PARKS COLLEGE OF ENGINEERING, AVIATION, AND TECHNOLOGY

Theodosios Alexander, Ph.D. Collegiate Dean
Riyadh Hindi, Ph.D., P. Eng. Director of Graduate Programs

Consistent with the mission of Saint Louis University, the mission of 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 at the undergraduate and graduate levels.

Program Objectives

The graduate program emphasizes quantitative extension of knowledge in the core area of engineering and aviation with additional specialization tailored to the interests of the graduate student.

The program emphasizes familiarization with the methods and techniques of scientific investigation through research, evaluation of knowledge in an independent and critical fashion, and communication of knowledge, through written and oral means. The program is designed to advance the careers of working engineers, as well as provide graduate education to students at the Master of Science and Ph.D. degree levels.

Master of Science

Required Courses

The College offers a Master of Science degree in engineering and a Master of Science degree in aviation with three options: a. courses only option, b. project option, and c. thesis option.

The minimum requirement for all Master of Science degrees in engineering is 30 credit hours, including up to nine credit hours for thesis research or a project. Faculty advisors may tailor individual curriculum to satisfy the research goals of the students. Industry professionals may complete a course only degree, with 30 credit hours of course work. Up to 9 credit hours may be comprised of coursework at the 400 level. The remaining course work credits must be at the 500 or 600 level.

The variable credit hour requirements for thesis or project allows flexibility in meeting the needs of students with a variety of backgrounds. The traditional model for a research Master of Science degree includes 6-9 credit hours of thesis research.

Within these minimum requirements, individual faculty advisors may impose additional requirements or specific course requirements.

Degree Plan

Each new graduate student writes a Program of Study that must be approved by the faculty advisor and the Graduate Programs Director. That document will be prepared and reviewed in the context of the student's background and the student's career goals. In that flexible approach, each student will determine, with faculty advice and approval, a
unique set of courses and a specific plan for the thesis or project. This approach can accommodate students who want to continue for a Ph.D. degree, students who want to go into industry with a M.S. degree, and students who want to integrate other areas into their degrees - areas like business, the basic sciences, or other areas that fit into the student's individual career plans. The number of allowed transfer credit hours to the Master of Science graduate program is limited to 12 credit hours. The transfer credit hours must be approved by the department chair and the Graduate Programs Director to determine the quality and relevance of graduate courses taken elsewhere. Significant changes in the degree plan, as indicated on the Program of Study form, requires approval of the student's faculty advisor and the Graduate Programs Director.

Research

Students who are research oriented, and may continue for a Ph.D. degree, will undertake thesis research for 6-9 credit hours. This is the traditional option for Ph.D. students who want academic or other careers where a doctorate level degree is required. Other students who expect to enter or re-enter industry, and they will likely choose the project option, or the course only option. The project represents successfully planning, conducting, and completing an individual or team task. The nature of the project may be quite varied. It could produce a research result, a product prototype in hardware or software, or a solution to a problem in industry or academia. The project may also initiate a new line of inquiry or progress toward a new product or process. In any case, it should go beyond simply providing a learning experience; it should represent a new contribution to knowledge by the student who is working towards obtaining a Master of Science degree.

Career Paths

The various departments within Parks College provide a stimulating environment for graduate study. Several courses are taught by working professionals, such as from the Boeing Company. Some courses are typically offered in the early evenings to facilitate working engineers to enroll in the program. Classroom lectures are sometimes supplemented by guest lectures, laboratory demonstrations and field trips, as appropriate. Students are encouraged to publish the results of their thesis or project work in appropriate professional conferences and archival journals.

Doctor of Philosophy

Required Courses

The College offers a Ph.D. degree in engineering and a Ph.D. degree in aviation.

The doctoral degree program builds upon the Master of Science degree curriculum with additional course work focused on the research area of interest.

The engineering Ph.D. degree requires a total of 60 credit hours of course work and research activity beyond the Bachelor of Science degree, including 15-18 credit hours of dissertation research. Of the 60 credit hours, a maximum of nine credit hours may be comprised of course work at the 400 level; all other course work must be at the 500 or 600 level.

The aviation Ph.D. degree requires a total of 63 credit hours beyond the Bachelor of Science degree, including 12 credit hours of dissertation research, 15 credit hours in research methods, 9 credit hours in a secondary discipline, and 3 credit hours in graduate reading.

Those students who earn a Master of Science degree may include the Master of Science degree course credits, but not the thesis or project credits in the 60 or 63 credit hours which are required for the Ph.D. degree.
Additional Requirements

Doctoral students are evaluated in three formal examinations. At the end of the first year of full-time doctoral study at SLU, the Qualifying Examination will assess the background of the student. After the second year, a dissertation proposal will be the basis of the Proposal Examination, which focuses on dissertation research, but also allows faculty to assess the student's abilities in research and the student's academic strengths and weaknesses. The third examination is a Dissertation Defense. Some students will enter doctoral studies with research experience and with a Master of Science degree, and the estimated timing of these three exams will be part of the initial Program of Study. The timing may be modified with approval of the faculty advisor, and the Director of Graduate Programs.

