BS Computer Science with a Specialization in Bioinformatics

- Undergraduate Bioinformatics Research Program
- Bioinformatics - Four Year Plan
- Bioinformatics Course Offerings

The explosion in biological knowledge spawned by the various genome projects has created entirely new fields and industries, and a need for trained computational biologists who are familiar with Biology, Mathematics, and Computer Sciences. The Computer Science and Engineering Department offers rigorous, interdisciplinary training in the new and rapidly evolving field of bioinformatics. Bioinformatics refers to advanced computational and experimental methods that model the flow of information (genetic, metabolic and regulatory) in living systems to provide an integrated understanding of the system properties of organisms. This interdisciplinary major will be offered by three other programs (Division of Biology, Department of Chemistry and Biochemistry and Department of Bioengineering). The Computer Science and Engineering requirements comprise of 152 units to be taken from the divisions of physical sciences, biology, and engineering.

Bioinformatics Course Requirements

Lower Division Requirements, 64 units

Students are expected to complete all lower-division requirements by the end of their sophomore year.

- Math 20A, 20B, 20C, 20F, and Math 15B or CSE 21 (20 units)
- Chemistry 6A, 6B, 6C, and one lab (15 units)
- BILD 1, BILD 2, and BILD 94 (9 units)
- CSE 11, CSE 12 (8 units)
- Physics 2A, 2B, 2C (12 units)

Upper Division Requirements, 88 units (includes 5 CSE technical electives)

- CSE 100 or Math 176 (Data Structures), (4 units)
- CSE 101 or Math 188 (Algorithms), (4 units)
- Chemistry 140A, 140B (Organic Chemistry), (8 units)
- Chemistry 114B (Biochemical Energetics and Metabolism) or BIBC 102 (Structural and Metabolic Biochemistry) (4 units)
- BIBC 103 (Biochemical Techniques), (4 units)
- BICD 100 (Genetics), (4 units)
- BIMM 100 (Molecular Biology) or Chemistry 114D (Molecular and Cellular Biochemistry), (4 units)
- BIMM 101 (Recombinant DNA Lab) or Chemistry 112B (Recombinant DNA Lab), (4 units)
- BICD 110 (Cell Biology), (4 units)
- BIBC 110 (Physical Biochemistry) or Chemistry 127 (Physical Chemistry), (4 units)
- Five additional CSE upper division electives (electives 1, 2, 3, 4, and 5). At least one course from each of the three groups for a total of five electives:
    - Group I: CSE 30, 111, 131A, 131B, 134A, 135

- Group II: CSE 105, 150, 151, MATH 184A
- Group III: CSE 132A, 132B, 133

The Bioinformatics Series comprised of the following six courses, 24 units

- CSE 181 or BIMM 181 or BENG 181 (Molecular Sequence Analysis), (4 units)
- CSE 182 or BIMM 182 or BENG 182 (Biological Databases), (4 units)
- BENG 183 (Applied Genomic Technologies), (4 units)
- CSE 184 or BIMM 184 or BENG 184 (Computational Molecular Biology), (4 units)
- BIMM 185 (Bioinformatics lab), (4 units)
- Math 186 (Probability and Statistics), (4 units)

Admission into BS in Computer Science with a Specialization in Bioinformatics

Since the number of pre-majors and majors will be limited as described in the section on Bioinformatics, student demand may exceed capacity. Therefore, admission to the specialization is not guaranteed and will be based on academic excellence, as described below. Since Bioinformatics is an interdisciplinary major, a Steering Committee involving faculty from the participating departments will select among the best candidates applying and recommended through each department, while insuring active participation of the departments and Divisions offering the major. The final decision on admission to the pre-major and major will be made by the Bioinformatics Steering Committee, in consultation with the departments.

Freshman and Continuing Students

Students (freshman or continuing UCSD students) will be admitted into one of our existing undergraduate majors (BA Computer Science, BS Computer Science, and BS Computer Engineering) through the direct admission process or through the exceptional admission program. Students will then have the option of trying to enter the Bioinformatics program by applying for the Bioinformatics pre-major (while still retaining their current major status) once they complete the first four screening courses (Math 20B, Math 20C, BILD 1, Chem 6A). Students will then formally apply to the Bioinformatics major upon completion of the remaining screening courses CSE 11 and CSE 12. If admitted, students will become Bioinformatics majors in CSE. If not, they can continue in their current CSE major.

Transfer Students

Transfer students will be admitted into one of our existing undergraduate majors (BA Computer Science, BS Computer Science, and BS Computer Engineering) through the direct admission process or through the exceptional admission program. Effective Fall 2003, CSE transfer students can directly apply to the Bioinformatics major if they completed the following courses prior to transferring to UCSD.

- A year of calculus (equivalent to Math 20A, B and C at UCSD)
- A year of General Chemistry, with lab (equivalent to Chem 6A, 6B/6BL and Chem 6C at UCSD)
- The highest level programming course offered at the Community College (equivalent to CSE 11 and CSE 12 at UCSD)
- One semester of Cell Biology (equivalent to BILD 1 and BILD 2 at UCSD)

Those who have not completed the above courses may be admitted as Bioinformatics pre-majors and will be allowed a maximum of three quarters to complete pre-major requirements. Students will then

formally apply to the Bioinformatics major upon completion of the remaining screening courses CSE 11 and CSE 12. If admitted, students will become Bioinformatics majors in CSE. If not, they can continue in their current CSE major. Transfer students are encouraged to complete these requirements at the community college.

Heavy Student Interest in CSE

Because of heavy student interest in the CSE Department, limited resources available to accommodate this high demand, and maintenance of a high quality program we find it necessary to limit enrollments. Admission to the department as a major, transfer, or minor student is in accordance with the general requirements established by the Jacobs School of Engineering.