

AEROSPACE ENGINEERING, B.S.

Saint Louis University's aerospace engineering curriculum provides hands-on experiences that complement theoretical knowledge. Faculty members incorporate innovative engineering experiences in the classroom that shape the student's mindset in order to become thoughtful leaders and change agents in society. Fluids, thermal, material, structural testing, space systems laboratory equipment and wind tunnels provide an excellent opportunity to integrate theory with real-world applications. State-of-the-art computer laboratories along with advanced software such as CREO, MATHCAD, MATLAB, STK, SC/Tetra CFD, CES Material Selector and Abaqus are available for design, modeling, simulation and analysis.

Students have several extracurricular opportunities to participate in national and international competitions and activities organized by AIAA, SAE, NASA and AFOSR and are involved in the activities of student chapters of AIAA, SAE, SWE and SLU Robotics. Innovative programs like the Monthly Innovation Challenge and the Grand Challenge Scholars Program help students acquire leadership skills and business acumen.

All students in the aerospace engineering program are exposed to entrepreneurship and the entrepreneurial mindset through the curriculum and extracurricular opportunities.

Additional program highlights include:

- Aerospace engineering students are given a well-rounded education and are taught not just technical skills but how to be innovative engineers and entrepreneurs.
- Undergraduate students have an opportunity to participate in research with faculty members in a range of areas from space systems to computational fluid dynamics.
- Aerospace engineering students have easy access to many state-of-the-art labs and research facilities, including the fluid systems lab that holds one supersonic wind tunnel and two subsonic wind tunnels.

Curriculum Overview

Students in SLU's aerospace engineering program gain a solid foundation of coursework in fundamental engineering sciences before progressing towards traditional aerospace engineering courses. The program offers technical electives in broader areas of aerospace engineering to provide opportunities for students to gain greater depth and understanding. These engineering fundamentals and aerospace topics integrate into a sequence of two capstone courses that provide greater depth in design.

Fieldwork and Research Opportunities

Other benefits of the aerospace engineering program include summer internships and cooperative education programs available with industry in the St. Louis area as well as nationwide.

SLU students have the opportunity to get hands-on, real-world experience in the Space Systems Research Lab as early as the first week of classes. In this lab students will design, construct and prepare cube satellites for launch.

Aerospace engineering majors also participate in national and international competitions and activities organized by the American

Institute of Aeronautics and Astronautics (AIAA), SAE International, NASA and RoboGames. Students can also get involved with student chapters of AIAA, SAE, National Society of Black Engineers, and the Society of Women Engineers.

Funded undergraduate and graduate research opportunities are available with faculty members in the program. Funded research grants ranging from private industries to federal government research laboratories are available for qualified students.

Careers

Corporations and government agencies where successful Parks aerospace engineering alumni can be found include:

- Boeing
- General Dynamics
- General Electric
- Hughes
- Lockheed Martin
- NASA, U.S. Air Force, Navy and Army research centers
- Northrop
- Pratt-Whitney
- Raytheon
- SpaceX

Admission Requirements

Freshman

All applications are thoroughly reviewed with the highest degree of individual care and consideration to all credentials that are submitted. Solid academic performance in college preparatory course work is a primary concern in reviewing a freshman applicant's file. College admission test scores (ACT or SAT) are used as an additional indicator of the student's ability to meet the academic rigors of Saint Louis University and are used as qualifiers for certain University scholarship programs. To be considered for admission to any Saint Louis University undergraduate program, the applicant must be graduating from an accredited high school or have an acceptable score on the General Education Development (GED) test.

Transfer

Applicants must be a graduate of an accredited high school or have an acceptable score on the GED. An official high school transcript and official test scores are required only of those students who have attempted fewer than 24 transferable semester credits (or 30 quarter credits) of college credit. Those having completed 24 or more of college credit need only submit a transcript from previously attended college(s). In reviewing a transfer applicant's file, the office of admission holistically examines the student's academic performance in college-level coursework as an indicator of the student's ability to meet the academic rigors of Saint Louis University.

International Applicants

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/undergraduate/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.

Additional Admission Requirements

In addition to the general admission and matriculation requirements of the University, Parks College engineering programs have the following additional requirements:

- GPA: Minimum cumulative 3.00 high school GPA for freshmen applicants and 2.70 college GPA for transfer applicants.
- ACT/SAT: ACT composite score of 24 or higher, or SAT composite score of 1160 or higher. ACT sub scores minimums of 22 in English, 24 in Mathematics, 22 in Reading Comprehension and 22 in Scientific Reasoning, or SAT Math sub score of 620.
- Coursework: Fifteen total units of high school work are required: three or four units of English; four or more units of mathematics including algebra I and II, geometry and precalculus (Algebra II with Trigonometry is not sufficient). Students should be prepared to start the first semester freshmen year in Calculus I or higher; three or four units of science including general science, introduction to physical science, earth science, biology, physics or chemistry; two or three units of social sciences including history, psychology or sociology; and three units of electives.

