

# Engineering, Jacobs School of

OFFICE: 7310 Engineering Building Unit 1, Warren Mall  
<http://www.jacobsschool.ucsd.edu>

The Irwin and Joan Jacobs School of Engineering at UC San Diego comprises the Departments of Bioengineering (BE), Computer Science and Engineering (CSE), Electrical and Computer Engineering (ECE), Mechanical and Aerospace Engineering (MAE), NanoEngineering (NE), and Structural Engineering (SE). The Jacobs School is directed by the dean of engineering. The departments offer eighteen undergraduate programs that fall into three categories: impacted, pre-major, and open major programs as well as many graduate degree programs. For a complete list of engineering undergraduate and graduate programs, please visit our Web site at <http://www.jacobsschool.ucsd.edu>. Students interested in engineering should consult the Web site and the individual department listings which follow this section of the catalog.

UCSD's six undergraduate colleges differ in their general-education requirements. Prospective students should review the general-education requirements and take them into account when planning their college curriculum.

## ACCEPTANCE TO DEPARTMENTAL MAJORS IN THE JACOBS SCHOOL OF ENGINEERING

Student demand exceeds program capacity in some of the undergraduate majors. Owing to limited departmental resources, major programs to which more students apply than can be accepted have been declared impacted majors. Acceptance into an impacted engineering major is based on academic excellence demonstrated in high school or at a community college. Acceptance will be granted to the maximum number of students in each of these impacted major programs consistent with maintaining acceptable program quality and in compliance with admissions procedures and criteria approved by the Academic Senate's Committee on Educational Policy.

**Remember that admission to the university and to a college does not guarantee acceptance to an impacted major.**

### FRESHMEN

Freshmen are admitted to engineering majors in one of three ways: open majors, pre-majors and impacted majors.

### Open Majors

The following majors are open to all admitted UCSD students: bioengineering: bioinformatics (offered through the BENG department), chemical engineering (offered through the NE department),

computer engineering (offered through the CSE department), computer engineering (offered through the ECE department), computer science, electrical engineering, electrical engineering and society, engineering science (offered through the MAE department), engineering sciences (offered through the SE department), environmental engineering, and structural engineering. All applicants who have been accepted to UCSD and indicated a pre-major or open engineering major on their application are placed directly into that major.

### Pre-major Programs

There is one engineering pre-major program offered: (1) engineering physics. Incoming freshmen who identify this pre-major as their first choice on their UCSD admissions application are accepted directly into the pre-major upon admission to UCSD. Subsequent acceptance to the major is dependent on performance in selected mathematics, science, and engineering screening courses as well as competitive grade-point average in the pre-major screening courses.

**Pre-major engineering students are expected to apply for acceptance to the major during the spring quarter of their freshman year.** Acceptance to the major is based on the grade-point average in the screening courses only. The grade-point average required for acceptance to the major by pre-majors is set individually by each engineering program. Pre-majors should consult their departments concerning the appropriate screening courses and the current grade-point average standards for acceptance. In addition to the courses required by the departments, it is expected that all pre-major students will take twelve to eighteen units of general-education college requirements during their first year.

**Pre-major engineering students** who are not able to apply before the end of their third quarter, or who wish to reapply following an unsuccessful application, must contact their department as soon as possible for further advising as **acceptance to any engineering major that has a pre-major will not be considered after six quarters of enrollment.**

### Impacted Majors

The following engineering majors are impacted: aerospace engineering, bioengineering, bioengineering: biotechnology and mechanical engineering. Applicants must indicate one of these impacted majors as their first choice on their UC application in order to be considered for acceptance to the major by the UC San Diego Office of Admissions.

Effective fall 2001, this selection is based on the freshman review criteria (Comprehensive Review) administered by the UCSD Office of Admissions and Relations with Schools.

It is strongly suggested that all students accepted into engineering programs consult their department's academic advisor at an early stage to plan their lower-division engineering courses, and that they consult with a college academic counselor to arrange general-education courses around the required screening courses. Students admitted fall quarter should attend the engineering department's orientation meetings during Welcome Week.

### Bioinformatics Programs

Students interested in applying to either the bioengineering: bioinformatics major (offered by the Department of Bioengineering), or the computer science major with a specialization in bioinformatics (offered by the Department of Computer Science and Engineering) should consult individual department listings which follow this section of the catalog.

### TRANSFERS

Following California's Master Plan for Higher Education, UC San Diego gives high priority to students transferring from California community colleges.

Transfer students are admitted to engineering majors in one of three ways: open majors, pre-majors, and impacted majors. For major-specific advising, please contact the relevant departmental undergraduate academic advising office.

Effective **fall 2009**, these courses are **strongly recommended for all engineering transfer students** for success in their major.

