Aerospace Engineering, B.S.

The Saint Louis University Department of Aerospace and Mechanical Engineering offers an undergraduate program in aerospace engineering that equips students to shape the future by incorporating the latest industry trends and immersive experiential coursework.

A robust foundation in aerospace engineering concepts coupled with cross-disciplinary teamwork sets SLU students apart not only as problem solvers but also as ethical innovators and leaders by becoming aware of the impact of engineering decisions in the context of the environment and society. Our program provides students with a comprehensive education in aerospace engineering with a focus on systems design.

Program Highlights

• Celebrating 90 years of aerospace engineering excellence.

• Curriculum: Strong foundation in engineering sciences, followed by structures, thermal fluids, dynamics, and controls, aeronautical, astronomical, and design courses with flexible elective courses in cutting-edge disciplines and technologies.

• Career focus: Preparation for careers in aerospace engineering, both in aeronautics and astronautics, and graduate studies.

• Global reach: The campus in Madrid provides students with a unique international experience and opportunities for study abroad. These opportunities are available anytime during the first two years.

• Experiential learning: Our curriculum emphasizes hands-on learning from day one with a focus on practical experience and proactive engagement through design projects and research endeavors. A commitment to innovation, entrepreneurship, service learning, diversity, equity, inclusion and teamwork is a part of the student experience.

• Capstone design experience: Two-semester capstone experience focusing on aerospace vehicle design from requirement development to prototyping.

• Research opportunities: Students can access a wide range of funded and voluntary research opportunities, collaborating closely with dedicated faculty members on diverse research projects.

• Cutting-edge facilities: State-of-the-art labs and equipment, including the WIND wind tunnel lab, AirCRAFT lab, and Space Systems Research lab.

• Student engagement that fosters diversity and inclusion: Our students have an opportunity to join active student organizations, participate in national and international competitions, and collaborate with faculty on research projects. Student organizations actively lead initiatives, organizing outreach events to promote the involvement of underrepresented groups in engineering.

• Dedicated faculty and staff: Faculty, staff and students form a learning community that supports individual excellence and shared accomplishment.

Curriculum Overview

We take pride in our innovative aerospace engineering curriculum, carefully crafted to offer students a holistic education that seamlessly integrates theoretical knowledge with experiential learning. Our program stands out for its exceptional faculty, dedicated staff, and access to a wide range of cutting-edge equipment and facilities, creating an immersive environment where students can immediately apply their knowledge to real-world scenarios.

Fieldwork and Research Opportunities

SLU’s aerospace engineering program benefits include summer internships and cooperative education programs available with industry, and federal labs in the St. Louis area and nationwide. These sites include NASA, the U.S. Department of Defense, the Boeing Company, Lockheed Martin Corporation and Northrop Grumman. Further, students can count the internship experience toward a technical elective by documenting their learning.

Funded undergraduate and graduate research opportunities with faculty members in the program are available for qualified students. Funded opportunities range from private industries to federal government research laboratories. Initiatives like SURGE and FIRE offer undergraduates hands-on research experiences, allowing them to work in university labs and apply their learning in practical settings, thereby enhancing their academic journey.

Careers

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

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

Admission Requirements

Begin Your Application (https://www.slu.edu/apply.php)

Saint Louis University also accepts the Common Application.

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 coursework is a primary concern in reviewing a freshman applicant’s file.

To be considered for admission to any Saint Louis University undergraduate program, applicants must be graduating from an
accredited high school, have an acceptable HiSET exam score or take 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.

Students who have attempted fewer than 24 semester credits (or 30 quarter credits) of college credit must follow the above freshmen admission requirements. Students who have completed 24 or more semester credits (or 30 quarter credits) of college credit must submit transcripts from all 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. Where applicable, transfer students will be evaluated on any courses outlined in the continuation standards of their preferred major.

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

- Demonstrate English Language Proficiency (https://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, applicants to SLU's engineering programs must meet the following requirements:

- **GPA**: Minimum cumulative 3.00 high school GPA for freshmen applicants and 2.70 college GPA for transfer applicants.
- **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 of 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 to the School of Science and Engineering’s degree programs is based on a combination of secondary school grades, college admission test scores, co-curricular activities and attempted college coursework, 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.

