

PARKS COLLEGE OF ENGINEERING, AVIATION, AND TECHNOLOGY

Michelle Sabick, Ph.D.

Dean

Riyadh Hindi, Ph.D., P.Eng., F.SEI

Associate Dean for Graduate Education & Research

Consistent with the mission of Saint Louis University, the mission of Parks College of Engineering, Aviation, and Technology (Parks College) is to prepare students to advance the frontiers of knowledge and technical expertise in engineering and aviation while instilling within them good ethical and professional character.

History

Oliver L. Parks founded Parks College, the first federally certified school of aviation in the United States, in 1927 in Cahokia, Illinois. After establishing a strong aviation program, the school's founder entrusted his legacy to Saint Louis University in 1947. Now, Parks College offers a variety of engineering and aviation programs.

Program Objectives

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 Master's of Science (M.S.) degree, the required milestone is a written research report/thesis and corresponding oral defense presentation. The M.S. course only option can be assessed through a portfolio process by the housing department. 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.

Graduate students in Aviation at Parks College of Engineering, Aviation and Technology will demonstrate: 1) enhanced professional, social 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 and related in-course projects; 3) creative thinking skills through mastery of topics required to solve complex aviation 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 Master's of Science degree, the required milestone is the exit examination. 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.

Admission

A four-year undergraduate degree in engineering or a related field may be appropriate for admission to the engineering program. A four-year undergraduate degree in aviation or a related field may be appropriate for admission to the aviation program. For deadlines on admission and assistantships, please visit our website.

Admission Requirements:

1. Online application at www.slu.edu/graduate-admission-home/apply-now
2. Official GRE quantitative score
3. Official transcripts of all previous degrees
4. Three letters of recommendation
5. Curriculum Vitae (CV)
6. Professional goals statement
7. Evidence of English language proficiency (when native language is not English). Minimum scores: TOEFL PBT 550, TOEFL IBT 80, or IELTS 6.5

Master of Science

The Master's Degree (M.S.) in Engineering requires minimum of 30 credits beyond a Bachelor's degree; the M.S. in Aviation requires a minimum of 32 credits beyond a Bachelor's degree. The M.S. in Aviation is non-thesis, a course only degree. For the M.S. in Engineering, students can choose between 1 of 3 options for their Master of Science: 1) course only, 2) project option, or 3) thesis option. For students pursuing the research option, 6 of the total credits to the degree must be in Thesis Research. For students pursuing the project option, 3 of the total credits to the degree must be devoted to carrying out a project, approved by students' Faculty Advisor. Up to 12 credit hours may be transferred from another institution. Students are expected to maintain a cumulative grade point average (GPA) of 3.00; lower GPA may result in probationary status and/or dismissal from the program due to unsatisfactory academic performance. Lastly, all students are required to enroll each semester until degree is received. M.S. students should satisfy two semesters of Graduate Seminar beyond a Bachelor's degree.

M.S. students prepare a program of study that must be approved by the Faculty Advisor, department chair, and the Parks College Graduate Programs Director. This program of study is developed within the context of background and career goals of students allowing them to customize their program to suit their professional goals.

The Accelerated B.S.-M.S. (ABM) Program in Engineering is a discrete accelerated program that allows high achieving students to complete both B.S. and M.S. degrees in a total of 5 years. Six credits of qualifying coursework can be used to satisfy both the undergraduate and graduate degree requirements. The B.S. degree is in the student's undergraduate major (aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, engineering physics, or mechanical engineering), and the M.S. degree is in engineering in the student's home department. The Master's degree provides additional technical depth and specialization that can lead to expanded career opportunities and responsibilities, as well as preparation for doctoral (Ph.D.) studies. Students interested in the B.S.-M.S. Accelerated Program should contact their home department for more information.

Thesis option

First Semester in the M.S. Program

In the first semester, M.S. 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 student will form a Guidance Committee of at least three members. The Committee members should be persons who will likely provide expertise and guidance that will assist students in research. At least one member, besides the Faculty Advisor, must be in the home department of students. 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.

