

ELECTRICAL AND COMPUTER ENGINEERING, PH.D.

The Ph.D. in electrical and computer engineering (ECE) at Saint Louis University's School of Science and Engineering focuses on a specific research topic. SLU students conduct original academic research culminating in a dissertation and peer-reviewed publications. Additional coursework related to the chosen research area is also required.

The ECE program offers opportunities to engage in frontier research spanning quantum sciences and computing, optics and photonics, electromagnetics, semiconductor devices, and nanoscale technologies. Students work closely with highly respected faculty conducting funded research supported by leading national and international agencies, with access to state-of-the-art laboratories and interdisciplinary collaborations. The environment fosters innovation, creativity and transition from consuming knowledge to generating new discoveries.

Curriculum Overview

The Ph.D. in electrical and computer engineering at Saint Louis University requires a total of 42 credits of coursework beyond the bachelor's degree, with 12 credits of dissertation. All courses must be at the 5000 or higher level. Students who earn an M.S. may include a maximum of 24 master's degree course credits with departmental approval, but not the thesis or project credits in the 42 credits for the Ph.D. degree.

The doctorate in electrical and computer engineering allows students to pursue a personalized curriculum that fits their interests and professional goals. The majority of courses will be in the area of emphasis; however, students in consultation with their academic advisor and department graduate coordinator may take limited number of credits from math or other engineering programs. Faculty advisors work closely with students to ensure that the requirements are met and that students are prepared for a career in their chosen field. Ph.D. ECE students are expected to register and attend zero-credit seminars every semester.

Experiential and Applied Learning

Graduate students in the School of Science and Engineering gain valuable experience working with both faculty and peers. Additional opportunities to publish in scientific journals and attend professional conferences prepare our graduates for careers in industry or academia.

Saint Louis University's location in a vibrant and industry-rich city means that faculty members have access to and relationships with industry professionals. The School of Science and Engineering provides many opportunities for these professionals to interact with students, share their real-world experiences, network and even collaborate on research projects. Therefore, students have access not only to top-notch faculty but to the most recent developments in industry.

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Students work closely with highly skilled faculty conducting funded research supported by leading national and international agencies, with

access to state-of-the-art laboratories and interdisciplinary collaborations in the following areas:

- Quantum science and computing
- Optics and photonics
- Electromagnetics
- Semiconductor technologies
- Nanoscale technologies
- Others

The environment fosters innovation, creativity and transition from consuming knowledge to generating new discoveries.

Careers

Graduates of the doctorate program seek employment in industry, government or as university professors. A Ph.D. is often expected for senior expert roles in industry (e.g., specialized R&D roles in semiconductor companies) or for pursuing a career in academia as a professor. Graduates are in high demand at top-tier firms like Intel, AMD, Amazon, and various national labs. Programs offer opportunities to build professional networks through international conferences and projects.

Admission Requirements

To be considered for the PhD program in ECE at SLU, applicants need a strong academic background and outstanding research potential. While requirements can vary, successful applicants for PhD in ECE often possess a Bachelor of Science (BS) and/or Master of Science (MS) degree in ECE, and prior research or industry experience.

The admission criteria for PhD in Electrical and Computer Engineering Program are:

1. BS and/or MS degree in Electrical and Computer Engineering or related disciplines (e.g., mathematics, physics, or non-ECE engineering programs) from an accredited institution of higher education. Proof of all previous degrees should be provided during the application in the form of official transcripts.
2. A minimum GPA of 3.0 on a 4.0 scale in the BS degree is required for students applying to the PhD who do not already hold a MS degree. For students who already hold an MS degree, a 3.25 in the MS degree is required in addition to the 3.0 GPA in the BS degree.

An applicant's academic record not meeting the above GPA criteria does not automatically disqualify them from consideration. Similarly, meeting the criteria does not guarantee acceptance into the program. The overall academic record, including coursework completed in the BS and MS programs and the quality of the applicant's performance, as well as the reference (or recommendation) letters will be evaluated. The final decision regarding acceptance or rejection is at the discretion of the ECE Graduate Committee.

Note: International applicants must submit official records, or attested copies, with certified translations if the records are not in English.

Note: The General Graduate Record Examination (GRE) Aptitude Test scores are not required for admission.

Begin your application for this program at <https://www.slu.edu/apply.php>.

Application Requirements

- Application form
- Transcripts from all previous colleges and/or universities and proof of degrees and certificates.
- A well-written and articulate professional goal statement describing the aspiring achievements in our program and beyond. The professional goal statement should also indicate research interests and career goals.
- Three letters of recommendation
- A resume or curriculum vitae (CV) outlining educational background, professional experience, awards, honors, and publications, if exist.