Admission requirements to Parks College of Engineering, Aviation and Technology degree programs are based on a combination of secondary school grades, college admission test scores, co-curricular activities and attempted college course work, as well as other indicators of the applicant's ability, career focus and character. This process respects the non-discrimination policy of the University and is designed to select a qualified, competent and diverse student body with high standards of scholarship and character, consistent with the mission of the University.

Scholarships and Financial Aid

There are two principal ways to help finance a Saint Louis University education:

- Scholarships: awarded based on academic achievement, service, leadership and financial need.
- Financial Aid: provided in the form of grants and loans, some of which require repayment.

For priority consideration for merit-based scholarships, applicants should apply for admission by Dec. 1 and complete a Free Application for Federal Student Aid (FAFSA) by March 1.

For information on other scholarships and financial aid, visit the student financial services office online at <http://finaid.slu.edu>.

Accreditation

The Aerospace Engineering, Biomedical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Engineering Physics and Mechanical Engineering undergraduate curricula are accredited

by the Engineering Accreditation Commission of ABET, www.abet.org (<https://www.abet.org>).

Enrollment and graduation data for aerospace engineering is listed here (<https://www.slu.edu/parks/pdfs/aerospace-engineering-enrollment-and-graduation-data.pdf>)

Learning Outcomes

The undergraduate engineering programs are accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

Program Educational Objectives

The undergraduate program is designed to meet the following specific objectives in order to fulfill the departmental and institutional missions.

- To practice the principles of engineering in aerospace or allied organizations
- To pursue further learning in aerospace engineering or in allied disciplines
- To function as effective engineers with professional knowledge, skills and values

Student Outcomes

Graduates of the aerospace engineering program at Saint Louis University will demonstrate:

- an ability to apply knowledge of mathematics, science, and engineering;
- an ability to design and conduct experiments, as well as to analyze and interpret data;
- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- an ability to function on multi-disciplinary teams;
- an ability to identify, formulate, and solve engineering problems;
- an understanding of professional and ethical responsibility;
- an ability to communicate effectively;
- the broad education necessary to understand the impact of engineering solutions in a global and societal context;
- a recognition of the need for, and an ability to engage in life-long learning;
- a knowledge of contemporary issues;
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Requirements

Code	Title	Credits
Basic Engineering		
CSCI 1060	Introduction to Computer Science: Scientific Programming	3
ECE 2001 & ECE 2002	Introduction to Electrical Engineering and Electrical Engineering Lab	4
Engineering Science Courses		
ESCI 2100	Statics	3
ESCI 2150	Dynamics	3
ESCI 2300	Thermodynamics	3
ESCI 3100 & ESCI 3101	Mechanics of Solids and Mechanics of Solids Lab	4
ESCI 3110	Linear Vibrations	3

ESCI 3200 & ESCI 3201	Fluid Dynamics and Fluid Dynamics Laboratory	4
ESCI 3410	Analysis & Cntrl of Linear Sys	3
MENG 2011	Engineering Shop Practice	1
Aerospace Engineering Courses		
AENG 1001	Introduction to Aerospace & Mechanical Engineering	1
AENG 1002	Computer-Aided Engineering Design	1
AENG 2000	Intro to Aeronautics & Astron	3
AENG 3000	Performance	3
AENG 3100	Computer Aided Engineering	3
AENG 3150	Astrodynamics	3
AENG 3210	Gas Dynamics	3
AENG 3220	Aerodynamics	3
AENG 4004	Flight Vehicle Analys & Dsgn I	3
AENG 4014	Flight Vehicle Analy & Dsgn II	3
AENG 4110	Flight Vehicle Structures	3
AENG 4111	Aerospace Laboratory	1
AENG 4210	Propulsion	3
MENG 4300	Heat Transfer	3
AENG 4400	Stability and Control	3
Technical Electives		
Select 6 credits from an approved AE/ME list each semester. ¹		6
Basic Science & Mathematics		
CHEM 1110 & CHEM 1115	General Chemistry 1 and General Chemistry 1 Laboratory	4
PHYS 1610 & PHYS 1620	Engineering Physics I and Engineering Physics I Laboratory	4
PHYS 1630 & PHYS 1640	Engineering Physics II and Engineering Physics II Laboratory	4
MATH 1510	Calculus I	4
MATH 1520	Calculus II	4
MATH 2530	Calculus III	4
MATH 3550	Differential Equations	3
MATH 3270	Advanced Mathematics for Engineers	3
Math/Science Elective		
Select one 3-credit course from the AE/ME Department approved list.		3
Written and Oral Communication		
ENGL 1920	Advanced Writing for Professionals	3
Liberal Arts		
THEO 1000	Theological Foundations	3
PHIL 3400	Ethics & Engineering	3
Cultural Diversity ²		3
Humanistic Values Electives ³		6
Total Credits		127

