DOCTOR OF PHILOSOPHY IN THE FIELD OF ELECTRICAL ENGINEERING (STEM)

The doctor of philosophy (PhD) program in electrical engineering is designed to prepare students for careers of creative scholarship by providing focused knowledge in a chosen area of specialty and guidance for research. PhD students choose from the following focus areas:

- Communications and networks.
- Electrical power and energy.
- Electronics, photonics, and MEMS (VLSI systems and microelectronics).
- Signal and image processing; and systems and controls.

GW's location in Washington, DC—home to one of the nation's largest concentrations of high-technology enterprises—gives students and faculty access to new advances in technology through government agencies, private industry, and defense centers.

Visit the program website (https://www.ece.seas.gwu.edu/phd-electrical-engineering/) for additional information.

ADMISSIONS

* A limited number of doctoral applicants are accepted for the summer. Please contact the admissions office for details. International applicants who require a visa from GW are eligible to apply for admission in fall and spring only (not summer).

Admission deadlines:	Fall – January 15
	Spring – September 1
	Summer* – March 1 (non-F1 visa seeking applicants)
Standardized test scores:	The GRE General Test is optional for all applicants. For applicants who want to submit scores, they must be submitted officially from ETS using the institutional code 5246.
	The Test of English as a Foreign Language (TOEFL), the Academic International English Language Testing System (IELTS), or the PTE Academic is required of all applicants except those who hold a bachelor's, master's, or doctoral degree from a college or university in the United States or from an institution located in a country in which English is the official language, provided English was the language of instruction. Minimum scores:
	- Academic IELTS: an overall band score of 6.5 with no individual score below 6.0; or
	- TOEFL: 550 on paper-based or 81 on Internet-based; or
	- PTE Academic: 53; applicants requesting funding consideration must have 68.
Recommendations required:	Three (3) recommendations required. If possible, one recommendation should be from your advisor at the institution from which you earned your highest degree.
Prior academic records:	Transcripts are required from all colleges and universities attended, whether or not credit was earned, the program was completed, or the credit appears as transfer credit on another transcript. Unofficial transcripts from all colleges and universities attended must be uploaded to your online application. Official transcripts are required only of applicants who are offered admission.
	If academic records are in a language other than English, a copy in the original language and an English language translation must be uploaded. Transcript evaluations should not be uploaded. Applicants who have earned a degree from an Indian university are required to submit individual semester marksheets.
Statement of purpose:	Please write a comprehensive essay of 400 to 600 words, indicating your primary and supporting fields of study, your specialized interests, and the general subject area of your planned dissertation or professional project.
Additional requirements:	Applicant must possess a baccalaureate or master's degree in an appropriate area from an accredited institution. Students whose highest degree is a bachelor's must have a grade point average of at least 3.3 (on a scale of 4.0); students whose highest degree is a master's degree must have a grade point average of at least 3.4 (on a scale of 4.0).
	Applicants must choose an area of focus that most closely matches their interests and note this on the online application. All applicants must submit a resumé or CV. Applicants should also identify one to three faculty members whose research interests most closely match their own and note this on the online application.
International applicants only:	Please review International Applicant Information carefully for details on required documents, earlier deadlines for applicants requiring an I-20 or DS-2019 from GW.

For additional information about the admissions process visit the SEAS Admissions Frequently Asked Questions (https://graduate.engineering.gwu.edu/admissions-frequently-asked-questions/) page.

Contact for questions:

engineering@gwu.edu
202-994-1802 (phone)
202-994-1651 (fax)

Hours: 9:00 am to 5:00 pm, Monday through Friday

REQUIREMENTS

The following requirements must be fulfilled:

The general requirements stated under School of Engineering and Applied Science, Doctoral Program Regulations (https://bulletin.gwu.edu/engineering-applied-science/#Doctor_of_Philosophy).

Credit requirements

Students with a master of science (MS) degree must take a minimum of 30 credits, of which at least 18 must be in courses available for graduate credit, and at least 12 must be in dissertation research

Students with a bachelor of science (BS) degree must take a minimum of 54 credits, of which at least 36 must be in courses available for graduate credit, and at least 12 must be in dissertation research. These courses must be approved by the student's faculty advisor. In some cases, particularly when the student undertakes a doctoral program in a field other than that in which the earlier degree was earned, the program of study can exceed the minimum number of credits. No specific courses are required; the student and faculty advisor design the curriculum to meet the student's needs and goals.

Preliminary examination

The Department of Electrical and Computer Engineering requires doctoral students to pass a preliminary examination. Doctoral students who received their master of science degree prior to admission to the doctoral program must attempt their preliminary exam before completing 27 program credits or before completing three semesters after matriculation into the program, whichever is later. Direct entry PhD students, i.e., those with a bachelor of science degree, must attempt their preliminary examination before completing 36 program credits or before completing four semesters after matriculation into the program, whichever is later. The examination, which is offered every spring and fall semester, is guided by, but not limited to, the core material in the electrical and computer engineering master's programs. Specific details regarding the examination are available on the department's website. Normally, a student is allowed two attempts to pass the preliminary examination. The student selects a research advisor, also called dissertation director, by the end of the semester in which the student passes the preliminary examination.