Thesis Proposal

Students prepare a Thesis Proposal before the end of the first year activities. The title and outline for this proposal are approved by the Guidance Committee and reported on the *Master's Thesis Proposal/Prospectus* form. After completing the thesis proposal, students meet with the Guidance Committee at least once every semester.

Thesis Defense

An oral Thesis Defense must be completed before graduation. The Defense typically includes a seminar that is open to the public. Following the open session, the student and Guidance Committee continue discussion in a closed session. A written Thesis report is submitted ~4 weeks prior to the oral defense.

Based on the Defense, the Guidance Committee may:

- (1) Approve the Thesis,
- (2) Conditionally approve, with specific instructions on revisions to the Thesis document, or
- (3) Not approve the Thesis.

The Guidance Committee conveys the decision to the Department Chair and the Director of Graduate Programs.

Doctor of Philosophy

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.

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 credit hours 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 hours 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.

The Aviation Ph.D. degree requires a total of 63 credits beyond the Bachelor of Science degree, including a minimum of 12 credits of dissertation. The curriculum will include a minimum of 24 credits of coursework comprised of at least 12 credits of coursework in research methodologies and 12 credits in a secondary discipline intended to complement knowledge of aviation. Students will work with their advisor and Ph.D. committee to determine the specific coursework to complete the program. Those students holding an appropriate Master of Science degree may include a maximum of 27 credits of the associated Master of Science degree course credits, but not the thesis or project credits, in the 63 credits required for the Ph.D. degree.

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.

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.

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.

Independent Studies and Special Topics Course

Independent Study courses are reserved for specialized topics individual to a graduate student that the student and advisor both agree fits into the program of study. Like Independent Study courses, Special Topics courses are not regularly offered courses in the catalog. Special Topics courses, however, are not specially written to match a student's research interests, but rather a course the department offers to a limited number of students for one semester. Since both types of courses are not in the catalog, the Graduate Education office requires a copy of the outline or syllabus will be kept in the student's file. All independent studies and special topics courses must be

submitted and approved by the mentor/advisor of students prior to registration.

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.

Post-baccalaureate Course Listing

Aerospace Engineering

Michael Swartwout, Ph.D.

Department Chair

AENG.5009 Seminar (0)	AENG.5530 Composite Materials for Structure and Design (3)
AENG.5050 Space Mission Analysis and Design (3)	AENG.5700 Aeroelasticity (3)
AENG.5060 Advanced Space Mission Design (3)	AENG.5750 Parachute Systems & Design (3)
AENG.5150 Orbital Mechanics (3)	AENG.5800 Autonomous Systems Design (3)
AENG.5230 Introduction to Computational Fluid Dynamics (3)	AENG.5850 Space Mission Failures (3)
AENG.5240 Hypersonics (3)	AENG.5910 Co-op with Industry (0-3)
AENG.5260 Unsteady Aerodynamics of Bluff Bodies (3)	AENG.5915 Internship with Industry (0-3)
AENG.5280 Applied Aerodynamics (3)	AENG.5930 Special Topics (1-3)
AENG.5400 Guidance, Navigation and Estimation for Dynamic Vehicles (3)	AENG.5964 Masters Project
AENG.5410 Flight Simulation (3)	AENG.5984 Independent Study (1-3)
AENG.5450 Space Dynamics and Control (3)	AENG.5994 Master's Thesis Research (0-6)
AENG.5460 Modern Control Systems (3)	AENG.6910 Co-op with Industry (0-3)
AENG.5470 Advanced Control Systems (3)	AENG.6915 Internship with Industry (0-3)
	AENG.6984 Independent Study (1-3)
	AENG.6994 Doctoral Dissertation Research (0-6)

