

# MECHANICAL ENGINEERING, B.S.

The mechanical engineering curriculum provides hands-on experiences that complement theoretical knowledge. Faculty members incorporate innovative engineering experiences in the classroom that shape the mindset, so students become thought leaders and change agents in the society. Working with fluids, thermal, material, structural testing, mechatronics and robotics equipment provide an excellent opportunity to integrate theory with real-world applications. Students learn computer aided manufacturing methods using a number of rapid prototype machines along with a high-speed machining center. 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.

Additionally, students have several extracurricular opportunities to participate in national and international competitions and activities organized by ASME, SAE, NASA and RoboGames and are involved in the activities of student chapters of ASME, 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 mechanical engineering program are exposed to entrepreneurship and the entrepreneurial mindset through the curriculum and extracurricular opportunities.

Additional program highlights include:

- Mechanical engineering students are given a well-rounded education and taught not just technical skills but how to be innovative engineers and entrepreneurs in their fields.
- Students have tremendous opportunities to participate in hands-on activities and networking events with industry professionals through a range extracurricular clubs and activities, including the American Society of Mechanical Engineers, the Parks Racing Club, and the Society of Women Engineers.
- Students have a unique opportunity to work directly alongside faculty members on research projects.

## Curriculum Overview

Students of the mechanical engineering program at Parks College will gain a solid foundation in the fundamental engineering sciences before progressing towards traditional mechanical engineering courses. The program offers technical electives in broader areas of structures, thermal fluids, and design engineering to provide opportunities for students to gain greater depth of understanding.

These engineering fundamentals and mechanical topics are then integrated into a sequence of two capstone design courses during senior year that provide greater depth in design. Students will learn the importance of design decisions not only on product design but on society as a whole. Well-equipped laboratory facilities emphasize measurement techniques and experimental methods that allow the student to verify the theory learned in the classroom.

The curriculum is designed to prepare students for professional careers in several fields of mechanical engineering involving product

development and manufacturing. The curriculum also provides excellent preparation for graduate studies.

## Fieldwork and Research Opportunities

Benefits of the mechanical engineering program also include several internship and career opportunities. Summer internships and cooperative education programs are available with industry in the St. Louis region as well as nationwide.

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

## Careers

Industry and government agencies have long recognized the quality of mechanical engineering graduates from Saint Louis University's Parks College. Successful alumni have found employment at corporations and government agencies such as:

- Boeing
- General Dynamics
- General Electric
- NASA
- Nooter/Eriksen
- Textron Systems
- 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](http://www.abet.org) (<https://www.abet.org>).

Enrollment and graduation data for mechanical engineering is listed here (<https://www.slu.edu/parks/pdfs/2018-mechanical-engineering-enrollment-and-graduation-data.pdf>)

## Learning Outcomes

The undergraduate mechanical engineering program is 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 mechanical or allied organizations
- To pursue further learning in mechanical engineering or in allied disciplines
- To function as effective engineers with professional knowledge, skills, and values

### Student Outcomes

- 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
<b>Basic Engineering</b>		
CSCI 1060	Introduction to Computer Science: Scientific Programming	3
ECE 2001 & ECE 2002	Introduction to Electrical Engineering and Electrical Engineering Lab	4
<b>Engineering Science Courses</b>		
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

**Mechanical Engineering Courses**

MENG 1001	Introduction to Aerospace & Mechanical Engineering	1
MENG 1002	Computer-Aided Engineering Design	1
MENG 2000	Foundation to Engineering Design	3
MENG 2300	Applied Thermodynamics	3
MENG 2600	Manufacturing Process	3
MENG 3001	Mechanical Engineering Lab	1
MENG 3010	Machine Design	3
AENG 3100	Computer Aided Engineering	3
MENG 3430	Measurements	3
MENG 3510	Material Science	3
MENG 4004	Design I	3
MENG 4014	Design II	3
MENG 4300	Heat Transfer	3
MENG 4450	Principles of Mechantronics	3

**Technical Electives**

Select six credits from an approved AE/ME list each semester. <sup>1</sup> 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 Electives**

Select one 3-credit courses 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 <sup>2</sup>		3
Humanistic Values Elective <sup>3</sup>		6

Total Credits 124

<sup>1</sup> 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.

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

<sup>3</sup> 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
<b>Year One</b>		
<b>Fall</b>		
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
MENG 1001	Introduction to Aerospace & Mechanical Engineering	1
THEO 1000	Theological Foundations	3
Credits		15
<b>Spring</b>		
CSCI 1060	Introduction to Computer Science: Scientific Programming	3

MATH 1520	Calculus II (must earn a grade of C- or above)	4
MENG 1002	Computer-Aided Engineering Design	1
PHYS 1610 & PHYS 1620	Engineering Physics I and Engineering Physics I Laboratory	4
	Humanistic Values Elective <sup>3</sup>	3
	Credits	15

**Year Two****Fall**

ESCI 2100	Statics	3
ESCI 2300	Thermodynamics	3
MATH 2530	Calculus III	4
MENG 2011	Engineering Shop Practice	1
PHYS 1630 & PHYS 1640	Engineering Physics II and Engineering Physics II Laboratory	4
	Credits	15

**Spring**

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
MENG 2000	Foundation to Engineering Design	3
MENG 2300	Applied Thermodynamics	3
MENG 2600	Manufacturing Process	3
	Credits	17

**Year Three****Fall**

AENG 3100	Computer Aided Engineering	3
ESCI 2150	Dynamics	3
ESCI 3200 & ESCI 3201	Fluid Dynamics and Fluid Dynamics Laboratory	4
MATH 3550	Differential Equations	3
	Humanistic Values Elective <sup>3</sup>	3
	Credits	16

**Spring**

ESCI 3110	Linear Vibrations	3
MATH 3270	Advanced Mathematics for Engineers	3
MENG 3001	Mechanical Engineering Lab	1
MENG 3010	Machine Design	3
MENG 3430	Measurements	3
MENG 3510	Material Science	3
	Credits	16

**Year Four****Fall**

ESCI 3410	Analysis & Cntrl of Linear Sys	3
MENG 4004	Design I	3
MENG 4450	Principles of Mechantronics	3
	Math/Science Elective	3
	Technical Elective <sup>1</sup>	3
	Credits	15

**Spring**

MENG 4014	Design II	3
MENG 4300	Heat Transfer	3

PHIL 3400	Ethics & Engineering	3
	Technical Elective <sup>1</sup>	3
	Cultural Diversity Elective <sup>2</sup>	3
	Credits	15
	Total Credits	124

<sup>1</sup> 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.

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

<sup>3</sup> 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.