**INTERESTED IN BIOENGINEERING?**

The **CCS Biology major** offers the opportunity for students to work with a faculty advisor to develop suitable course sequence and research experience that address their interests using the resources of a world-class university. Within this major, enrolled students who are interested in **Bioengineering** can, under the guidance of a faculty advisor with expertise in bioengineering, identify courses that combine the rigor of engineering with the creative academic freedom enabled by the College of Creative Studies, to ultimately prepare them for advanced graduate study or careers in bioengineering.

In the freshman year, in addition to taking the courses required for the CCS Biology Major, students learn the basic mathematics and physics required for the rest of their study. If the student has already placed out of these courses, they can move on to advanced courses offered in the sophomore year after consultation with a CCS Biology academic advisor. In the sophomore year, the focus will shift more towards basic chemistry and laboratory skills. The junior year is the pivotal year for two reasons; in this year, students take the bulk of the biology and engineering courses relevant to their interests. More importantly, in the junior year, students are strongly encouraged to join a participating research lab to pursue academic research. Information on participating labs can be found at the Center for Bioengineering website [http://bioengineering.ucsb.edu/research](http://bioengineering.ucsb.edu/research). In the senior year, students are strongly encouraged to complete a directed 3-quarter research project that will be presented at the end of the senior year. The senior year emphasizes courses that are more hands-on and laboratory intensive to give the tools and skills necessary for the next steps in a bioengineer’s career. For more information, please contact CCS Bioengineering advisors, Prof. Samir Mitragotri ([samir@engineering.ucsb.edu](mailto:samir@engineering.ucsb.edu)) or Prof. Luke Theogarajan ([theogar@ece.ucsb.edu](mailto:theogar@ece.ucsb.edu)).

**COURSES RELEVANT TO THOSE INTERESTED IN BIOENGINEERING**

*(In consultation with a faculty advisor, students interested in Bioengineering should consider the following courses; ability to enroll in any suggested course is controlled by the faculty instructor & departments offering the course and prerequisites may be enforced with possible course enrollment restrictions)*

**FRESHMAN & SOPHOMORE YEARS**

*(Preparatory Courses: may credit out with AP scores and/or take courses in summer sessions if offered)*

Mathematics (Math 3AB and 4AB and 6AB, yrs 1 & 2)

General Chemistry (Chem 1ABC or 2ABC, all yr 1)

General Chemistry Laboratory (Chem 1AL/BL/CL or 2AC/BC/CC, all yr 1)

Physics (Physics 1/2/3 or 21/22/23, 3 qtrs starting W yr1)

Physics Laboratory (Physics 3L, F yr 2, **optional**)

Organic Chemistry (Chem 109ABC or 109AH/BH/CH, all yr 2)

Organic Chemistry Laboratory (Chem 6AL, yr 2; **Chem 6BL & 6CL optional**)

Introductory Biology (MCDB 1A & 1AL, Biol CS 12, 20, & 30, all yr 1) – **required of CCS Biology majors**

CCS Biology Colloquium (Biol CS 10, F yr 1) – **required of CCS Biology majors**

Programming for Engineers (Engr 3, F or S Yr 1)

Circuits/Electronics (ME 6, W yr 2 or Phys 127AL, F yr 2 or ECE 2A, F Yr 2)
JUNIOR & SENIOR YEARS

Upper Division Biology courses
Molecular Genetics I & II (MCDB 101AB)
General Biochemistry (MCDB 108ABC)
General Biochemistry Laboratory (MCDB 109L)
Molecular Evolution (EEMB 101)
Cell Biology with Laboratory (MCDB 103 and 103L)
Neurobiology I & II (MCDB 151 & 152) if interested in Neuroscience
Immunobiology (MCDB 133) & Growth and Oncogenesis (MCDB 135) if interested in Cellular Biology

Upper Division Chemistry Courses
Advanced Physical Chemistry Laboratory (Chem 116AL & BL)

Upper Division Engineering Courses
Biomaterials & Biosurfaces (ChE 102)
Transport Processes (ChE 120A)
Principles of Bioengineering (ChE 125)
Statistical Methods (ChE 132C)
Engineering Approaches to Systems Biology (ChE 154)
Intro to Biochemical Engineering (ChE 171)
Design of Biomedical Devices (ME 128; useful for senior design projects)
Intro to NEMS & MEMS Systems (ME 141A)
MEMS: Processing & Device Characterization (ME 141B)
Intro to Microfluidics & BioMEMS (ME 141C)
Molecular & Cellular Biomechanics (ME 146)
Biophysics & Biomolecular Materials (Matrl 135)
Signal Analysis & Processing (ECE 130A & B-optional)
Polymer Science (ChE 160) and Stem Cell Biology (MCDB 146) if interested in Tissue Engineering

Summary:
48 units of suggested upper division Biology courses relevant to bioengineering (indicated in red)
plus potentially 9, 8, or 4 additional units depending on specific areas of research interests
24 units of suggested upper division Engineering courses (indicated in green)
plus potentially an additional 3 units for those in interested in Tissue Engineering

OTHER SUGGESTED ACADEMIC ENDEAVORS – RESEARCH:
Independent Research - students are strongly encouraged to seek out research opportunities as early as their sophomore year
Senior Research/Design Project with credits given via Independent Studies courses (199 units)

UCSB REQUIREMENTS:
Satisfaction of the Subject A – English Composition (with a course or by exam)
Satisfaction of the American History and Institutions requirement (with a course or by exam)

COLLEGE OF CREATIVE STUDIES REQUIREMENTS:
Completion of 2 courses related to major (in consultation with CCS advisor)
Completion of 8 courses unrelated to major (GE's; in consultation with CCS advisor; not including Physical Activities or Writing 1; this must include 1 course in Ethnic Studies which can also count towards AH&I requirement)