**Tuition**

<table>
<thead>
<tr>
<th>Tuition</th>
<th>Cost Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate Tuition</td>
<td>$54,760</td>
</tr>
</tbody>
</table>

Additional charges may apply. Other resources are listed below:

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

**Scholarships and Financial Aid**
There are two principal ways to help finance a Saint Louis University education:

- **Scholarships**: Scholarships are awarded based on academic achievement, service, leadership and financial need.
- **Financial Aid**: Financial aid is provided through grants and loans, some of which require repayment.

Saint Louis University makes every effort to keep our education affordable. In fiscal year 2023, 99% of first-time freshmen and 92% of all students received financial aid (https://www.slu.edu/financial-aid/) and students received more than $459 million in aid University-wide.

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

For information on other scholarships and financial aid, visit www.slu.edu/financial-aid/ (https://www.slu.edu/financial-aid/).

**Accreditation**

Enrollment and Graduation Data for Aerospace Engineering (https://www.slu.edu/science-and-engineering/about/pdfs/ae-enrollment-graduation-data.pdf)

**Learning Outcomes**

**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 have an ability to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science and mathematics.
2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Communicate effectively with a range of audiences.
4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.

## Requirements

### Code | Title | Credits
--- | --- | ---
**University Undergraduate Core** ([https://catalog.slu.edu/academic-policies/academic-policies-procedures/university-core/](https://catalog.slu.edu/academic-policies/academic-policies-procedures/university-core/))

### Basic Engineering
- CSCI 1060 | Introduction to Computer Science: Scientific Programming | 3
- ECE 1100 | Electrical Engineering 101 | 2
- ECE 1200 | Computer Engineering 101 | 2
- SE 1700 & SE 1701 | Engineering Fundamentals and Engineering Fundamentals Studio | 3

### General Engineering Courses
- MENG 1011 | Prototyping | 1
- MENG 2100X | Statics | 3
- MENG 2150 | Dynamics | 3
- MENG 2310 | Thermodynamics | 3
- MENG 3105 | Mechanics of Solids | 3
- MENG 3110 | Linear Vibrations | 3
- MENG 3111 | Mechanics Laboratory | 1
- MENG 3200 | Fluid Dynamics | 3
- AENG 3410 | Analysis and Control of Linear Systems | 3
- MENG 3510X | Materials Science | 3

### Aerospace Engineering Courses
- AENG 2020 | Introduction to Aero and Astro Engineering | 1
- AENG 3000 | Performance | 3
- AENG 3050 | Design of Space Missions | 3

| Code | Title | Credits
--- | --- | ---
AENG 3150 | Astrodynamics | 3
AENG 3230 | Compressible Flow | 3
AENG 3240 | Aerodynamics and Boundary Layer Flow | 3
AENG 4004 | Flight Vehicle Analysis and Design I | 3
AENG 4014 | Flight Vehicle Analysis and Design II | 3
AENG 4110 | Flight Vehicle Structures | 3
AENG 4111 | Aerospace Laboratory | 1
AENG 4210 | Propulsion | 3
AENG 4400 | Stability and Control | 3

### Technical Electives
Select 9 credits from an approved AE list

### Basic Science & Mathematics
- CHEM 1110 | General Chemistry I | 4
- & CHEM 1115 and General Chemistry I Laboratory | 4
- PHYS 1610 | University Physics I | 4
- & PHYS 1620 and University Physics I Laboratory | 4
- PHYS 1630 | University Physics II | 4
- & PHYS 1640 and University 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

### Total Credits
131-134

## Non-Course Requirements
All Science and Engineering B.A. and B.S. students must complete an exit interview/survey near the end of their bachelor's program.

### Continuation Standards
Students must maintain a minimum 2.00 GPA.

1 Acceptable technical electives are courses at the 4000 level in the area of program major or the 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 an approved project or research independent study with a faculty member, or an approved internship with industry.

