

#### CREATE A PROGRAM SHEET

**You will see examples of Program Sheets for each of the majors in the sections that follow.**

These Program Sheets represent sample full or partial curricula for the majors, not a complete

program that must be followed exactly in all cases. Your personal Program Sheet is created by you: Go to <http://ughb.stanford.edu> and choose from a selection of departmental and blank Program Sheets; each major program has one or more on file. You may fill it out electronically or in hardcopy. Carefully review the notes and footnotes on the Program Sheet for directions on completing the form, and for details about major courses and alternatives. Remember that each course can only be listed under one category on the program sheet; that is, a course may not “double count” for more than one requirement. You may select a Program Sheet from any year in which you are enrolled at Stanford.

### **SUBMIT A PROGRAM SHEET TO YOUR DEPARTMENT**

A signed copy of your own Program Sheet generally must be submitted to the major department at the beginning of the quarter prior to the quarter in which you intend to graduate. *However, it is prudent to have a completed and approved Program Sheet on file with your department by the end of your junior year*, and some departments have special requirements: Electrical Engineering majors are required to submit their Program Sheet by the end of the quarter following their declaration; revisions are allowed up to the beginning of the final quarter before graduation.

### **REVISING AN APPROVED PROGRAM SHEET**

A program sheet that has been approved and signed by your advisor must be resubmitted for approval if you change your program. That is, any deviation from required courses or transfer of credit from another institution must be petitioned using your current program sheet, which you should then have re-approved/re-signed by your advisor and department. The final program sheet you will use to graduate must have all changes initialed and dated in ink by your advisor, and must be reviewed and signed by your department, etc. See Chapter 4 for details on petitions. Petitions to alter graduation requirements, for transfer credit evaluation, or for course substitutions should be submitted as early as possible and always at least one quarter before your final quarter as an undergraduate student.

### **FULFILLING REQUIREMENTS FOR ACCREDITED PROGRAMS**

The Program Sheet provides a convenient way to assess a program with respect to accreditation requirements, which are not the same as the School’s curricular requirements. In order to satisfy Accreditation Board for Engineering and Technology (ABET) requirements, a student majoring in Chemical, Civil, Electrical, Environmental, or Mechanical Engineering must complete one and a half years (minimum of 68 units) of Engineering Science and Engineering Design appropriate to the student’s field of study. Engineering Science and Design units are not the same as total units;

see program sheet forms and major descriptions for details. A minimum 8 units of Experimentation units are also required for ABET-accredited programs.

## DECLARING AN ENGINEERING MAJOR

Stanford has a long-standing policy that any student may declare any major. Hence, there are no separate “entrance” requirements for the School of Engineering. Students at Stanford also have considerable time to weigh their choice of major, and it is useful to take a variety of courses in engineering before settling on a particular major. The majors offered by the School of Engineering are demanding, but also extremely rewarding.

Students at Stanford must declare a major by the time they achieve junior status (85 completed units). Prospective Engineering majors should review their departmental program section for any major-specific declaration procedures. As the final step, students will formally declare their major in Axess. The link for Declaring a Major/Minor is under the Academics tab.

- Departmental majors (ChemE, CEE, CS, EE, EnvE, MS&E, MatSci, ME) should select a Department Plan. Check your major program section in Chapter 5 for detailed instructions.
- Engineering majors (Aeronautics and Astronautics, Architectural Design, Atmosphere/Energy, Biomechanical Engineering, Biomedical Computation, Computer Systems Engineering, Engineering Physics, and Product Design) should select “Engineering” as their Plan and then the appropriate Subplan. Check your major program section in Chapter 5 for detailed instructions.
- Individually Designed Majors should select the IDMEN Plan (see Chapter 2 for detailed instructions).

You must satisfy department or program declaration requirements before you are officially declared in a major; see instructions for each major in the appropriate section of Chapter 5. Your academic record will not be changed until you have satisfied all requirements. When the department certifies in Axess that you have met its declaration requirements, an e-mail message will be sent to notify you that your academic record has been updated.

# MAJOR PROGRAMS AND THEIR REQUIREMENTS

In the following sections you will find detailed descriptions of the programs in:

- **Chemical Engineering**
- **Civil Engineering**
- **Computer Science**
- **Electrical Engineering**
- **Engineering**
  - **Aeronautics and Astronautics**
  - **Architectural Design**
  - **Atmosphere/Energy**
  - **Biomechanical Engineering**
  - **Biomedical Computation**
  - **Computer Systems Engineering**
  - **Engineering Physics**
  - **Product Design**
- **Environmental Engineering**
- **Individually Designed Major in Engineering is described in Chapter 2**
- **Management Science and Engineering**
- **Materials Science and Engineering**
- **Mechanical Engineering**