- Calculus I—for Science and Engineering (Math. 20A)
- Calculus II—for Science and Engineering (Math. 20B)
- Calculus and Analytic Geometry (Math. 20C)
- Differential Equations (Math. 20D)
- Linear Algebra (Math. 20F)
- Complete calculus-based physics series with lab experience (Physics 2A-B-C)
- Chemistry 6A (except computer science and computer engineering majors)  
**Note:** A total of ten quarter-units of general chemistry (including laboratory) will be recommended for students applying to all majors offered by the Department of Bioengineering.
- Highest level of introductory computer programming language course offerings at the community college\*
- Community college equivalent courses can be found at: <http://www.assist.org>

\*Refer to the *UC San Diego General Catalog* to select major prerequisite recommendations for computer language courses.

### Open Majors

The following majors are open to all admitted UCSD transfer students: aerospace engineering (offered through MAE through spring 2011), bioengineering: bioinformatics (offered through the BENG department), chemical engineering (offered through NE), computer engineering (offered through CSE), computer engineering (offered through ECE), computer science, electrical engineering, electrical engineering and society, engineering science (offered through MAE), engineering sciences (offered through SE), environmental engineering, mechanical engineering (offered through MAE through spring 2011), and structural engineering.

## Pre-major Programs

There is one engineering pre-major program offered: (1) engineering physics. Subsequent acceptance to the major is dependent on performance in selected mathematics, science, and engineering screening courses as well as competitive grade-point average in the pre-major screening courses.

**Pre-major transfer engineering students are expected to apply for acceptance to the major during their third quarter of their first year at UCSD.** Acceptance to the major is based on the grade-point average in the screening courses only. The grade-point average required for acceptance to the major by pre-majors is set individually by each engineering program. Pre-majors should consult their departments concerning the appropriate screening courses and the current grade-point average standards for acceptance. In addition to the courses required by the departments, it is expected that all pre-major students will take twelve to eighteen units of general-education college requirements during their first year.

**Pre-major transfer engineering students must apply to the major before the end of their third quarter as acceptance to any engineering major that has a pre-major by a transfer student will not be considered after the end of the third quarter of enrollment.**

## Impacted Majors

Since acceptance to impacted engineering majors is quite competitive for freshman and transfer applicants alike, academic standards are high.

Transfer students who choose impacted engineering major programs (bioengineering, bioengineering: biotechnology) as their first-choice major on their UC application are strongly encouraged to complete the major preparation classes listed previously.

Acceptance to impacted majors may be limited to the best transfer applicants, e.g., those who have been admitted to UCSD with the most complete lower-division preparation and the highest college grade-point averages. Since acceptance is restricted to these majors, **transfer students are encouraged to apply to more than one major degree program.**

It is strongly suggested that all students accepted into engineering programs consult their department's academic advisor at an early stage to plan their lower-division engineering courses, and that they consult with a college academic counselor to arrange general-education courses around the required screening courses. Students admitted fall quarter should attend the engineering department's orientation meetings during Welcome Week.

For specific program requirements for transfer students, please refer to the appropriate department's listing which follow this section of the catalog.

## Bioinformatics Programs

Students interested in applying to either the bioengineering: bioinformatics major (offered by the Department of Bioengineering), or the computer science major with a specialization in bioinformatics (offered by the Department of Computer Science and Engineering) should consult individual

department listings which follow this section of the catalog.

## CONTINUING UCSD STUDENTS

Continuing UCSD undergraduate students who wish to change into impacted majors must submit an application to the department on or before the target dates and must meet minimum requirements. Interested students should make an appointment to speak with the departmental undergraduate advisor for more details.

## ACCESS OF NON-ENGINEERING MAJORS TO THE JACOBS SCHOOL OF ENGINEERING COURSES

The number of students enrolled in some courses offered by departments in the Jacobs School of Engineering must be restricted to meet the resources available. Students who have successfully completed all prerequisite courses will be enrolled in these restricted courses in the following order:

1. students accepted by the department to a major curriculum
2. students accepted by the department to a minor curriculum
3. students fulfilling a requirement for another major
4. all others, with permission of the department and instructor

Students should check with the departments concerning the limitations on specific courses and the requirements needed prior to attempting to enroll.

## DOUBLE MAJORS AND MINORS

It is the policy of the UC San Diego Academic Senate not to approve double majors within engineering. Students who qualify for admission to graduate school and who have the extra time are encouraged to consider co-terminal B.S./Master's degrees in one or two engineering disciplines.

For more information visit [http://www.jacobsschool.ucsd.edu/academic/academic\\_undergrad/bs-ms.shtml](http://www.jacobsschool.ucsd.edu/academic/academic_undergrad/bs-ms.shtml).

## ORIENTATION TO ENGINEERING

**ECE 1A-B-C:** This course series has no prerequisites and students will be given an introduction to the engineering profession and our undergraduate program. Exercises and practicums will develop the problem-solving skills needed to succeed in engineering. It is offered fall, winter, and spring.

