Institutional Effectiveness Report
2018-19

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.

Results:

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 2019 = 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

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
# Students	13	9	7	12	8	15
3-yr Avg	11	9	10	9	9	12

For FY 2019: 3-yr rolling avg PhD degrees conferred = 12

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

Tracking the progress of PhD students based on registration, advisor, candidacy status and funding status is available via a spreadsheet dating back to 2015-16. In addition, the CoE Graduate Committee has been reviewing the college-wide program requirements and has proposed a number of changes, which are under review. Additional data analysis and aggregation of the data is in place. In addition, the policy to ensure time to candidacy is 3 years for post MS degree and 4 years for Direct PhD students is fully enforced.

Modifications for Improvement:

Extensive review of the PhD program information contained in the Graduate Catalog and on the CoE website was conducted by the CoE Graduate Executive Committee (GEC). All information was updated and the following improvements were developed and approved by the GEC and subsequently approved at the university level by the Graduate Studies Executive Committee (GSEC) for implementation in fall 2019.

- Minimum lecture course credit hours were established at 18 credit hours for post-MS students, and 42 for post-BS students, for all specializations within the CoE PhD program and this was clarified for all program material and the Graduate Catalog.
- The minimum dissertation credit hours for the PhD program is 24. It was further clarified that students would be able to complete their degree requirements by meeting the minimum lecture course credit hours and maximizing their dissertation research hours.
- The previous requirements for the PhD students to take two 7000 level lecture courses were clarified to include Directed Study courses as well.
- Students admitted directly from the Bachelor's Degree into Ph.D. degree program (Direct PhD admits) were required to pass a preliminary examination. This requirement was entirely removed.
- Direct PhD admits were required to successfully complete a qualifying examination based mostly on undergraduate materials before the end of the second semester of enrollment. This requirement was modified to the following:
    - Students with a Bachelor of Science (BS) degree from an ABET accredited program are exempted from this examination. Other students without such a degree or MS students without an ABET accredited BS degree switching to Direct Ph.D. will have to take a qualifying exam through a formal process established by the department housing their specialization. The examination should include at a minimum, an evaluation of the students fundamental knowledge managed by the Graduate Committee of the department.
- These changes prompted another plan to be drafted for future implementation. This plan requires a formal meeting of the PhD student advisory committee prior to the completion of 15 credit hours of course work. The draft was developed by the CoE GEC and was submitted to the departments for comments.

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