

Institutional Effectiveness  
2018-2019

Program: Chemical Engineering MS

College & Department: College of Engineering / Department of Chemical Engineering

Contact: Pedro Arce, Robby Sanders

Mission: The Department of Chemical Engineering at Tennessee Technological University strives to develop the 21st Century Renaissance Engineer through development and implementation of novel learning environments anchored by the award-winning Renaissance Foundry Model. The foundation of this platform is rooted in the guidelines provided by the National Academy of Engineering's Vision for the Engineer of 2020. Educational protocols within the department are consistent with the mission and vision statements given below:

The Mission of the Department of Chemical Engineering at Tennessee Tech blends scholarship and

4. Provide a meaningful environment for student growth in cultural, professional aspects including opportunities to develop as a future faculty member in an academic department.
5. Demonstrate scholarship through peer-reviewed/archival publications, externally sponsored projects and presentation in national and international scientific meetings.
6. Optimize graduate student time to graduation by providing courses and advising that facilitates student completion of the MS degree within a designated window.

Student Learning Outcomes:

Student Learning Outcome - All students must demonstrate knowledge and proficiency in the method of scientific inquiry.



expected to file a program of study not later than the end of the semester in which they will have earned 15 credits towards their degree, and they are allowed to register for subsequent semesters if this is not done. Additionally, a review of graduate courses and the curriculum is periodically completed through meetings between the Department Chair and the Research and Graduate Program Coordinator to ensure that courses are offered in a time frame consistent with the program goal for time to graduation. Faculty advisors meet routinely with their advisees to discuss progress in courses and plans for the future. The Research and Graduate Program Coordinator meets with all new students in the program to discuss courses, the program, and other critical matters. Additions, deletions, and/or changes to the graduate curriculum are first approved via the CHE Graduate Committee and subsequently the College of Engineering's Graduate Executive Committee (of which the CHE Research and Graduate Program Coordinator is a member) and then the Graduate School Executive Committee (of which the CHE Department Chair is a member).

committee meetings, the threshold scores for recommendations of full and provisional admission have been increased steadily over time, with the thought being that those with higher scores will have more potential to be successful in the graduate program. (2) The CHE graduate program continues to have a high percentage of female students and international students as well as of students who are graduates from the CHE undergraduate program. Review of the program demographics continues to be conducted to ensure that these indicators of program diversity are maintained. (3) To complement campus sources of graduate student support and to further increase the amount of external funding, the department as PI and other faculty in CHE and across campus recently have resubmitted (February 2019) a grant proposal to the NSF's National Research Traineeship (NRT) program. (4) Finally, evaluations of the graduate curriculum have resulted in new courses as well as updates to the BS program and approval of the MS-thesis CHE option.

	Assessment Process		Program Goals	Student Learning Outcomes	Assessment Frequency
1	CHE Department Graduate Student Admissions and Success Database	Tracking spreadsheet	1,2,3	5,6	Upon entrance of student into program and then periodically throughout the year
2	Chemical Engineering Graduate Research Association (CEGRA)	Other	4	3,4,6	Periodically throughout the year during department meetings
3	Diversity of Program Demographics	FTE Enrollment, Tracking spreadsheet	2	4,6	Periodically throughout each year
4	External and Internal Funding Generated/Obtained	Tracking spreadsheet	1,5,6		Annually
5	Graduate Student Enrollment Data	FTE Enrollment	1,2		Annually
6	Periodic Review of Graduate Coursework and Curriculum	Tracking spreadsheet	3,6	1,2,3	Periodically, or as the need arises
7	Thesis Presentation and Defense, Publications, and Other Presentations	Dissertation Criteria	3	1,5,6	

Number of CHS Graduates and Graduate Student Enrollment in CHE

of MS graduates was tied to three major issues: 1) the rapid and substantial growth in the undergraduate program; 2) the departure of several research active faculty prior to 2011; and 3) that the department chose to focus on the PHD program in an effort to increase the research status of the program. Several corrective action measures that were focused on the following items were pursued to remedy this: 1) Adding new faculty, TAs and staff; 2) Improving program quality; 3) Increasing efficiencies; and 4) Maximizing resources. By implementing this plan and through careful coordination, the program is no longer low performing. Based on five years of data collected through the end of the Spring 2018 semester and five years of data collected through the end of the Spring 2019 semester, the five-year rolling average has been 5.4 MS graduates for each of the last two assessments.

CHE Department Graduate Student Admissions and Success Database. The department collects information from all students applying for admission to its graduate programs and records several related items (e.g., GRE Scores, BS QPA, TOEFL scores, etc.) in a spreadsheet database. The spreadsheet is maintained in which metrics regarding student success (such as completion of core courses, time to complete, grades, and retention) are tracked with the prorogal

Members, and a variety of methods specific to the Advisored students who serve as teaching assistants meet periodically with their instructors for the courses for which they TA.



The math course is offered each semester (including summers), and the CHE courses are offered annually based on annual review of student needs to ensure appropriate sequencing and availability courses. On a rare occasion, to maximize alignment with graduate research, a course may be substiti

Research and Graduate Program Coordinator and the Department Chair. At these meetings, the two discuss course needs, which take into account the number of students needing a given class plus the goal that the department offers at least one of the required courses each semester. (Note: As indicated above, MATH 5510 is offered every semester [including summers] by faculty in the Department of Mathematics.) Elective courses within and outside the department are also offered at a

---

x Helped with seminars

x

These funds help to enhance the environment for research within the department, provide for increased research depth, and directly or indirectly support graduate students' research projects that lead to theses, dissertations, publications, and presentations.

### Student Learning Outcome 6 (Presentation Skills)

Student Presentations In addition to an oral presentation/defense of a thesis as described elsewhere, students routinely attend conferences and present their research. They also present research during the Student Research and Creative Inquiry Day (Day) event held each spring on the TTU campus. During the 2019 Research Day, in addition to 15 undergraduates, 3 MS students presented their research while 13 PHD students presented their research. The number of MS students present 0 Tw 3.39

Appendix 1: Curriculum Mapping Thesis Option

Chemical Engineering, MS (Thesis): Mapping of the Graduate Curriculum and Student Objectives

		Student Outcomes			
Course	Title	SLO1: Research Skills	SLO2: Content Knowledge	SLO3: Ethical Behaviors	SLO4: Research

Appendix2 Curriculum MapNon-Thesis Option

Chemical Engineering, MS (Non-thesis): Mapping of the Graduate Curriculum and Student Learning Objectives