Requirements for International Students

Along with the general admission requirements listed above, the following must be provided by prospective international students:

- English language proficiency should be demonstrated through TOEFL/ IELTS/ Duolingo/ Pearson scores as per the University guidelines (<https://www.slu.edu/admission/international/english-proficiency.php>).
- English translation of academic records if the BS and/or MS degree is obtained at an institute outside the United States and the instruction language is not English. Academic record must include the courses taken and/or lectures attended, practical laboratory work, the maximum and minimum grades attainable, the grades earned or the results of all end-of-term examinations, and any honors or degrees received. Academic records must be certified by designated institutions such as World Education Services (WES) and Educational Credential Evaluators (ECE).
- Proof of financial support that must include:
 - A letter of financial support from the person(s) or sponsoring agency funding the time at Saint Louis University.
 - A letter from the sponsor's bank verifying that the funds are available and will be so for the duration of study at the University.

Review Process

All applicants are admitted based on their research interests and openings in the ECE research groups. Applicants with degrees from non-ECE Departments will also be considered after reviewing the transcripts to determine fit and/or pre-requisite/concurrent classes that the applicant would need to take to qualify for the ECE PhD program. Such applicants may receive conditional admission.

Apply Now (<https://gradapply.slu.edu/apply/>)

Tuition

Tuition	Cost Per Credit
Graduate Tuition	\$1,450

Additional charges may apply. Other resources are listed below:

Information on Tuition and Fees (<https://catalog.slu.edu/academic-policies/student-financial-services/tuition/>)

Miscellaneous Fees (<https://catalog.slu.edu/academic-policies/student-financial-services/fees/>)

Information on Summer Tuition (<https://catalog.slu.edu/academic-policies/student-financial-services/tuition-summer-current/>)

Financial Support

The School of Science and Engineering offers graduate fellowship awards and assistantships each year. Assistantships provide tuition, stipend and health insurance. There are also many opportunities for students to receive funding through external research grants that are managed by individual faculty.

For more information, visit the Office of Student Financial Services (<https://slu.edu/financial-aid/>).

Learning Outcomes

1. Apply advanced mathematical and scientific principles and computational and modeling tools to solve electrical and computer engineering problems.
2. Communicate complex technical information effectively.
3. Demonstrate a deep and integrated understanding of foundational and advance principles in sub specialized discipline of electrical and computer engineering.
4. Conduct original and significant research that generates new knowledge and advances the theory or practice of electrical and computer engineering, contributing to the body of scholarly literature in the field.

Requirements

A grade of B or higher is required for a course to be used for the degree requirements.

Code	Title	Credits
ECE 5001	Practices in ECE	3
<i>Foundational Courses</i>		6
Choose 6 credits from the below:		
ECE 5110	Power Systems Analysis I	
ECE 5170	Energy Technologies I	
ECE 5055	Stochastic Processes	
ECE 5051	Mathematical Methods for Engineers	
ECE 5160	Communication Systems	
ECE 5161	Satellite Communications	
ECE 5120	Modern Control Theory	
ECE 5132	Analog Integrated Circuit Design	
ECE 5235	Digital IC Design	
ECE 5225	Hardware Software Co-Design	
ECE 5245X	Computer Networks	
<i>Electrical & Computer Engineering Technical Electives</i>		21
Students should choose 21 credits of courses with the Electrical and Computer Engineering Graduate Technical Elective attribute. Up to 9 credits of coursework with the attribute may be counted toward this requirement.		
<i>Dissertation Research</i>		12
ECE 6990	Doctoral Dissertation Research	
Total Credits		42

Non-Course Requirements

- **Graduate Seminar.** All Graduate students must attend the ECE Graduate Seminar every semester. Students should attend at least 50% of the seminars and submit satisfactory reports each semester to fulfill this requirement.
- Qualifying Exam
- Candidacy (Comprehensive) Exam
- Written Dissertation
- PhD Oral Defense

Roadmap

This roadmap is just one example of a semester-by-semester plan of study for this program. There are other plans students can and do take. The plan of study for each particular student is established in consultation with each student’s academic advisor; *this roadmap does not replace academic advising appointments.*

Roadmap notes:

- This Roadmap assumes full-time enrollment unless otherwise noted.
- Courses/Milestones marked with an “!” are critical and must be completed in the semester listed in the Roadmap to ensure a timely graduation.
- Course availability and sequencing are subject to change.

Course	Title	Credits
Year One		
Fall		
ECE 5001	Practices in ECE	3
Foundational Course		3
ECE Technical Elective		3
Seminar		0
Credits		9
Spring		
Foundational Course		3
ECE Technical Electives		6
Seminar		0
Credits		9
Year Two		
Fall		
ECE Technical Elective		3
ECE 6990	Doctoral Dissertation Research	3
Seminar		0
Credits		6
Spring		
ECE Technical Electives		6
ECE 6990	Doctoral Dissertation Research	3
Seminar		0
Credits		9
Year Three		
Fall		
ECE Technical Elective		3

ECE 6990	Doctoral Dissertation Research	3
Seminar		0
Proposal Defense		
Credits		6
Spring		
ECE 6990	Doctoral Dissertation Research	1
Seminar		0
Credits		1
Year Four		
Fall		
ECE 6990	Doctoral Dissertation Research	1
Seminar		0
Credits		1
Spring		
ECE 6990	Doctoral Dissertation Research	1
Seminar		0
Dissertation Defense		
Credits		1
Total Credits		42

Contact Us

For more information about any School of Science and Engineering graduate program, email ssegrad-admissions@slu.edu.