

# ENGINEERING, PH.D.

The Doctor of Philosophy (Ph.D.) programs focus on a specific research topic. The students are expected to conduct original academic research that culminates in a dissertation and peer-reviewed publications.

Additional coursework related to the chosen research area is also required.

Ph.D. students prepare a program of study that must be approved by the Faculty Advisor, Department Chair, and the Director of Graduate Programs. This program of study is developed and then reviewed within the context of students' background and career goals, allowing students to customize their program to suit their professional goals.

Graduate students in Engineering at Parks College of Engineering, Aviation and Technology will demonstrate:

1. enhanced professional and analytical skills through the development of an in-depth understanding of theoretical and practical concepts;
2. excellent communications skill through written and oral presentations;
3. creative thinking skills through mastery of topics required to solve complex engineering problems; and
4. depth of knowledge required to pursue advanced work in a modern, ever-changing world through entrepreneurial experiences woven into their program.

These attributes will be assessed during the required examination milestones. For a Ph.D. degree, the required milestones include a qualifying exam, a written dissertation proposal and corresponding oral defense, and a written dissertation and corresponding oral defense presentation.

## Curriculum Overview

The Ph.D. in engineering requires a total of 60 credits of coursework beyond the bachelor's degree, with a minimum of 12 credits of dissertation. A limited number of courses may be at the 4000 level; all others must be at the 5000 or higher level. Those students who earn an M.S. degree may include a maximum of 24 master's degree course credits with departmental approval, but not the thesis or project credits in the 60 credits for the Ph.D. degree.

There are three concentrations in the engineering doctoral program:

- Aerospace and mechanical engineering
- Biomedical engineering
- Civil engineering

## Fieldwork and Research Opportunities

The expert faculty of Parks College collaborate with graduate students in ground-breaking research in the following areas:

- Aircraft engine aerodynamics
- Cardiovascular and assist devices
- Energy, sustainability and environmental
- Engineering education
- Flight control systems
- Haptic and human-machine interfaces
- Human factors/physiology

- Innovation and entrepreneurship
- Medical robotics
- Orthopedic biomechanics
- Regenerative medicine
- Robotics and mechatronics
- Safety
- Sensors and systems
- Signal processing
- Space systems
- Structures and bridges
- Thermal-fluid sciences
- Tissue engineering
- Transportation
- Unmanned aerial systems
- Water resources and hydraulics

## Careers

Graduates of the doctoral program seek employment in the industry, government or as university professors.

## Admission Requirements

Begin your application for this program at [www.slu.edu/apply](http://www.slu.edu/apply).

Most admitted students meet the following criteria:

- GRE quantitative score greater than 650 (old grading system) or greater than 150 (new grading system)
- Undergraduate GPA of at least 3.00
- A four-year undergraduate degree in engineering related field of desired graduate program.

## Application Requirements

- Application form and fee
- Transcript(s) from all colleges and universities attended
- Three letters of recommendation (preferably from recent instructors)
- GRE scores
- Résumé or curriculum vitae
- Professional goal statement

## Requirements for International Students

All admission policies and requirements for domestic students apply to international students along with the following:

- Demonstrate English Language Proficiency (<http://catalog.slu.edu/academic-policies/office-admission/graduate/english-language-proficiency>)
- Proof of financial support 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
- Academic records, in English translation, of students who have undertaken postsecondary studies outside the United States 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. WES and ECE transcripts are accepted.

## Assistantship Application Deadline

Admitted students who want to be considered for an assistantship must submit a separate application for assistantship consideration by March 1.

## Review Process

Once all the materials are received and the online application is complete, materials will be reviewed by the Parks College's Office of Graduate Education and Research before being sent to the engineering department for a recommendation. The final decision is made by the Parks College Associate Dean of Graduate Education and Research.

Admissions decisions are made based on the background and educational experience of students. Applications are reviewed when completed, and decisions are generally made within a few weeks.

Apply Now (<http://www.slu.edu/apply.php>)

## Scholarships and Financial Aid

Parks College 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 student financial services office online at <http://finaid.slu.edu>.

