COMPUTER ENGINEERING, B.S.

Saint Louis University’s Parks College of Engineering, Aviation and Technology offers a unique, hands-on undergraduate program culminating in a Bachelor of Science in computer engineering. The program provides a curriculum that incorporates analysis, design and development of computer systems containing hardware and software components.

The curriculum provides graduates with necessary skills for entry into the profession as productive and effective engineers or to pursue graduate education.

An additional feature of the program is that all students are exposed to entrepreneurship and the entrepreneurial mindset through the curriculum and extracurricular opportunities.

Additional program highlights include:

- The hands-on nature of the curriculum allows computer engineering students to apply theoretical concepts to practical applications. Students begin conducting experiments in labs during their freshman year.
- Students have the opportunity to work with faculty on research programs, enhancing their educational experience and preparing them for industry.
- Computer engineering students are given a well-rounded approach that teaches not only technical skills but the business side of engineering as well.

Curriculum Overview

The program coursework provides students with both breadth and depth in computer engineering. The program develops a student’s ability to apply knowledge of mathematics, sciences and computer engineering to find solutions to practical problems. It ensures that graduates have an opportunity to work on multidisciplinary teams and develop effective communication skills.

In addition to a strong focus on computer skills and computer hardware and software, the program provides a broad design experience which is integrated throughout the program by introducing fundamental elements of the design process in coursework. The program also includes a two-semester design sequence to provide a meaningful and significant engineering design experience that focuses on and prepares students for professional practice.

Fieldwork and Research Opportunities

Benefits of the computer engineering program also include several internship, research and career opportunities. Students are encouraged and assisted in obtaining summer internships with local and global companies through career services.

Undergraduate research opportunities within the college are available during the summer or regular semesters. Undergraduate students are also encouraged to seek opportunities for research with faculty of the program or faculty in other programs.

Careers

As a computer engineer, there are a variety of career paths spanning industrial or consulting positions. Students are also prepared for graduate school and professional schools such as law, business administration or medicine.

Graduates have found employment at such companies as:

- Amazon
- AT&T
- Boeing
- Department of Defense
- Emerson Electric
- Garmin
- General Motors
- Intel
- Rockwell
- Samsung
- Texas Instruments
- U.S. Air Force

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.
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


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

Learning Outcomes

The undergraduate computer 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.

- Our graduates will have acquired advanced degrees or are engaged in advanced study in engineering, business, law, medicine or other appropriate fields.
- Our graduates will have established themselves as practicing engineers in electrical, computer or related engineering fields.
- Our graduates will be filling the technical needs of society by solving engineering problems using electrical or computer engineering principles, tools, and practices.

Student Outcomes

Student outcomes are defined by ABET as the skills that graduates will attain at the time of graduation. Student outcomes are listed below:

a. an ability to apply knowledge of mathematics, science, and engineering;
b. an ability to design and conduct experiments, as well as to analyze and interpret data;
c. 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;
d. an ability to function on multi-disciplinary teams;
e. an ability to identify, formulate, and solve engineering problems;
f. an understanding of professional and ethical responsibility;
g. an ability to communicate effectively;
h. the broad education necessary to understand the impact of engineering solutions in a global and societal context;
i. a recognition of the need for, and an ability to engage in life-long learning;
j. a knowledge of contemporary issues;
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<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>PHYS 1610</td>
<td>Engineering Physics I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; PHYS 1620</td>
<td>and Engineering Physics I Laboratory</td>
<td></td>
</tr>
<tr>
<td>PHYS 1630</td>
<td>Engineering Physics II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; PHYS 1640</td>
<td>and Engineering Physics II Laboratory</td>
<td></td>
</tr>
<tr>
<td>MATH 1660</td>
<td>Discrete Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1510</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1520</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>MATH 2530</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 3110</td>
<td>Linear Algebra for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3550</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3052</td>
<td>Probability and Random Variables for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 1920</td>
<td>Advanced Writing for Professionals</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 1300</td>
<td>Introduction to Object-Oriented Programming</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2100</td>
<td>Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2300</td>
<td>Object-Oriented Software Design</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 3500</td>
<td>Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 3400</td>
<td>Ethics &amp; Engineering</td>
<td>3</td>
</tr>
<tr>
<td>THEO 1000</td>
<td>Theological Foundations</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3090</td>
<td>Junior Design</td>
<td>1</td>
</tr>
<tr>
<td>CSCI 3100</td>
<td>Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 3200</td>
<td>Programming Languages</td>
<td>3</td>
</tr>
</tbody>
</table>

**Written and Oral Communication**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 3820</td>
<td>Computer Graphics I</td>
<td></td>
</tr>
<tr>
<td>CSCI 3710</td>
<td>Databases</td>
<td></td>
</tr>
<tr>
<td>CSCI 3200</td>
<td>Programming Languages</td>
<td></td>
</tr>
<tr>
<td>CSCI 4550</td>
<td>Advanced Operating Systems</td>
<td></td>
</tr>
<tr>
<td>CSCI 3760</td>
<td>Artificial Intelligence</td>
<td></td>
</tr>
</tbody>
</table>

**Technical Elective**
Select one 3-credit course

**Internship and Co-op**
Although not required, students can elect to participate in an internship or cooperative experience before graduation.