¹ Technical electives provide an opportunity to expand the horizon of each student's program major or in areas related to program major. Students are encouraged to take courses at 4000-level in the area of program major or a 3000-level or above in allied disciplines. Allied disciplines include courses in engineering other than student's major, Mathematics – MATH, Computer Science – CSCI, Management – MGT, Pre-Law – PLS, Physics – PHYS, Chemistry – CHEM and Biology – BIOL. The student may also do a project or research independent study with a faculty member and it is considered as equivalent to technical elective. The courses or independent study in these areas should be beyond the required courses within the curriculum.

² Cultural Diversity elective courses must be selected from an approved Arts & Sciences list. See the description of the Parks College core for more information.

³ Humanistic Values courses shall be chosen from: Humanities or Social & Behavioral Sciences.

Humanities courses include Fine Arts (excludes applied, studio, and performance courses), Literature (ENGL2000-ENGL 2600 Introduction to Short Fiction (3 cr), ENGL3000-ENGL3950, ENGL 4100 History of the English Language (3 cr)-ENGL 4790 American Drama (3 cr)), History, American Studies and Foreign Languages (excludes English or native language), Philosophy or Theology.

Social & Behavioral Sciences courses include Anthropology, Communication, Communication Sciences and Disorders, Criminology and Criminal Justice, Economics, Education, Political Science, Psychology, Sociology, Social Work or Public Health.

Continuation Standards

Students must maintain a minimum 2.00 GPA.

Roadmap

Roadmaps are recommended semester-by-semester plans of study for programs and assume full-time enrollment unless otherwise noted.

Courses and milestones designated as critical (marked with !) must be completed in the semester listed to ensure a timely graduation. Transfer credit may change the roadmap.

This roadmap should not be used in the place of regular academic advising appointments. All students are encouraged to meet with their advisor/mentor each semester. Requirements, course availability and sequencing are subject to change.

Course	Title	Credits
Year One		
Fall		
AENG 1001	Introduction to Aerospace & Mechanical Engineering	1
CHEM 1110 & CHEM 1115	General Chemistry 1 and General Chemistry 1 Laboratory	4
ENGL 1920	Advanced Writing for Professionals	3
MATH 1510	Calculus I (! requires proficiency exam; must earn a grade of C- or above)	4
THEO 1000	Theological Foundations	3
Credits		15
Spring		
AENG 1002	Computer-Aided Engineering Design	1

CSCI 1060	Introduction to Computer Science: Scientific Programming	3
MATH 1520	Calculus II (must earn a grade of C- or above)	4
PHYS 1610 & PHYS 1620	Engineering Physics I and Engineering Physics I Laboratory	4
	Humanistic Values Elective ³	3
	Credits	15

Year Two**Fall**

AENG 2000	Intro to Aeronautics & Astron	3
MENG 2011	Engineering Shop Practice	1
MATH 2530	Calculus III	4
PHYS 1630 & PHYS 1640	Engineering Physics II and Engineering Physics II Laboratory	4
	Humanistic Values Elective ³	3
	Credits	15

Spring

ESCI 2100	Statics	3
ESCI 2150	Dynamics	3
ESCI 2300	Thermodynamics	3
ESCI 3200 & ESCI 3201	Fluid Dynamics and Fluid Dynamics Laboratory	4
MATH 3550	Differential Equations	3
	Credits	16

Year Three**Fall**

AENG 3000	Performance	3
ECE 2001 & ECE 2002	Introduction to Electrical Engineering and Electrical Engineering Lab	4
ESCI 3100 & ESCI 3101	Mechanics of Solids and Mechanics of Solids Lab	4
ESCI 3110	Linear Vibrations	3
MATH 3270	Advanced Mathematics for Engineers	3
	Credits	17

Spring

AENG 3100	Computer Aided Engineering	3
AENG 3150	Astrodynamics	3
AENG 3210	Gas Dynamics	3
AENG 3220	Aerodynamics	3
ESCI 3410	Analysis & Cntrl of Linear Sys	3
	Math/Science Elective	3
	Credits	18

Year Four**Fall**

AENG 4004	Flight Vehicle Analys & Dsgn I	3
! AENG 4110 & AENG 4111	Flight Vehicle Structures and Aerospace Laboratory	4
AENG 4210	Propulsion	3
AENG 4400	Stability and Control	3
MENG 4300	Heat Transfer	3
	Credits	16

Spring

AENG 4014	Flight Vehicle Analy & Dsgn II	3
PHIL 3400	Ethics & Engineering	3
	Cultural Diversity Elective ²	3
	Technical Elective ¹	3
	Technical Elective ¹	3
	Credits	15
	Total Credits	127

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