Aviation Science

Stephen Magoc, MBA

Department Chair

ASCI.5010 Analysis of Aviation Safety Data (3)	ASCI.5930 Special Topics (1-3)
ASCI.5020 Aviation Safety Data Analysis (3)	ASCI.5960 Project Guidance (3)
ASCI.5030 Aviation Security Management (3)	ASCI.5980 Graduate Reading Course (1-3)
ASCI.5040 Human Factors in Aviation Safety (3)	ASCI.5984 Independent Study (1-3)
ASCI.5080 Management of Aviation Safety Programs (3)	ASCI.6010 Federal and International Regulatory Environment (3)
ASCI.5100 Aviation Safety Career and Personal Development (3)	ASCI.6020 Flight Operations Business and Administration (3)
ASCI.5120 Aviation Safety Quality Issues (3)	ASCI.6030 Aviation and Public Policy (3)
ASCI.5130 Aviation Safety Ethics (3)	ASCI.6050 Legal and Ethical Issues in Collegiate Flight Education (3)
ASCI.5150 Aviation Incident/Accident Analysis (3)	ASCI.6060 Aviation Curriculum Development and Management (3)
ASCI.5210 Aviation Org. Theory and Management (3)	ASCI.6070 Aviation Training Methods and Practice (3)
ASCI.5220 Aviation Safety Programs (3)	ASCI.6990 Doctoral Dissertation Research (0-6) 100
ASCI.5230 Professional Ethics and Standards (3)	FSCI.5230 Economics of Air Transportation (3)
ASCI.5460 Qualitative Analysis (3)	
ASCI.5470 Quantitative Analysis (3)	
ASCI.5910 Graduate Internship (3)	

Biomedical Engineering

J. Gary Bledsoe, Ph.D.

Department Chair

BME.5000 Seminars (0)
BME.5010 Research Analysis (2)
BME.5020 Accelerated Introduction to Biomechanics & Biomaterials (2)
BME.5030 Accelerated Introduction to Neuroengineering and Bioimaging (2)
BME.5050 Data Handling (3)
BME.5060 Ethics & Compromise (3)
BME.5200 Continuum Biomechanics (3)
BME.5320 Drug Delivery (3)
BME.5400 Tissue-Material Interfaces (3)
BME.5410 Tissue Engineering (3)
BME.5420 Tissue Engineering Scaffold Fabrication Techniques (3)
BME.5450 AFM Techniques and Training (3)
BME.5500 Experimental Techniques and Design (0-2)
BME.5600 Quantitative Physiology I (3)

BME.5650 Quantitative Physiology II (3)
BME.5800 Research Rotation (1-3)
BME.5910 Co-op with Industry (0-3)
BME.5915 Internship with Industry (0-3)
BME.5930 Special Topics (1-3)
BME.5955 Capstone Project 1 (3)
BME.5960 Project Guidance (1-3)
BME.5965 Capstone Project 2 (3)
BME.5970 Research Topics (1-3)
BME.5980 Graduate Reading Course (1-3)
BME.5990 Master's Thesis Research (0-6)
BME.6910 Co-op with Industry (0-3)
BME.6915 Internship with Industry (0-3)
BME.6930 Special Topics (1-3)
BME.6970 Research Topics (1-3)
BME.6980 Graduate Reading Course (1-3)
BME.6990 Doctoral Dissertation Research (0-6)

Civil Engineering

Ronaldo Luna, Ph.D.,

Department Chair

CVNG.5000 Seminar (0)
CVNG.5050 Advanced Structural Analysis (3)
CVNG.5070 Structural Dynamics (3)
CVNG.5090 Advanced Reinforced Concrete (3)
CVNG.5110 Advanced Steel Design (3)
CVNG.5130 Bridge Engineering (3)
CVNG.5150 Prestressed Concrete (3)
CVNG.5170 Seismic Design (3)
CVNG.5190 Sustainable Land Development Engineering (3)
CVNG.5210 Sustainable Water Resources Management (3)
CVNG.5230 Biological Treatment Systems (3)
CVNG.5250 Physical/Chemical Treatment Systems (3)
CVNG.5310 Air Pollution (3)

