

ELECTRICAL ENGINEERING PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (<http://catalogue.uvm.edu/graduate/degree/requirements/requirementsforthedoctorofphilosophydegree/>)

OVERVIEW

The Electrical Engineering (EE) Ph.D. program at the University of Vermont is at the forefront of research in the areas of digital signal processing, control systems, power and energy systems, wireless communications, and electronic circuit and system design and testing. This rigorous and focused Ph.D. program offers competitive funding and prepares graduate students for careers in research and technical leadership. EE Ph.D. graduate students can contribute to interdisciplinary research within a broad range of applications, including power/energy, biomedical, aerospace, and transportation. In addition, the EE program partners with other academic units to also offer a Ph.D. degree in Materials Science and a Ph.D. degree in Biomedical Engineering.

Typically candidates have obtained the Master of Science degree in Electrical Engineering prior to application but other applicants are encouraged to consider the program if they have extensive background in mathematics and/or the basic sciences. In such cases, it may be necessary for a student to complete the entrance qualifications without receiving credit toward graduate studies. The general requirements for admission as outlined under the Regulations of the Graduate College must be met.

SPECIFIC REQUIREMENTS

Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

A master's degree in electrical engineering or the equivalent is recommended, however, exceptional applicants with a bachelor's degree in electrical engineering or the equivalent may be directly admitted. Admission to the Ph.D. program from applicants outside of electrical engineering may need to complete entrance qualifications without receiving course credit towards graduate studies.

Minimum Degree Requirements for the Degree of Doctor of Philosophy

A total of 75 credit hours of graduate work are required for the Ph.D. degree, with at least 51 credits taken in residence at UVM and at least 30 credits in coursework, 15 of which must be graded at UVM following matriculation into the program. These courses should be selected to meet the following requirements:

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| 2 courses to satisfy the EE Ph.D. core requirement (≥ 6 credit hours), which consists of EE 301 (System Theory) and EE 302 (Stochastic Processes). These courses are typically offered in alternate years in the fall semester. To achieve candidacy, students must complete both courses with a B or better grade. | |
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| At least 3 additional courses (≥ 9 credit hours) of advanced topics in electrical engineering (200 or higher) specifically selected with their graduate advisor to facilitate your research goals. | |
| To bolster their background in a particular area and with their advisor's approval, a student may apply 3 100 or 200-level (that are not already approved for graduate credit) credit hours to their Ph.D. degree requirements. These credits may apply to the 75 in total required but not to the 15 credits of EE coursework specified above. Students interested in taking this course for graduate credit will need to submit a Permission to Take a 100/200 Level Course for Graduate Credit Form to the Graduate College before the first day of class. | |
| A student with a M.S. degree in Electrical Engineering can apply up to 24 credit hours from this M.S. degree toward the Ph.D. coursework requirements, subject to the approval of the EE graduate studies committee. | |
| At least 20 credit hours of EE 491, doctoral dissertation research, supervised by the student's Ph.D. advisor. | |
| Following the successful completion of all course and research credits, students requiring continuing registration must enroll in either GRAD 901 (less than half-time), GRAD 902 (at least half-time), or GRAD 903 (full-time) as a reflection of their current research activity. | |

Students should complete a coursework plan in their first year of Ph.D. studies, and submit this plan to the graduate studies committee for review.

Comprehensive Examination

To be eligible for taking the comprehensive exam, the student must have completed taking 1 of the 2 EE core courses (EE 301 or EE 302) with passing grades B or higher. Candidacy is achieved with successful completion of the exam and successful completion (B or higher) of the second EE core course (EE 301 or EE 302) before the end of their 4th semester.

The written part of the examination will be a report presented in the form of an IEEE conference paper, with the format of double column and maximum length of 6 pages. The paper will be focused on a research topic in the area of the candidate's dissertation work, and will comprise three Specific Aims:

1. Introduction, background and literature review related to the research problem. Development of a comprehensive bibliography related to their research topic.
2. A clear description of open issues related to the research topic. Discussion of the value and innovative aspects of the student's proposed research.
3. Proposed research approach description, hypothesis(es) and/or goal(s), potential barriers and possible solutions, preliminary data, and experimental design plan.

The first aim will demonstrate the student's ability to collect and contextualize prior art in the area of research. The second aim will demonstrate the student's ability to identify new research problems and justify their value to the field. The third aim will be a "stretch

aim” that extends beyond the completed aspects of the candidate’s research. In this third aim, the candidate will be expected to exhibit evidence of an ability to generate imaginative and thoughtful hypotheses, and to think laterally about how their PhD research area could be developed in a new direction. The candidate should gain the approval of their thesis committee regarding the general area of the proposal prior to beginning work on it.

The oral part of the comprehensive examination will be a formal seminar by the student in front of the faculty committee, to take place after the committee members have had a chance to review the written report, which should be in the hands of the committee members at least 2 weeks prior to the oral presentation. The student will be asked to defend the paper and to answer any additional questions the committee members feel appropriate. It is expected that there will be specific questions directly associated with broad electrical engineering fundamentals. The expectation is that the oral portion will be completed prior the start of the student’s 3rd semester.

Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Successful completion of Ph.D. comprehensive examinations.

The majority of students will have completed a core program comprising graduate courses before taking the comprehensive examination.