

# ELECTRICAL ENGINEERING, BACHELOR OF SCIENCE

The Electrical and Computer Engineering (ECE) Department takes a human-centric approach to research and education, with a focus on applications in speech processing, medical imaging, bio-photonics, computer-integrated surgery, renewable energy, human inspired electronic systems for perception and cognition, and other cutting-edge technologies that address real-world problems. Our courses cover wide-ranging topics in three broad areas: signal, systems, and control; electro-physics; and computational systems.

## Mission

The Electrical Engineering Program at Johns Hopkins is supported by faculty in the Department of Electrical and Computer Engineering who are committed to providing a rigorous educational experience that prepares students for further study and to professionally and ethically practice engineering in a competitive global environment. Electrical Engineering is concerned with a wide variety of topics in signals, systems and communications, photonics and optoelectronics, and computer engineering. The mission of the program is to provide students with a broad, integrated education in the fundamentals and advanced topics in computer engineering, basic sciences, mathematics, and humanities in an environment that fosters the development of analytical, computational, and experimental skills, and that involves students in design projects and research experiences; and to provide our electrical engineering graduates with the tools, skills and competencies necessary to understand and apply today's technologies and become leaders in developing and deploying tomorrow's technologies.

## ECE Focus Areas for Undergraduate Studies

ECE Students have a lot of flexibility as it relates to their studies. They have the ability to craft a program that is as broad or as specific as they wish. Students who want to deepen their knowledge can do so in seven different areas of the discipline. They are:

1. Computing Systems
2. Integrated Circuits and Microsystems
3. Machine Learning and Artificial Intelligence
4. Medical Imaging
5. Photonics and Optoelectronics
6. Robotics
7. Signals, Systems, and Communication

Classes that fall under each category can be found here (<https://engineering.jhu.edu/ece/academics/undergraduate-studies/degree-options/study-focus-areas-for-undergraduates/>).

*The information below describes the academic requirements for students entering JHU as degree-seeking students in Fall 2025. Students who entered JHU as degree-seeking students prior to Fall 2025 should view the appropriate archived catalogue (<https://e-catalogue.jhu.edu/archive/>).*

Students must meet the University requirements and the Whiting School of Engineering requirements (see Requirements for a Bachelor's Degree (<https://e-catalogue.jhu.edu/ksas-wse/undergraduate-policies/academic-policies/requirements-bachelors-degree/>)).

policies/requirements-bachelors-degree/) in this catalogue), as well as the departmental major requirements, to complete a bachelor's degree.

- The Bachelor of Science degree in Electrical Engineering requires 126 credits.
- The ECE department recognizes students with exemplary academic records by awarding Departmental Honors to students with a Grade Point Average of 3.50 or higher in courses used to satisfy the Electrical Engineering Requirements. EE Honors are awarded only to students whose primary major is Electrical Engineering.

## UNIVERSITY REQUIREMENTS

These requirements are described in this section of the catalogue (<https://e-catalogue.jhu.edu/ksas-wse/undergraduate-policies/academic-policies/requirements-bachelors-degree/>).

## WSE SCHOOL REQUIREMENTS

### FIRST-YEAR SEMINAR OR DESIGN CORNERSTONE REQUIREMENT

All WSE primary majors are required to complete a First-Year Seminar (FYS) or a Design Cornerstone class with a grade of Satisfactory (S).

The first-year seminar requirement is waived for students who transfer into the university after the first year. These students must still complete the minimum number of required credits to graduate.

Code	Title	Credits
	One FYS or Design Cornerstone course	2-3
<b>Total Credits</b>		<b>2-3</b>

## FOUNDATIONAL ABILITIES REQUIREMENTS

All students with a primary major within the Whiting School of Engineering must complete the Foundational Abilities (<https://e-catalogue.jhu.edu/ksas-wse/undergraduate-policies/academic-policies/requirements-bachelors-degree/#writingtext>) (FA) in six designated areas. Grades of C- or higher are required. No Satisfactory/Unsatisfactory (S/U) grades will be accepted, except in cases where a course is offered on an S/U basis only, such as the Bootcamp Computing courses. For Foundational Abilities that require the submission of ePortfolio assignments in an engineering discipline, students must achieve a minimum assessment of "Proficient".