CVNG.5330 Open-Channel Flow (3)
CVNG.5350 Hydraulic Modeling (3)
CVNG.5370 River Engineering (3)
CVNG.5450 Traffic Engineering (3)
CVNG.5470 Urban Transportation Planning (3)
CVNG.5910 Co-op with Industry (0-3)
CVNG.5915 Internship with Industry (0-3)
CVNG.5930 Special Topics (1-3)
CVNG.5960 Master's Project (1-3)
CVNG.5990 Master's Thesis Research (0-6)
CVNG.6910 Co-op with Industry (0-3)
CVNG.6915 Internship with Industry (0-3)
CVNG.6990 Doctoral Dissertation Research (0-6)

Electrical and Computer Engineering

Huliyar Mallikarjuna, Ph.D.,

Department Chair

ECE.5000 Seminar (0)
ECE.5055 Stochastic Processing (3)
ECE.5110 Power Systems I (3)
ECE.5111 Power Systems II (3)
ECE.5120 Modern Control Theory (3)
ECE.5130 Advanced Semiconductor Devices (3)
ECE.5131 Low Noise Electronics Design (3)
ECE.5132 Analog Integrated Circuit Design (3)
ECE.5141 Radar System Design and Analysis (3)
ECE.5142 Microwave Theory and Techniques (3)
ECE.5143 Antenna Theory and Design (3)
ECE.5150 Advanced Filter Design (3)

ECE.5151 Digital Signal Processing (3)
ECE.5160 Communication Systems (3)
ECE.5161 Spacecraft Communications (3)
ECE.5162 Cellular Communications (3)
ECE.5170 Energy Technologies I (3)
ECE.5225 Hardware Software Co-design (3)
ECE.5226 Robotics (3)
ECE.5235 Digital IC Design (3)
ECE.5910 Co-op with Industry (0-3)
ECE.5915 Internship with Industry (0-3)
ECE.5930 Special Topics (1-3)
ECE.5960 Master's Project (3)

ECE.5970 Research Topics (1-3)
ECE.5980 Independent Study (1-3)
ECE.5990 Master's Thesis Research (0-6)
ECE.6910 Co-op with Industry (0-3)

ECE.6915 Internship with Industry (0-3)
ECE.6970 Research Topics (1-3)
ECE.6980 Independent Study (1-3)
ECE.6990 Doctoral Dissertation Research (0)

Engineering Physics

William Thacker, Ph.D.,

Department Chair

PHYS.5010 Nanoscience and Nanofabrication Frontiers
(required core course) (3)
PHYS.5020 Experimental Physics (3)
PHYS.5030 Mathematical Methods in Physics with
Elements of Classical Mechanics (3)
PHYS.5060 Numerical Analysis and Computational
Physics (required core course) (3)

PHYS.5910 Co-op with Industry (0-3)
PHYS.5915 Internship with Industry (0-3)
PHYS.5930 Special Topics (1-3)
PHYS.5960 Masters Project (1-3)
PHYS.5980 Independent Study (1-3)
PHYS.5990 Thesis Research (0-6)

Mechanical Engineering

Michael Swartwout, Ph.D.

Department Chair

MENG.5009 Seminar (0)
MENG.5100 Advanced Mechanics of Solids (3)
MENG.5110 Fracture Mechanics and Plasticity (3)
MENG.5120 Structural Reliability (3)
MENG.5150 Finite Element Analysis I (3)
MENG.5160 Finite Element Analysis II (3)
MENG.5200 Advanced Fluid Dynamics (3)
MENG.5220 Experimental Methods in Fluid Dynamics (3)
MENG.5230 Viscous Flows (3)
MENG.5240 An Introduction to Turbulence (3)
MENG.5530 Composite Materials for Structure and Design
(3)

MENG.5700 Multidisciplinary Optimization (3)
MENG.5810 Technology Entrepreneurship (3)
MENG.5910 Co-op with Industry (0-3)
MENG.5915 Internship with Industry (0-3)
MENG.5930 Special Topics (1-3)
MENG.5964 Masters Project
MENG.5980 Independent Study (1-3)
MENG.5990 Master's Thesis Research (0-6)
MENG.6910 Co-op with Industry (0-3)
MENG.6915 Internship with Industry (0-3)
MENG.6994 Doctoral Dissertation Research (0-6)