

Electrical Engineering, Ph.D.

Curriculum in Doctor of Philosophy – Electrical Engineering Requirements

A candidate for the Ph.D. degree with a major in electrical engineering must comply with the rules and regulations as outlined in the WVU Graduate Catalog and the specific requirements of the Statler College and the Lane Department of Computer Science and Electrical Engineering.

Program Requirements

The doctor of philosophy degree with a major in electrical engineering is administered through the college's interdisciplinary Ph.D. program. The research work for the doctoral dissertation must show a high degree of originality on the part of the student and must constitute an original contribution to the art and science of electrical engineering.

All Ph.D. degree candidates are required to perform research and follow a planned program of study. The student's research advisor, in conjunction with the student's Advising and Examining Committee (AEC) will be responsible for determining the plan of study appropriate to the student's needs. The underlying principle of the planned program is to provide the students with the necessary support to complete their degree and prepare them for their career.

Research work for the doctoral dissertation must represent a significant contribution to engineering or computer science. It may entail a fundamental investigation into a specialized area. A minimum of twenty-four credit hours of research (EE 797 (http://catalog.wvu.edu/graduate/collegeofengineeringandmineralresources/thelanedepartmentofcomputerscienceandelectricalengineering/computer_engineering/)) is required.

Curriculum Requirements

Code	Title	Hours
A minimum cumulative GPA of 3.0 is required		
Course Requirements *		
A minimum of six credit hours of 600 or higher level courses		
A maximum of six credit hours may be in directed study (EE 795)		
Research		24
EE 797	Research	
Select from the following based on degree path:		18
Any BIOM, BMEG, CE, CHE, CHEM, CPE, CS, EE, IENG, IH&S, MAE, MATH, MINE, PNGE, PHYS, SAFM, SENG, or STAT courses 500-795, as approved by the student's AEC		
Examinations		
Plan of Study		
Qualifying Exam		
Candidacy Exam		
Final Exam		
Dissertation		
Total Hours		42

*

Students who do not hold a baccalaureate degree in electrical engineering are required to take a set of undergraduate electrical engineering courses above and beyond the minimum coursework requirements.

Doctoral students who do not have an M.S.E.E. degree must either earn this degree, or complete coursework as required for the Master's degree with thesis option. It is not necessary to actually write a thesis. A minimum of twenty-four hours of coursework is required. Up to twelve hours may be transferred from work done at another institution.

A minimum of forty-two hours of coursework and thirty hours of independent research beyond a bachelor's degree, or eighteen hours of coursework and twenty-four hours of independent research beyond an M.S. degree are required.

Examinations

QUALIFYING EXAM

All students must take and pass a written qualifying examination. Normally, the qualifying examination is given no later than one semester after completion of eighteen credit hours toward the doctoral degree. This examination is designed to assess the basic competency of students in the electrical engineering field to determine whether or not they have sufficient knowledge to undertake independent research.

The Lane Department of Computer Science and Electrical Engineering is organized in the following five Focus Areas. All Ph.D. degree programs use these Areas to provide organizational structure to the educational process as delineated under specific Ph.D. requirements. The significance of these Areas will be of particular importance in preparation for the Qualifying Exam as each area has designated Ph.D. Qualifier Core Courses as follows:

Code	Title	Hours
1. Electronics and Photonics Focus Area		
EE 550	Advanced Semiconductor Electronics	
EE 551	Linear Integrated Circuits	
EE 650	Optoelectronics	
2. Signals and Systems Focus Area		
EE 513	Stochastic Systems Theory	
EE 515	Linear Control Systems	
EE 533	Computer Applications in Power System Analysis	
3. Computer Systems Focus Area		
CPE 670	Switching Circuit Theory 1	
CS 550	Theory of Operating Systems	
4. Software/Knowledge Engineering Focus Area		
CPE 684	Advanced Real-Time Systems	
CS 677	Pattern Recognition	3
CS 630	Empirical Methods in Software Engineering and Computer Science	3
CPE 520	Application of Neural Networks	3
5. Theory of Computing Focus Area		
CS 510	Formal Specification of Language	
CS 520	Advanced Analysis of Algorithms	
CS 525	Computational Complexity	

Ph.D. students must make the first attempt to pass the qualifying exam within fourteen months of their enrollment if they already have a M.S. degree from the Lane Department of CSEE or within twenty-six months otherwise. The Ph.D. qualifying process consists of completion of a research project and oral examination. The project is intended to demonstrate the student's ability to assemble and analyze the relevant literature for a given research problem and to make preliminary steps towards his/her own contribution.

The oral exam will include:

1. Presentation by the student of his/her research project
2. Questions about the work, its context, and relevant literature
3. Questions about course work, focusing specifically on the three core courses for which the student has earned credit

The possible outcomes of the first year exam are: "Pass" which means the student is qualified to begin work towards the candidacy exam; "Pass with Recommended Coursework" which means the student is qualified to begin work towards a candidacy exam but certain courses must be taken; or "Fail". Any student failing the qualifying exam on the initial attempt will have one additional attempt within six months. Failure of the exam on the second attempt will disqualify the student from further doctoral studies in the LCSEE program.

CANDIDACY EXAMINATION

In order to be admitted to candidacy, the student must pass a candidacy exam, which is designed to evaluate the student's overall ability to engage in high-level research.

When all requirements are completed, the qualifying and candidacy examinations are passed, and the research proposal is successfully defended, the student is formally admitted to candidacy for the Ph.D. degree. For full-time students, admission to candidacy must occur within three years of entering the Ph.D. program.

FINAL EXAMINATION

At the completion of the dissertation research, candidates must prepare a dissertation and pass the final oral examination (defense) administered by their AEC.

In order to complete the Ph.D. requirements, a student must pass a final oral examination on the results embodied in the dissertation. This examination is open to the public and, in order to evaluate critically the student's competency, may include testing on material in related fields, as deemed necessary by the AEC. All requirements for the degree must be completed within five years after the student has been admitted to candidacy.

Suggested Plan of Study

It is important for students to take courses in the order specified as much as possible; all prerequisites and concurrent requirements must be observed. A typical doctoral degree program that completes degree requirements in three years is as follows. A typical Ph.D. program requires four to five years beyond the baccalaureate degree, although scholarly achievements are more important than length of program.

First Year

Fall	Hours	Spring	Hours
Course		3 Course	3
Course		3 Course	3
EE 797		3 EE 797	3
		9	9

Second Year

Fall	Hours	Spring	Hours
EE 797		9 EE 797	9
		9	9

Third Year

Fall	Hours	Spring	Hours
Course		3 Course	3
EE 797		6 EE 797	6
		9	9

Total credit hours: 54

Major Learning Outcomes

ELECTRICAL ENGINEERING

It is our goal that in the first five years after graduation our students will:

1. Achieve success and proficiency in the Electrical Engineering profession.
2. Be recognized as leaders.
3. Contribute to the well-being of society.