## INTEGRATIVE ENGINEERING EDUCATION

**Engineering Student Services:** Engineering Student Services (ESS) facilitates and encourages the professional, academic, and personal success of engineering students. The services available through Engineering Student Services are designed to assist students as they pursue their chosen degrees and to prepare them for life outside of the university as engineering professionals and responsible citizens. The staff serve as a resource for those interested in applying to engineering majors; getting involved in

student organizations; seeking internships; accessing tutoring, scholarship, and involvement information; or for those needing a referral to on-campus and community resources. In addition, support is provided to the Teams in Engineering Service (TIES) Program, Team Internship Program, and the California State Summer School for Mathematics and Science (COSMOS). For more information, visit the office in Engineering Building Unit 1, Room 1400, email the staff at [ess@soe.ucsd.edu](mailto:ess@soe.ucsd.edu), or visit <http://ess.ucsd.edu>.

### Teams in Engineering Service (TIES):

Engineering undergraduates can place their technical and creative skills to work for San Diego nonprofit organizations through the Teams in Engineering Service (TIES) Program. Through TIES, multidisciplinary teams of UCSD students design, build, and deploy projects that solve technology-based problems for local community organizations, and receive technical elective (or academic) credit. For details, visit <http://ties.ucsd.edu>.

**Team Internship Program (TIP):** Under the direction of the Corporate Affiliates Program, this corporate-sponsored program gives students the opportunity to develop their engineering skills in a multidisciplinary team environment that provides real-world engineering experience in preparation for entering the workforce. In these full-time, competitive summer paid internships, students work on-site with industry partners as a systems-oriented solution team focused on a clearly defined and significant project. For details, visit <http://www.jacobsschool.ucsd.edu/TIP>.

**The California State Summer School for Mathematics and Science (COSMOS)** is a four-week residential pre-college academic experience in math., science, and engineering for top high school students. Students participate in one of the following eight academic courses (or clusters): 1. Computers in Everyday Life; 2. Engineering Design and Control of Kinetic Sculptures; 3. Living Oceans and Global Climate Change; 4. Earthquakes in Action; 5. Bright Ideas: Light at Work; 6. Exploring the Cosmos; 7. Biological Motivations for Tensegrity Structures; and 8. The Molecular Biology Revolution. In summer 2008, one-third of the admitted students were awarded full financial aid. For more information, visit <http://www.jacobsschool.ucsd.edu/cosmos>.

### Bernard and Sophia Gordon Engineering

**Leadership Center:** The mission of the Gordon Center is to train effective engineering leaders who create new products and jobs that benefit society. The Gordon Center offers an engineering leadership and awards program for undergraduate, graduate, and professional students with leadership potential. The Gordon Scholars participate in a comprehensive engineering leadership training program, which includes leadership workshops and forums, and summer programs that integrate theory and case studies with hands-on practice and mentoring. For details, visit <http://www.jacobsschool.ucsd.edu/GordonCenter/>.

## COURSES

*For course descriptions not found in the UC San Diego General Catalog, 2010–11, please contact the department for more information.*

### **100A. Team Engineering (2)**

Introduction to theory and practice of team engineering, including temperament and work styles; stages of team development; project management; communication, problem-solving, and conflict resolution skills; creativity; leadership; social entrepreneurship; and ethics. Students may not receive credit for both ENG 100 and ENG 100A.

**Prerequisites:** concurrent enrollment in or completion of one of the following: DOC 2, CAT 2, HUM 2, MMW 2, MCWP 50, or WCWP 10B, or consent of instructor.

### **100L. Team Engineering Laboratory (2)**

Faculty-directed, multi-disciplinary, long-term engineering projects. Students use their technical knowledge to design and develop solutions to real problems in consultation with customers such as community organizations. **Prerequisite:** ENG 100 (required prior to or in concurrent enrollment with ENG 100).

### **ENG 100B. Engineering Leadership (2)**

Engineering leadership attitudes, styles, principles, and approaches; stages of product development and evolution; strategic and critical thinking and problem solving for engineering projects; resource management; quality control; risk-analysis and risk-taking; engineering business economics, law, leadership and corporate ethics. Prerequisite: ENG 100A or ENG 100 or consent of the instructor.

### **201. Venture Mechanics (4)**

Examines the engineering/entrepreneurism interface. Discovery, development, and implementation of new product ideas. Understanding markets, competitors, and selling innovations. Cultivating effective working relationships between research, engineering, manufacturing, and marketing elements of an organization. Priority enrollment given to engineering majors.

### **202. Enterprise Dynamics (4)**

Case studies of start-ups, strategic technology management, practice in use of industrial decision-making tools, and speakers from successful firms combined with experience in making management decisions dynamically in a competitive computer-simulated enterprise. Field study of ongoing processes in a local high technology company. Priority enrollment given to engineering majors.

### **203. Applied Innovations (4)**

Course includes the examination of business plans developed by early stage technology businesses. Students expected to work on the development of business plans for real, innovative business organizations. Will explore all of the business research and analysis that needs to be undertaken in order to develop a complete business plan. Completion of ENG 201 or ENG 202 preferred.

### **207. Corporate Entrepreneurship for Global Competitiveness (4)**

Explore corporate entrepreneurship and innovation process using the medical device industry as a case example. This highly dynamic industry segment provides an approachable model to analyze corporate strategies and behaviors that affect overall competitiveness. **Prerequisites:** ENG 201, ENG 202, ENG 203 or consent of instructor.