## Learning Outcomes

1. Graduates will be able to apply knowledge of advanced concepts and analytical skills within engineering that enhances or adds to the scientific consensus.
2. Graduates will be able to communicate clearly and creatively a mastery of topics required to solve complex engineering problems through peer-reviewed research and oral presentations.
3. Graduates will be able to conduct independent research that addresses problems in broader contexts.

## Requirements

The Engineering Ph.D. degree requires a total of 60 credits beyond the bachelor's degree with a minimum of 12 credits of dissertation research. Of the 60 credits, a maximum of 9 credits may be comprised of coursework at the 4000-level; all other course credits must be at the 5000 or 6000-level. Those students who earn a Master of Science degree may include up to 24 credits from the associated Master of Science degree, but not the thesis or project credits, in the 60 credits which are needed for the Ph.D. degree. Ph.D. students should also satisfy four semesters of Graduate Seminar beyond a bachelor's degree.

## Non-Course Requirements

### First Semester in Ph.D. Program

In the first semester, Ph.D. students will begin taking courses as indicated in the program of study. In parallel, students may also begin research in an identified research area under the guidance of a Faculty Advisor.

The Faculty Advisor and students will form a Guidance Committee of at least five members. The Committee members should be persons who will likely provide expertise and guidance that will assist students

in their research. At least two members, besides the Faculty Advisor, must be in students' home department. If the Faculty Advisor is in another department, then one Guidance Committee member in the home department will be designated as the Guidance Committee Chair.

## Annual Student Review

All active students are expected to check in with their Faculty Advisor regularly regarding coursework and research, and to conduct an Annual Student Review. New students who start in the Summer and Fall semesters will conduct their Reviews by the end of January, and every academic year thereafter by the end of May. New students who start in the Spring semester will conduct their Reviews by the end of May. All students conduct their reviews annually in consultation with the Faculty Advisor and submitted to a respective Department Chair and then the Graduate Education office by the end of May.

The Annual Student Review form can be obtained from the Parks College Graduate Programs Office.

## Qualifying Exam

A qualifying exam will be administered according to the expectations of the academic discipline. For example, in engineering a qualifying exam may be administered relatively early in the doctoral studies. In aviation, the qualifying exam is structured to assess comprehensive knowledge of the discipline after all or nearly all of academic work has been completed and thus, it is administered closer to the completion of the degree.

The student's Guidance Committee will advise students on preparation for the Qualifying Exam. Ideally, the Guidance Committee will continue after the Qualifying Exam and through the dissertation research.

The Qualifying Exam is designed to determine if students are prepared to continue Ph.D. studies. Normally, it is a written exam, with the option for follow-up with an oral exam. The details of the exam are determined by the home department, but all portions of the Qualifying Exam should be completed in one day.

Qualifying examinations are arranged and administered by the home department. The result of the exam may be a pass, no-pass, or conditional-pass. The conditional-pass will normally require that students correct specific weaknesses, with appropriate modifications to the plan of study.

Qualifying exam procedures can be accessed at the Parks College Graduate Education website. [Error! Hyperlink reference not valid.](#)

## Dissertation Proposal & Doctoral Oral Examination

Typically, after a year following the Qualifying Exam, students will present and defend a Dissertation Proposal, called a Doctoral Oral Examination. This Exam is based on their written proposal, and their oral defense of the proposal. Both components will be evaluated by the Guidance Committee.

Doctoral Candidate status will be given to students after successful passage of the Doctoral Oral Examination of the dissertation proposal.

## Dissertation Defense

At a time selected by students and the Guidance Committee, the doctoral candidates present the dissertation research in both written and oral format. The Defense typically includes a seminar that is open to the public. Following the open session, the student defending and his or her Guidance Committee continues the discussion in a closed session.

Based on the Defense, the Guidance Committee may:

1. approve the Dissertation,
2. conditionally approve, with specific instructions on revisions to the Dissertation document, or
3. not approve the Dissertation.

### **Continuation Standards**

Students must maintain a cumulative grade point average (GPA) of 3.00 in all graduate/professional courses.