## 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.
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year One</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE 1700</td>
<td>Engineering Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>&amp; SE 1701</td>
<td>and Engineering Fundamentals Studio</td>
<td></td>
</tr>
<tr>
<td>CHEM 1110</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 1115</td>
<td>and General Chemistry I Laboratory</td>
<td></td>
</tr>
<tr>
<td>CORE 1500</td>
<td>Cura Personalis 1: Self in Community</td>
<td>1</td>
</tr>
<tr>
<td>CORE 1600</td>
<td>Ultimate Questions: Theology</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1510</td>
<td>Calculus I (requires proficiency exam; must earn a grade of C- or above)</td>
<td>4</td>
</tr>
<tr>
<td>CORE 1900</td>
<td>Eloquienia Perfecta 1: Written and Visual Communication</td>
<td>3</td>
</tr>
<tr>
<td><strong>Year Two</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AENG 2020</td>
<td>Introduction to Aero and Astro Engineering</td>
<td>1</td>
</tr>
<tr>
<td>MENG 2310</td>
<td>Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 1630</td>
<td>University Physics I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; PHYS 1640</td>
<td>and University Physics I Laboratory</td>
<td></td>
</tr>
<tr>
<td>MENG 3105</td>
<td>Mechanics of Solids</td>
<td>3</td>
</tr>
<tr>
<td>CORE</td>
<td>Eloquienia Perfecta: Creative Expression</td>
<td>1-3</td>
</tr>
<tr>
<td>MATH 2530</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSCI 1060</td>
<td>Introduction to Computer Science: Scientific Programming</td>
<td>3</td>
</tr>
<tr>
<td>MENG 1011</td>
<td>Prototyping</td>
<td>1</td>
</tr>
<tr>
<td>MATH 1520</td>
<td>Calculus II (must earn a grade of C- or above)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 1610</td>
<td>University Physics I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; PHYS 1620</td>
<td>and University Physics II Laboratory</td>
<td></td>
</tr>
<tr>
<td>MENG 2100X</td>
<td>Statics</td>
<td>3</td>
</tr>
<tr>
<td>CORE 1200</td>
<td>Eloquienia Perfecta 2: Oral and Visual Communication</td>
<td>3</td>
</tr>
<tr>
<td><strong>Year Three</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AENG 3230</td>
<td>Compressible Flow</td>
<td>3</td>
</tr>
<tr>
<td>AENG 3150</td>
<td>Astrodynamics</td>
<td>3</td>
</tr>
<tr>
<td>MENG 3510X</td>
<td>Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>MENG 3110</td>
<td>Linear Vibrations</td>
<td>3</td>
</tr>
<tr>
<td>MENG 3111</td>
<td>Mechanics Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>MATH 3270</td>
<td>Advanced Mathematics for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CORE</td>
<td>Equity and Global Identities: Identities in Context</td>
<td>0-3</td>
</tr>
<tr>
<td><strong>Year Four</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AENG 4004</td>
<td>Flight Vehicle Analysis and Design I</td>
<td>3</td>
</tr>
<tr>
<td>AENG 4110</td>
<td>Flight Vehicle Structures</td>
<td>3</td>
</tr>
<tr>
<td>AENG 4400</td>
<td>Stability and Control</td>
<td>3</td>
</tr>
<tr>
<td>AENG 4210</td>
<td>Propulsion</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>AENG 4111</td>
<td>Aerospace Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CORE</td>
<td>Eloquienia Perfecta: Writing Intensive</td>
<td>0-3</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AENG 4014</td>
<td>Flight Vehicle Analysis and Design II</td>
<td>3</td>
</tr>
<tr>
<td>AENG 3050</td>
<td>Design of Space Missions</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>CORE</td>
<td>Reflection-in-Action</td>
<td>0-3</td>
</tr>
<tr>
<td>CORE 3400</td>
<td>Ways of Thinking: Aesthetics, History, and Culture</td>
<td>3</td>
</tr>
<tr>
<td>CORE</td>
<td>Equity and Global Identities: Dignity, Ethics, and a Just Society</td>
<td>0-3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td></td>
<td>127-144</td>
</tr>
</tbody>
</table>

1. Acceptable technical electives are courses at the 4000 level in the area of program major or the 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 an approved project or research independent study with a faculty member, or an approved internship with industry.

2+SLU programs provide a guided pathway for students transferring from a partner institution.

- Aerospace Engineering, B.S. (STLCC 2+SLU) (https://catalog.slu.edu/academic-policies/office-admission/undergraduate/2plus slu/stlcc/aerospace-engineering/)