# Computer Engineering, Ph.D.

## Degree Offered

- Doctor of Philosophy, Computer Engineering (Ph.D.)

## Nature of the Program

The Doctor of Philosophy program should be considered by those with superior academic achievement and who desire to pursue a career of research or teaching. Students interested in the Ph.D. program in computer engineering should see our webpage at http://lcsee.statler.wvu.edu (https://lcsee.statler.wvu.edu/) for information.

## Program Educational Objectives

The educational objective of the Ph.D. program in Computer Engineering is to produce graduates who have the knowledge, skills, and attitudes that will ensure success in professional positions in business, industry, research, government service, or in further graduate or professional study.

Specific outcomes of the program are:

1. Achieve a depth of knowledge in core computer engineering subjects, as demonstrated by completion of core Ph.D. courses and examination on those subjects through the Qualifying Examination process.
2. Achieve a breadth of advanced knowledge to support research, as demonstrated by completion of doctoral level coursework and graduate seminar participation.
3. Achieve an ability to carry out independent research, as demonstrated by successful completion and defense of a dissertation.

## Admissions for 2026-2027

### DOCTORAL ADMISSIONS

To be eligible for admission into the doctoral program, a candidate must fulfill the following requirements:

- A minimum cumulative grade point average (GPA) of 3.0 or equivalent, based on a 4.0 system.
- Three letters of reference.
- Statement of purpose.
- Submission of GRE scores. GRE scores are required for admission and to be considered for graduate assistantships. The GRE requirement can be waived for students from:
  - ABET accredited undergraduate programs with an MS GPA of 3.2 or better.
  - A computer science, electrical engineering, or computer engineering program with a Top 600 QS world program ranking with a 3.2 BS GPA and/or 3.2 MS GPA or better.
  - An institution with a top 1000 QS world ranking with a 3.2 BS GPA and/or 3.2 MS GPA or better.
- All applicants for the doctoral program require an appropriate bachelor's or master's degree for entry. Students lacking some foundation courses appropriate to a particular degree program may be assigned some preparatory coursework as a condition of admission.
- International applicants must meet the WVU requirement of English language proficiency (https://graduateadmissions.wvu.edu/information-for/international-students/).

Students who hold a M.S. degree in Electrical Engineering or Computer Engineering (or equivalent degree) will be considered for admission with regular status into the Ph.D. program. Students who hold a Master's degree in the sciences or engineering, excluding electrical or computer, will be considered for admission with provisional status and will likely have coursework deficiencies to remove. All other students must apply for admission into a master's program as the first stage in attaining the Ph.D.

### FOUNDATION ASSESSMENT

Upon application review and discussion with the graduate coordinator, it may be determined a student needs preparatory work in order to pursue a graduate degree. Students with deficiencies may be required to take courses as prerequisites for graduate courses. Deficiencies are usually noted as a condition for admission; however, they may also be identified after joining the program.

Major Code: 3021

## Curriculum in Doctor of Philosophy –Computer Engineering

A candidate for the Ph.D. degree with a major in computer 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 computer 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 computer 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.

## 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 (CPE 795) | | |
| 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 | | |
| Research | | 24 |
| CPE 797 | Research | |
| **Examinations** | | |
| Plan of Study | | |
| Qualifying Exam | | |
| Candidacy Exam | | |
| Final Exam | | |
| Dissertation | | |
| Total Hours | | 42 |

*

Students who do not hold a baccalaureate degree in computer engineering are required to take a set of undergraduate computer engineering courses above and beyond the minimum coursework requirements.
Doctoral students who do not have an M.S.C.S. or 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 computer 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 573 | Advanced Data Mining |
| CS 677 | Pattern Recognition |
| CPE 520 | Application of Neural Networks |
| **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 normally 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 |

| | | | |
|---|---|---|---|
| CPE 797 | | 3 CPE 797 | 3 |
| | | 9 | 9 |

**Second Year**

| Fall | Hours | Spring | Hours |
|---|---|---|---|
| CPE 797 | | 6 CPE 797 | 6 |
| Course | | 3 Course | 3 |
| | | 9 | 9 |

**Third Year**

| Fall | Hours | Spring | Hours |
|---|---|---|---|
| CPE 797 | | 9 CPE 797 | 9 |
| | | 9 | 9 |

Total credit hours: 54

# Major Learning Outcomes

## COMPUTER ENGINEERING

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

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