Graduate Program in Chemical and Biochemical Engineering
Ph.D. Degree Learning Goals and Assessment
Adopted January 2012

The doctoral program in Chemical and Biochemical Engineering trains students at the highest level to assume leadership roles in the field of Chemical Engineering or closely related areas of science and engineering.

Learning Goal 1 for Students: Attain marked ability, scholarship, research and leadership skills in Chemical Engineering fundamentals and advanced Chemical Engineering topics

Assessment of graduate student achievement of Goal 1:
- Grades in graduate courses (core courses and electives)
- Qualifying examination at the end of the first year assessing depth and breadth of knowledge in Chemical Engineering fundamentals
- Review by faculty of student progress with close advising and mentoring
- Placement in positions and careers that require ability and scholarship in Chemical Engineering

Role of the program in helping students to achieve Goal 1:
- Defined curriculum of core courses required for all graduate students in the program:
  - Advanced Transport Phenomena I (155:501)
  - Advanced Transport Phenomena II (155:502)
  - Analytical Methods in Chemical and Biochemical Engineering (155:507)
  - Advanced Chemical Engineering Thermodynamics (155:511)
  - Kinetics, Catalysis & Reactor Design (155:514)
- Evolving set of graduate elective courses taught by program faculty covering a wide range of advanced Chemical Engineering topics
- Life science course requirement ensuring that all graduate students in the program gain a broader perspective by being exposed to biologically related course material
- Departmental seminar series offered in the Fall and Spring required for all graduate students in the program (graduate seminar course 155:601 and 602) so that they are knowledgeable regarding current research in the field.
- Close advising regarding elective courses and course prerequisites to assure that students are being prepared in a coherent and academically rigorous fashion
- Effective monitoring of student progress
  - Includes annual reports on research progress from both the student and the student’s research advisor
- Evaluations of teaching effectiveness of instructors in graduate courses
  - If effectiveness is below expectations, work with instructors to improve effectiveness
- Periodic review of curricular offerings, degree requirements and assessment tools
  - By program faculty
  - In consultation with the office of the dean of the graduate school and the dean of engineering
Learning Goal 2 for Students: Engage in and conduct original research

Assessment of graduate student achievement of Goal 2:
- Preparation of and defense of Ph.D. dissertation proposal
- Ph.D. dissertation data defense in fourth year of studies
- Assessment of quality of Ph.D. dissertation:
  - Public defense of dissertation
  - Critical reading of dissertation by committee of graduate faculty members and a committee member from outside of the Chemical and Biochemical Engineering graduate program.
  - Submission and acceptance of peer-reviewed articles and conference papers based on the dissertation
- Achievement of students as evidenced by professional placements, selection for conference presentations, peer-reviewed publications and individual grant attainment

Role of the graduate program in helping students achieve Goal 2:
- Provide early introduction to research methods and opportunities for research
- Provide opportunities to present research and receive feedback
- Maintain adequate funding levels through the research phase
- Provide comprehensive advising and assist in the identification of mentors

Learning Goal 3 for Students: Prepare to be professionals in careers that require training at the highest levels in Chemical Engineering

Assessment of graduate student achievement of Goal 3:
- Review evidence of papers presented, publications and professional networking
- Evaluations of teaching effectiveness of graduate student instructors
- Collection of placement data
- Review by external advisory board, with members both inside of and external to the academy
- Survey alumni/ae

Role of the program in helping students achieve Goal 3:
- A two-semester teaching requirement for all full-time Ph.D. students.
  - Typical teaching experiences include supervision of undergraduate laboratories, grading of homework and/or exams in a lecture course or handling review sessions and holding office hours for undergraduate students.
  - In concert with the TA Training Project (TAP) sponsored by the Graduate School – New Brunswick and the Center for Teaching Advancement and Assessment Research (CTAAR) at Rutgers
- Required enrollment in Teaching the Engineering Curriculum (155:605)
  - Includes lectures by faculty instructors from CTAAR
- Encourage participation in professional development programs in such areas as interview skills, presentation skills, development of CVs, use of research tools, human subjects
research, library use, course management software, training in the responsible conduct of research, and proposal writing

- Host discipline-specific training when appropriate
- Teach students how to perform assessment in their future professional capacities
- Provide flexible options for students with interdisciplinary interests related to Chemical Engineering
- Develop or enhance programs related to job and networking skills, including activity in professional societies and preparation for necessary certifications
- Make students aware of external and internal graduate fellowship opportunities and awards
- Acquaint students with non-academic career opportunities

The leadership of the Chemical and Biochemical Engineering graduate program will regularly review the structure and content of the program and the feedback received from assessments and surveys. These reviews will be used to provide the best possible education to students in order to meet the needs for highly trained individuals in Chemical Engineering.