The Qualifying Examination will focus on topics related to the required courses and the student’s general preparation for graduate study and research. All qualifying examinations will be arranged and administered by the associated department chair. The Qualifying Exam will normally be a written examination. The intent of this exam is to determine if the student is prepared to continue doctoral studies. The result of the exam may be a pass, no-pass, or conditional-pass. The associated department chair will report the results of the Qualifying Examination to the Graduate Programs Director. The conditional-pass will normally require that the student correct specific weaknesses, and modify the Program of Study accordingly.

A doctoral student will ordinarily develop a dissertation proposal under the supervision of the faculty advisor, and present at the Proposal Exam prior to the third year of studies. The guidance committee administers the dissertation proposal exam. The results are reported to the Graduate Program Director. On successfully completing the Proposal Exam, the student becomes a doctoral candidate.

Upon completion of the final dissertation document, a final public defense is held as a Dissertation Defense. Following the open forum seminar-style presentation, the student continues the defense in a private session with the guidance committee.

Normally, graduate students are expected to publish the results of their research with their faculty advisor. Although not a rigid requirement, Ph.D. degree candidates are expected to produce a minimum of one manuscript submitted for journal publication prior to completing their degree.

Every student entering the graduate program is assigned a faculty advisor. The student must file a proposed Program of Study normally prior to the end of the second semester of full-time doctoral study at SLU. The student's Program of Study is a schedule of academic and research work that has been carefully designed by the student in close consultation with the faculty advisor.

In regard to transfer credit hours for the Ph.D. degree, up to 30 credit hours may be transferred at the Master of Science degree level to contribute to the credit hour requirements for a Ph.D. level degree. At the post-Master of Science degree level, up to 9 credit hours may be transferred to contribute to the credit hour requirements for a Ph.D. level degree. In all three cases, the transferred credit hours and associated course work are reported on the Program of Study form, and are subject to approval by the faculty advisor, department chair, and Director of Graduate Programs.

Graduate Courses

AEROSPACE ENGINEERING
Interim Department Chair: Sridhar Condoor, Ph.D.

AENG 500: Seminar (0)
AENG 513: Introduction to Computational Fluid Dynamics (3)
AENG 514: Hypersonics (3)
AENG-515 Parachute Systems & Design (3)
AENG-516 Unsteady Aerodynamics of Bluff Bodies (3)
AENG 518: Applied Aerodynamics (3)
AENG 522: Flight Simulation (3)
AENG 532: Aeroelasticity (3)
ESCI 533: Composite Materials for Structure and Design (3)
AENG 541: Space Dynamics and Control (3)
AENG 551: Space Mission Failures (3)
AENG 553: Space Mission Analysis and Design (3)
AENG 554: Orbital Mechanics (3)
AENG 555: Guidance, Navigation and Estimation for Dynamic Vehicles (3)
AENG 556: Modern Control Systems (3)
AENG 557: Advanced Control Systems (3)
AENG 558 Autonomous Systems Design (3)
AENG 559: Advanced Space Mission Design (3)
AENG 593: Special Topics (1-3)
AENG 598: Independent Study (1-3)
AENG 599: Master’s Thesis Research (0-6)
AENG 698: Independent Study (1-3)
AENG 699: Doctoral Dissertation Research (0-6)

AVIATION SCIENCE COURSES
Department Chair: Stephen Belt, Ph.D.

Aviation Science Core
ASCI 521 Aviation Org. Theory and Management (3)
ASCI 522 Aviation Safety Programs (3)
ASCI 523 Professional Ethics and Standards (3)
ASCI 546 Qualitative Analysis (3)
ASCI 547 Quantitative Analysis (3)

Flight Operations Administration Track
FSCI 523 Economics of Air Transportation (3)
ASCI 601 Federal and International Regulatory Environment (3)
ASCI 602 Flight Operations Business and Administration (3)
ASCI 603 Aviation and Public Policy (3)

Collegiate Flight Education Track
EDL 564 The Student in Higher Education (3)
ASC 605 Legal and Ethical Issues in Collegiate Flight Education (3)
ASC 606 Aviation Curriculum Development and Management (3)
ASC 607 Aviation Training Methods and Practice (3)

BIOMEDICAL ENGINEERING COURSES
Interim Department Chair: Gary Bledsoe, Ph.D.

