

CHEMICAL ENGINEERING, PH.D.

Learning Outcomes

- Students will acquire and demonstrate expertise in selected core subject areas of chemical engineering: chemical process analysis, thermodynamics, fluid flow analysis, mass transfer and reactor design by earning a grade of B or better.
- Students will acquire a working knowledge of various areas of chemical science and technology and in allied fields, including other engineering disciplines, the sciences, and mathematics. They will successfully complete three elective courses; these courses will be approved by their advisors and the Graduate Director.
- Students will gain exposure to advances at the frontiers of knowledge in chemical science and technology. All PhD students are required to attend periodic departmental seminars by registering for a one-credit seminar class each semester.
- Students will acquire the ability to identify pertinent research problems, to formulate and execute a research plan, to generate and analyze original research results, and to communicate those results through oral presentations and written publications submitted to refereed archival journals.
- Students will acquire the basic skills needed for life-long learning and professional development. The ability to perform research and apply it to practical use is demonstrated by successful completion of a doctoral research project and related dissertation. Writing an article suitable for publication in peer-reviewed journals is a necessary skill, which students demonstrate by having three such articles accepted for publication prior to the granting of the PhD. A Graduate Symposium is held each year by the Department at which students present their research results to the Department Industrial Advisory Board.

Degree Requirements (60 Post-Baccalaureate Hours)

For Doctor of Philosophy students, a minimum of 60 credit hours is required beyond the B.S. degree. No more than two courses below the 700 level may be used on the program of study.

For students entering the Ph.D. degree program with a Master of Science or Master of Engineering degree in chemical engineering equivalent to that awarded at USC, the Program of Study must show a minimum of 30 credit hours beyond the Master's degree, including at least 12 credit hours of dissertation preparation (ECHE 899 (http://bulletin.sc.edu/preview_program.php?catoid=94&poiid=6180&returnto=2725#tt9959)) and six credit hours of independent research (ECHE 797 (http://bulletin.sc.edu/preview_program.php?catoid=94&poiid=6180&returnto=2725#tt9959)). Elective courses are not required of students entering the Ph.D. program with a Master's degree. The Department requires that these students also provide evidence that courses similar to the core graduate courses have been successfully completed in the Master's program or these courses must be successfully completed at USC.

Each Ph.D. student must select a research advisor during the first semester after admission to the doctoral program. After a Ph.D. student passes the admission to candidacy examination, an advisory committee of no less than four members will be selected. The committee must

include the department chair and one outside member. Doctoral students must pass the comprehensive examination before the start of the student's fifth semester in the program (not including summer terms). Students should consult the graduate director for information on the format and subjects of the admission to candidacy and comprehensive examinations. Prior to graduation, each Ph.D. student must submit at least three papers for publication in peer-reviewed technical journals. Other requirements pertaining to the comprehensive examination, dissertation examination, and final submission of the dissertation conform to the general regulations of The Graduate School.

Under extenuating circumstances, students may seek relief from departmental degree regulations by written petition to the graduate director.

Coursework (24 Hours)

Core Courses (12 Hours)

Course	Title	Credits
ECHE 700	Chemical Process Analysis	3
ECHE 710	Advanced Chemical Engineering Thermodynamics	3
ECHE 720	Advanced Fluid Flow Analysis	3
ECHE 722	Advanced Mass Transfer	3

Total Credit Hours 12

Elective Courses (12 Hours)

The remaining four courses may be from many disciplines including chemistry, engineering, mathematics, statistics, physics, biology, medicine, etc. upon approval of the Ph.D. Committee and Graduate Director and shall be selected to acquire expertise in the area of the student's dissertation research.

Research (6 Hours)

Course	Title	Credits
ECHE 797	Research	6

Total Credit Hours 6

Dissertation Preparation (12-30 Hours)

Course	Title	Credits
ECHE 899	Dissertation Preparation	12

Total Credit Hours 12