Select from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 2910</td>
<td>Co-op in ECE</td>
<td></td>
</tr>
<tr>
<td>ECE 3910</td>
<td>Co-op with Industry</td>
<td></td>
</tr>
<tr>
<td>ECE 4910</td>
<td>Co-Op with Industry</td>
<td></td>
</tr>
<tr>
<td>ECE 2915</td>
<td>Internship with Industry</td>
<td></td>
</tr>
<tr>
<td>ECE 3915</td>
<td>Internship with Industry</td>
<td></td>
</tr>
<tr>
<td>ECE 4915</td>
<td>Internship with Industry</td>
<td></td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 1001</td>
<td>Introduction to Electrical and Computer Engineering</td>
<td>1</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 1 Laboratory</td>
<td></td>
</tr>
<tr>
<td>ENGL 1920</td>
<td>Advanced Writing for Professionals</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1510</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>THEO 1000</td>
<td>Theological Foundations</td>
<td>3</td>
</tr>
</tbody>
</table>

**Credits**

6

1 Cultural Diversity, Humanities, Social and Behavioral Science must be selected from an approved list.

2 One 3 credit course selected from an approved list in science, mathematics, or engineering, at the 2000-level or higher, or Computer Science at 3000 or higher.

**Course**

<table>
<thead>
<tr>
<th>Year One</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ECE 1001</td>
<td>Introduction to Electrical and Computer Engineering</td>
</tr>
<tr>
<td>CHEM 1110</td>
<td>General Chemistry I</td>
</tr>
<tr>
<td>&amp; CHEM 1115</td>
<td>and General Chemistry 1 Laboratory</td>
</tr>
<tr>
<td>ENGL 1920</td>
<td>Advanced Writing for Professionals</td>
</tr>
<tr>
<td>MATH 1510</td>
<td>Calculus I</td>
</tr>
<tr>
<td>THEO 1000</td>
<td>Theological Foundations</td>
</tr>
</tbody>
</table>

**Credits**

15

<table>
<thead>
<tr>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 1002</td>
<td>Introduction to ECE II</td>
</tr>
<tr>
<td>CSCI 1300</td>
<td>Introduction to Object-Oriented Programming</td>
</tr>
</tbody>
</table>
MATH 1660  Discrete Mathematics  3  
MATH 1520  Calculus II  4  
PHYS 1610  Engineering Physics I  4  
& PHYS 1620  and Engineering Physics I Laboratory  4  

Credits  16  

Year Two  

Fall  
ECE 2101  Electrical Circuits I  3  
ECE 2205  Digital Design  4  
& ECE 2206  and Digital Design Lab  4  
MATH 2530  Calculus III  4  
PHYS 1630  Engineering Physics II  4  
& PHYS 1640  and Engineering Physics II Laboratory  4  

Credits  15  

Spring  
CSCI 2100  Data Structures  4  
ECE 2102  Electrical Circuits II  4  
& ECE 2103  and Electrical Circuits Lab  4  
MATH 3110  Linear Algebra for Engineers  3  
MATH 3550  Differential Equations  3  
Core: Humanities  2  3  

Credits  17  

Year Three  

Fall  
CSCI 2300  Object-Oriented Software Design  3  
ECE 3130  Semiconductor Devices  3  
ECE 3150  Linear Systems  4  
& ECE 3151  and Linear Systems Lab  4  
ECE 3225  Microprocessors  4  
& ECE 3226  and Microprocessors Laboratory  4  
ECE 3205  Advanced Digital Design  3  

Credits  17  

Spring  
ECE 3052  Probability and Random Variables for Engineers  3  
ECE 3090  Junior Design  1  
ECE 3131  Electronic Circuit Design  4  
& ECE 3132  and Electronic Circuit Design Lab  4  
ECE 3215  Computer Systems Design  4  
& ECE 3216  and Computer Systems Design Lab  4  
ECE 3217  Computer Architecture and Organization  3  

Credits  15  

Year Four  

Fall  
ECE 4800  ECE Design I  4  
CSCI 3500  Operating Systems  3  
ECE/CSCI Elective  5  3  
PHIL 3400  Ethics & Engineering  3  

Credits  12  

Spring  
ECE 4810  ECE Design II  3  
ECE 4245  Computer Networks Design  3  

ECE/CSCI Elective  5  3  
Core: Cultural Diversity  2  3  

Credits  12  

Total Credits  119  

1 Students needing prerequisite work in writing skills as determined by ACT or SAT scores will be required to take ENGL 1500 The Process of Composition (3 cr) and perhaps ENGL 1040 Accelerated Reading (3 cr).  
2 Must not be used to satisfy another core requirement.  
3 Prerequisite requirement of computer programming, either CSCI 1060 Introduction to Computer Science: Scientific Programming (3 cr), CSCI 1300 Introduction to Object-Oriented Programming (4 cr), or BME 2000 BME Computing (3 cr).  
4 Requires Senior standing (all required technical courses through the junior year have been completed and passed).  
5 Must be taken from an approved list of engineering or CSCI elective courses.  
6 Must be taken from an approved list of Social and Behavioral Science courses (including Economics).  
7 Must be selected from courses in science, math, or engineering at the 2000 level or higher, or Computer Science at 3000 level or higher.