Institutional Effectiveness Report
2019-20

Program: Engineering PhD

College and Department: College of Engineering

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Mission: The PhD program is a research degree and aims to enhance research quality and external recognition. The program goal has evolved to provide increasing prospects for the students to focus on research in five specialization areas as well as opportunities to pursue interdisciplinary research involving one or more of these specializations.

Description of Program

The College of Engineering (CoE) at Tennessee Tech University (TTU) first began offering a Doctor of Philosophy in Engineering (PhD-Engr) degree in 1971. The PhD-Engr is a single, college-wide degree for all departments. However, students pursuing this degree will do so in an area of specialization, listed below, hosted by a CoE department. The college-wide program also allows students to develop an interdisciplinary research topic that cuts across one or more of these specializations.

PhD Specialization Area	Host Department
Chemical Engineering	Chemical Engineering Department (CHE)
Civil Engineering	Civil and Environmental Engr. Dept. (CEE)
Computer Science	Computer Science (CSC)
Electrical & Computer Engr.	Electrical & Computer Engineering (ECE)
Mechanical Engineering	Mechanical Engineering Department (ME)

Purpose of the PhD Program

The purpose of the PhD Program is to provide students with an opportunity for advanced studies and research in the field of engineering and computer science. As a research-based degree, the focus is on developing the independent learning skills of students in preparation for advanced-level, research-focused employment in industry or academia.

Program Goals:

1. Increase the average enrollment to 90, based on a 3-yr rolling average.

2. Increase the average number of students completing the PhD program to 20 per year by 2020-21.

3. In anticipation of the PhD program review taking place in 2020, continuous improvements have been planned and components implemented. Major changes to the program, including redefinition of student assessments and streamlining the process. These plans also include assessment tools, data analysis, and improvement actions.

Student Learning Outcomes:

1. The student should demonstrate breadth of knowledge in the discipline and depth in the specific area of his/her research topic.

2. The student should gain experience in doing independent academic work and research.

3. The student should demonstrate his/her ability to identify and define the research topic.

4. The student's research work should contribute to the existing knowledge in the engineering field.

5. The student should demonstrate the ability to clearly communicate complex engineering and research topics in both verbal and written format.

A departmentally developed curriculum map can be found in Appendix 1 that shows the connections between courses and student learning outcomes.

Assessment Methods:

1. *3-yr Avg PhD Enrollment:* Three-year rolling average of number of students enrolled in the PhD program is a better indicator of trends than year-to-year data, which may be subject to fluctuations.

2. *3-yr Avg PhD Degrees Conferred:* Three-year rolling average of number of students graduating per year is a better indicator of trends than year-to-year data, which may be subject to fluctuations.

3. *Comprehensive Exam*: The comprehensive examination involves examination of the depth and breadth of the specific knowledge in the field of study, and a written proposal describing the research the student will conduct

Results:

The goals below enhance the student experience and success since increased enrollment allows for more graduate level courses with the required minimum enrollment and increased engagement and collaboration among the students. Maintaining a higher annual degrees conferred allows for the university Carnegie ranking to be maintained and increase the number of alumni they can network with. Finally, tracking students' progress helps them navigate through the program and avoid unnecessary delays in their program of study and research.

Program Goal 1: Increase the average enrollment to 90, based on a 3-yr rolling average.

Enrollment - PhD Program CoE

	2013F	2014F	2015F	2016F	2017F	2018F	2019F
# Students	48	66	88	85	105	106	101
3-yr Avg	49	55	67	80	93	99	104

3-yr rolling average of PhD enrollment for FY 2020 = 104

Program Goal 2: Increase the average number of students completing the PhD program to 20 per year by 2020-21.

Degrees Conferred - PhD Program CoE

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
# Students	9	7	12	8	15	21
3-yr Avg	9	10	9	9	12	15

For FY 2020: 3-yr rolling avg PhD degrees conferred = 15

Program Goal 3: Assessment and Continuous Improvement Program established for PhD program

Each department has a graduate committee and dedicated graduate coordinator and staff. The departments offering PhD Specializations track all of the graduate students including their PhD students. In addition, the progress of PhD students through their program is also tracked at the college-level by maintaining student record files as well as a spreadsheet. The data in the spreadsheet contains information on first enrollment, credit-hours completed, major advisor, candidacy and funding status. The CoE Graduate Committee continuously reviews the program requirements and develop improvements in all areas of admission and program requirements.

SLOs 1-5:

Comprehensive Exams

	2017-18	2018-19	2019-20
# Students	15	35	23
#Pass on first attempt	14	35	23

Modifications for Improvement:

Program of Study Development

The CoE has added a new step for the PhD program and has eliminated preliminary and qualifying examination for the DPhD students, except in cases when the student does not possess a BS degree from an ABET accredited program. This step is an initial meeting of the PhD Student Advisory Committee for all students enrolled in the program. The Student's Advisory Committee (AC) shall formally meet with the student to make an objective assessment of the student's knowledge relative to the field of study. Presence of all members of the AC would make this meeting most effective, but at least four members of the AC must be present. The program of study should reflect the objective assessment of the AC. Completion of the Program of Study based on this assessment is required before the end of the second semester of enrollment for the degree, or completion of 15 Credit Hours of graduate courses, whichever comes first. It is desirable for this meeting to take place during the first semester of enrollment for the post-MS PhD students. (implemented in fall 2020).

Appendices

1. Curriculum Map

Appendix 1: Curriculum Map

Engineering PhD

Coursework	Student Learning Objectives				
	Demonstrate Depth and Breadth of Knowledge	Gain Experience in Independent Academic Work and Research	Identify and Define the Research Topic	Contribute to Existing Knowledge	Communicate Effectively
6XXX and 7XXX Coursework*	X		X		
7980 Directed Study	X	X			
7990 Research and Dissertation	X	X	X	X	X