Chemical and Biomolecular Engineering, Ph.D.

Chemical engineering uses the knowledge of chemistry, mathematics, physics, biology, and humanities to solve societal problems in areas such as energy, health, environment, food, clothing, materials, shelter, and sustainability and serves a variety of processing industries whose vast array of products include chemicals, petroleum products, plastics, pharmaceuticals, foods, textiles, fuels, consumer products, and electronic and cryogenic materials. Chemical Engineering also advances societal goals by developing environmentally conscious and sustainable technologies to meet global challenges. Chemical engineering is an engineering discipline that has its strongest ties with the molecular sciences. This is an important asset since sciences such as chemistry, molecular biology, biomedicine, and solid-state physics are providing the seeds for future technologies. Chemical engineering has a bright future as the discipline which will bridge science with engineering in multidisciplinary environments.

Biomolecular Engineering is concerned with the processing of biological materials and processes that use biological agents such as living cells, enzymes, or antibodies. Biomolecular Engineering, with integrated knowledge of the principles of biology and chemical engineering, plays a major engineering role in the rapidly developing area of biotechnology. Career opportunities in Biomolecular Engineering are available in a variety of industries such as biotechnology, chemical, environmental, food, petrochemical, and pharmaceutical industries.

The principal objectives of the graduate curriculum in Chemical and Biomolecular Engineering are to develop and expand students' abilities to solve new and more challenging engineering problems and to promote their skills in independent thinking and learning in preparation for careers in manufacturing, research, or teaching. These objectives are reached through a program of course work and research designed by each student with the assistance, advice, and approval of a primary faculty advisor and a faculty advisory committee. Programs of study leading to the M.S. and Ph.D. in Chemical and Biomolecular Engineering are offered.

Students applying with the objective of a Ph.D. are admitted to the M.S./Ph.D. program only if they are likely to successfully complete a Ph.D. program. These students do not formally re-apply to the Ph.D. program after completing the M.S. Students who apply to the M.S.-only program must petition for the Ph.D. program if they desire to continue on for the Ph.D. Financial support is usually reserved for those students who plan to complete the Ph.D. The normative time to complete M.S. and Ph.D. degrees is two and five years, respectively.

The Ph.D. in Chemical and Biomolecular Engineering requires a commitment on the part of the student to dedicated study and collaboration with the faculty. Ph.D. students are selected on the basis of outstanding demonstrated potential and scholarship. Applicants must hold the appropriate prerequisite degrees from recognized institutions of high standing. After substantial preparation, Ph.D. candidates work under the supervision of faculty advisors. The process involves extended immersion in a research atmosphere and culminates in the production of original research results presented in a dissertation.

Milestones to be passed in the Ph.D. program in order to remain in good standing include the following: acceptance into a research group by the faculty advisor at the end of the student's first year of study; successful completion of the Ph.D. preliminary examination by the end of the second year; preparation for pursuing research and the development of a research proposal culminating in passing the Qualifying Examination by the end of the third year of the Ph.D. program. The Qualifying Examination includes faculty evaluation of a written research dossier and an oral presentation. Students must advance to candidacy in their third year (second year for students who entered with a master's degree).

The core course requirements for the Ph.D. are the same as for the M.S. (http://catalogue.uci.edu/thehenrysamuelischoolofengineering/departmentofchemicalandbiomolecularengineering/chemicalandbiomolecularengineering_ms/#requirementstext) Students must enroll in the departmental seminar each quarter during their first year unless exempt by petition. Ph.D. students must take two additional elective courses beyond the M.S. requirements. These courses are to be taken after the first year of graduate work, should be relevant to the Ph.D. dissertation topic, and must be selected in consultation with the research advisor and approved by the CBE graduate advisor. The preliminary examination is based on the four core courses and the ability of the student to comprehend and present a research paper. M.S. students who have completed a CBE M.S. degree elsewhere must have a written approval by the graduate advisor to waive required CBE core courses, if they have taken the equivalent courses elsewhere.

Final examination involves the oral presentation and defense of an acceptable dissertation in a seminar attended by students and faculty. The Ph.D. is granted upon the recommendation of the Doctoral Committee and the Dean of the Graduate Division. The normative time for completion of the Ph.D. is five years (four years for students who entered with a master's degree). The maximum time permitted is seven years.