BME 500 Seminars (0)
BME 501 Current Topics I (1)
BME 502 Current Topics II (1)
BME 503 Current Topics III (2)
BME 504 Current Topics IV (2)
BME 510 Biomedical Signals (3)
BME 515 Sensory Neuroscience (3)
BME 520 Biomechanics (3)
BME 540 Tissue-Material Interfaces (3)
BME 541 Tissue Engineering (3)
BME 545 AFM Techniques and Training (3)
BME 550 Experimental Techniques and Design (0-2)
BME 560 Quantitative Physiology (3)
BME 580 Research Rotation (1-3)
BME 593 Special Topics (1-3)
BME 596 Masters Project (1-3)
BME 597 Research Topics (1-3)
BME 598 Independent Study (1-3)
BME 599 Masters Thesis Research (0-6)
BME 697 Research Topics (1-3)
BME 698 Independent Study (1-3)
BME 699 Doctoral Dissertation Research (0-6)

CIVIL ENGINEERING COURSES
Interim Department Chair: Riyadh Hindi, Ph.D., P.Eng.

Structures Track
CVNG 405/505 – Advanced Structural Analysis (3)
CVNG 407/507 – Structural Dynamics (3)
CVNG 409/509 – Advanced Reinforced Concrete (3)
CVNG 411/511 – Advanced Steel Design (3)
CVNG 413/513 – Bridge Engineering (3)
CVNG 515 – Prestressed Concrete (3)
CVNG 517 – Seismic Design (3)

**Environmental and Sustainable Engineering Track**

CVNG 419/519 – Sustainable Land Development Engineering (3)
CVNG 421/521 – Sustainable Water Management (3)
CVNG 423/523 – Biological Treatment Systems (3)
CVNG 425/525 – Physical/Chemical Treatment Systems (3)
CVNG 427/527 – Design of Wastewater Treatment Facilities (3)
CVNG 429/529 – Design of Drinking Water Treatment Facilities (3)
CVNG 431/531 – Air Pollution (3)
CVNG 433/533 – Solid and Hazardous Waste Regulation and Treatment (3)
CVNG 535 – Groundwater Analysis and Site Remediation (3)

**Geotechnical Engineering Track**

CVNG 437/537 – Slopes and Retaining Structures (3)
CVNG 439/539 – Advanced Geotechnical Engineering (3)
CVNG 541 – Soil Dynamics (3)
CVNG 543 – Foundation Engineering II (3)

**Transportation Analysis and Planning Track**

CVNG 445/545 – Traffic Engineering (3)
CVNG 447/547 – Urban Transportation Planning (3)
CVNG 449/549 – Data Management and Analysis (3)

**General Courses**

CVNG 500: Seminar (0)
CVNG 593 – Special Topics (1-3)
CVNG 596 – Master’s Project (1-3)
CVNG 599 – Master’s Thesis Research (0-6)
CVNG 699 – Doctoral Dissertation Research (0-6)

**ELECTRICAL AND COMPUTER ENGINEERING**

Department Chair: Huliyar Mallikarjuna, Ph.D.

ECE 500: Seminar (0)
ECE 510 Power Systems I
ECE 511 Power Systems II
ECE 520 Modern Control Theory
ECE 525 Hardware Software Co-design
ECE 526 Robotics
ECE 530 Advanced Semiconductor Devices
ECE 531 Low Noise Electronics Design
ECE 532 Analog Integrated Circuit Design
ECE 535 Digital IC Design
ECE 541 Radar System Design and Analysis
ECE 542 Microwave Theory and Techniques
ECE 543 Antenna Theory and Design
ECE 550 Advanced Filter Design
ECE 551 Image Processing
ECE 555 Stochastic Processing
ECE 560 Communication Systems
ECE 561 Spacecraft Communications
ECE 562 Cellular Communications
ECE 570 Energy Technologies I
ECE 593 Special Topics (1-3)
ECE 596 Master’s Project (3)
ECE 597 Research Topics (1-3)
ECE 598 Independent Study (1-3)
ECE 599 Master’s Thesis Research (0-6)
ECE 697 Research Topics (1-3)
ECE 698 Independent Study (1-3)
ECE 699 Doctoral Dissertation Research (0-6)

MECHANICAL ENGINEERING
Interim Department Chair: Sridhar Condoor, Ph.D.
MENG 500: Seminar (0)
MENG 501: Advanced Fluid Dynamics (3)
MENG 502: Technology Entrepreneurship (3)
MENG 503: Numerical Methods Using Matlab and Labview (3)
MENG 512: Experimental Methods in Fluid Dynamics (3)
MENG 517: Viscous Flows (3)
MENG 519: An Introduction to Turbulence (3)
ESCI 533: Composite Materials for Structure and Design (3)
MENG 534: Finite Element Analysis I (3)
MENG 535: Finite Element Analysis II (3)
MENG 536: Multidisciplinary Optimization (3)
MENG 537: Structural Reliability (3)
MENG 538: Advanced Mechanics of Solids (3)
MENG 539: Fracture Mechanics and Plasticity (3)
MENG 593: Special Topics (1-3)
MENG 598: Independent Study (1-3)
MENG 599: Master’s Thesis Research (0-6)
MENG 698: Independent Study (1-3)
MENG 699: Doctoral Dissertation Research (0-6)