Doctoral qualifying examination

After passing the preliminary examination, in consultation with the research advisor (also referred to as the dissertation director), a student prepares for the doctoral qualifying examination (also known as proposal defense). The doctoral qualifying examination is the principal means of determining whether a student qualifies as a candidate for the doctoral degree and progress to the next stage of the program.

For the doctoral qualifying examination, a written proposal of the doctoral dissertation research is presented to a committee which also conducts an oral examination of the student. In consultation with the research advisor, and with the approval of the department chair, a student's doctoral qualifying examination committee is formed. The committee must consist of at least three tenured/tenure-track electrical and computer engineering faculty members, including the student's research advisor. This step is completed using signed form and must take place prior to administering the qualifying examination.

Publication requirements

Every doctoral student is required to have a paper based on the student's dissertation research published or accepted in a scientific journal before the student's doctoral final examination. By the time of the doctoral qualifying exam, the student is expected to have published at least one paper in a refereed conference (two are recommended) and have submitted one journal paper.

Doctoral final examination

Once the dissertation has been completed, the student schedules the doctoral final examination (also known as dissertation defense) in consultation with the research advisor. The doctoral final examination form must be filed and approved by the department chair at least three weeks prior to the examination date. Approval is granted only when all required materials have been submitted to the department. The required materials include a completed form, a copy of the journal article or final acceptance letter, resumes of any outside examination committee members, and a copy of the dissertation.

In consultation with the research advisor, and with the approval of the department chair, a doctoral examination committee must be formed consisting of at least five members with a minimum of three being tenured/tenure-track faculty members of the department (including the student's research advisor) and at least three members of the doctoral qualifying exam committee. The committee shall be formed prior to the dissertation defense. Members external to the ECE department must have a PhD (or equivalent) in ECE or a closely related field or in a field needed by the dissertation research topic. The chair of the doctoral defense committee should be different from the research advisor who is considered the advocate. Once formed, changes to the doctoral defense committee are allowed, only if necessary, with the endorsement of the research advisor and the approval of the department chair.

The doctoral final examination is oral, open to the public and should be conducted in person. The candidate must demonstrate mastery of the special field of study and of the materials and techniques used in the research. The committee of examiners can include qualified experts brought to the University specially to participate in the examination. The research advisor usually serves as advocate for the candidate. The committee assesses the quality and originality of the candidate's contribution to knowledge as well as the student's mastery of the scholarship and research techniques of the field. Upon decision to pass, the committee recommends the candidate for the degree of doctor of philosophy. The decision to pass can be

provisional based on committee recommendations for changes to the dissertation in terms of additional work, writing, or clarifications.

Doctoral proposal, dissertation and presentation guidelines

A proposal document for the doctoral qualifying exam should be provided to the committee 10 days prior to the exam and a presentation with viewgraphs during the exam is expected. The proposal document and presentation are expected to cover background, motivations, problem statement, related work, approach, preliminary results, an overall plan of completion, with milestones highlighting what was done and what needs to be completed before the defense. A list of publications produced from the research so far should be attached. The proposal document should be at least 20 pages but no more than 50 pages, double spaced, and using a 12-point font. The presentation should be 45 to 60 minutes in length with 30 to 50 viewgraphs.

The doctoral dissertation is typically 100 to 120 pages in length. A presentation of 45 to 60 minutes with 35 to 50 viewgraphs is expected. The doctoral dissertation must be provided to the committee members at least three weeks prior to the date of the defense.

Important timelines

The student must select a research advisor by the end of the semester following the one in which the student passes the preliminary examination. The process is officially completed with a special form signed by the student, the research advisor, and academic advisor, and submitted to the department. Doctoral students who received their MS degree prior to admission to the doctoral program and direct entry PhD students should take the preliminary examination as specified above.

Students who miss the preliminary examination deadline by more than one semester can be suspended. The dissertation defense and the doctoral qualifying examination cannot be taken by a student in the same semester. The doctoral qualifying examination should be taken as soon as possible, but advisably no later than 3 years from the start of the doctoral program.

Monitoring the adherence to all policies is consolidated via a standard annual progress form that needs to be signed by the student, advisor, and chair. Students should ensure that an up-to-date progress form is approved and included in their file by April 15 of each year.

Students must complete all program requirements by the end of seven years of their enrollment. Any further extensions must be requested from and approved by the department.

Colloquium requirements

Students are required to attend ten in-person colloquia during their time in the program, verified by a faculty member also in attendance. At least two of these colloquia must be attended in the first two semesters in the program. Upon the attendance of ten colloquia, the student must submit to the department the colloquium attendance form signed by the faculty advisor prior to applying for graduation.

Graduation and scholarship requirements

Students are responsible for knowing the university's minimum GPA requirement for graduation and scholarships. See School of Engineering and Applied Science Regulations, Graduation and Scholarship Requirements (http://bulletin.gwu.edu/engineering-applied-science/#Graduation_Scholarship_Requirements_DP). Students should contact the department for additional information and requirements.