

Institutional Effectiveness Report 2020-2021

Program:Engineering PhD

College and DepartmentCollege 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) degree in 1971. The PhD 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)

Electrical & Computer Engr.
Mechanical Engineering

Computer
Electrical
Mechanical

Purpose of the PhD Program

The purpose of the PhD Program is to provide research in the field of engineering and computer science, developing the independent learning skills for focused employment in industry or academia.

Program Goals:

PG 1: Increase the average enrollment to 90

PG 2: Increase the average number of students to 21.

PG 3: In anticipation of the PhD program, a plan has been planned and components implemented, including the redefinition of student assessment, assessment tools, data analysis, and

Student Learning Outcomes:

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

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

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

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

SLO 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 1mixd7 (7 T0 (h in)2.2 (b)2.2 s0.8 (ddn

and defend their ideas during the presentation of the proposal and oral examination (SLO 5). Completion of student's research is culminated in a written dissertation examined by the AC and defended publicly through oral examination (SLO 5).

Results

PG 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	2020F
# Students	48	66	88	85	105	106	101	104
3-yr Avg	49	55	67	80	93	99	104	104

New Concentration

Currently, the departments of Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical and Computer Engineering, and Mechanical Engineering participate in the PhD program, each with a "Specialization" in their discipline. This college program allows for interdisciplinary PhD research by the students, a characteristic that needs to be preserved. The general degree requirements for a Ph.D. in Engineering are the same for all departments. The general admission requirements, application procedures, admission to candidacy are the same across the college; however, each department may evaluate applicants based on their needs and specific perspectives. Departments may also establish additional procedures and requirements for the degree.

The PhD enrollment has more than doubled and that enrollment has been maintained for the past five years. In addition, enrollment in each specialization have been at a much higher level than in the past. The higher enrollments, coupled with enforcing policies, that enable students to graduate in a timely manner, has resulted in a higher degree production by the program. The higher enrollments coupled with the markedly higher number of degrees conferred over the past several years warrants concentrations in each discipline. Creation of a separate concentration in Mechanical Engineering will allow a closer evaluation of the program and a more focused marketing and definition of the research topic.

Program of Study Development

The CoE has added a new step for the PhD program implemented in 2020. Student's Advisory Committee (AC) are required to formally meet with the student to make an objective assessment of 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 has to 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 BS PhD students.

In addition, starting in 2020, we have eliminated preliminary and qualifying examination for the PhD students, except in cases when the student does not possess a BS degree from an ABET accredited program.

Appendices

1. Curriculum Map
2. Oral Defense and Dissertation Assessment Form

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

Appendix 2: Oral Defense and Dissertation Assessment Form

College of Engineering PhD Program
Oral Defense and Dissertation Assessment Form

Candidate Name: _____ Engineering discipline: _____

Committee Member _____ Faculty _____ Student _____ (Please check one)

Date: _____

Evaluation of Oral Presentation

Oral Presentation Type (circle) ☐ Proposal Defense ☐ Dissertation Defense

Graduates of the PhD program must be able to communicate their ideas effectively with their technical peers and with others outside their discipline. Please assess this candidate's oral presentation and written work using the following scale:

Not <u>Acceptable</u> 1	Below <u>Expectation</u> 2	Meets <u>Expectation</u> 3	Above <u>Expectation</u> 4
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1 2 3 4 Content: appropriate, complete, concise, and logically organized; problem, approach and results clear; appropriate use of time.

1 2 3 4 Visual aids readable and clear, concise wording, effective use of graphics, appropriate amount of information

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