### FA1 WRITING AND COMMUNICATION

This Foundational Abilities requirement has four parts:

**1. Foundational Course in Writing:** All WSE students are required to successfully complete one foundational course in writing. Courses that will satisfy the writing course requirement are listed below:

Code	Title	Credits
Choose one from the following:		
AS.004.101	Reintroduction to Writing	3
EN.661.110	Professional Writing and Ethics	3

**2. Writing ePortfolio Assignment:** All WSE students must be assessed as at least proficient in one or more writing ePortfolio assignments. Courses that include at least one assignment eligible for the writing ePortfolio assignment requirement can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching the tag listed below:

Code	Title	Credits
EN Foundational Ability tag FA1.1eP		

**3. Foundational Course in Oral Communication:** All WSE students are required to successfully complete one foundational course in oral communication. The course that will satisfy the oral communication course requirement is listed below:

Code	Title	Credits
EN.661.250	Oral Presentations	3

**4. Oral Communication ePortfolio Assignment:** All WSE students must be assessed as at least proficient in one or more oral communication ePortfolio assignments. Courses that include at least one assignment applicable to the oral communication ePortfolio assignment requirement can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching the tag listed below:

Code	Title	Credits
EN Foundational Ability tag FA1.2eP		

## FA2 SCIENTIFIC AND QUANTITATIVE REASONING

This Foundational Abilities requirement has five parts. The ECE department has specified the courses below that will satisfy the requirements.

**1. Calculus I:** Calculus I applies to both the FA2 requirement and the EE Mathematics requirement.

Code	Title	Credits
AS.110.108	Calculus I (Physical Sciences & Engineering)	4

**2. Calculus II:** Calculus II applies to both the FA2 requirement and the EE Mathematics requirement.

Code	Title	Credits
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4

**3. Probability and Statistics:** The Probability and Statistics course applies to both the FA2 requirement and the EE Mathematics requirement.

Code	Title	Credits
EN.553.311	Intermediate Probability and Statistics	4

**4. Computing and Data Science:** The computing course applies to both the FA2 requirement and the EE Other Engineering requirement.

Code	Title	Credits
Choose one from the following:		
EN.500.113	Gateway Computing: Python	3
EN.500.112	Gateway Computing: JAVA <sup>1</sup>	3

<sup>1</sup> If EN.500.112 Gateway Computing: JAVA is taken, then EN.500.133 Bootcamp: Python is strongly recommended.

**5. Natural Science and Laboratory:** One natural science lecture and its associated laboratory will apply to both the FA2 requirement and the EE Basic Sciences requirement. Additional natural science lectures and labs are required for the major; see the Major Requirements section for details.

Code	Title	Credits
Choose one from the following:		

AS.171.101 & AS.173.111	General Physics: Physical Science Major I and General Physics Laboratory I	5
AS.171.102 & AS.173.112	General Physics: Physical Science Major II and General Physics Laboratory II	5
AS.171.107 & AS.173.111	General Physics for Physical Sciences Majors (AL) and General Physics Laboratory I	5
AS.171.108 & AS.173.112	General Physics for Physical Science Majors (AL) and General Physics Laboratory II	5

## FA3 CREATIVE EXPRESSION

A minimum of 12 credits of coursework in creative expression (FA3) and engagement with society (FA4) is required. At least three of these credits must be earned through a course tagged FA3. Courses with the FA3 tag can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching the tag listed below:

Code	Title	Credits
EN Foundational Ability tag FA3		3

In addition to the required FA3 and FA4 courses, students must complete six additional credits from any combination of FA3 or FA4 courses, for a total of 12 credits in FA3 and FA4.

## FA4 ENGAGEMENT WITH SOCIETY

A minimum of 12 credits of coursework in creative expression (FA3) and engagement with society (FA4) is required. At least three of these credits must be earned through a course tagged FA4. Courses with the FA4 tag can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching the tag listed below:

Code	Title	Credits
EN Foundational Ability tag FA4		3

In addition to the required FA3 and FA4 courses, students must complete six additional credits from any combination of FA3 or FA4 courses, for a total of 12 credits in FA3 and FA4.

## FA5 ETHICAL REFLECTION

This Foundational Abilities requirement has two parts:

**1. Foundational Course in Ethical Reflection:** All WSE students are required to successfully complete one foundational course in ethical reflection. Courses that will satisfy the ethical reflection course requirement are listed below:

Code	Title	Credits
EN.660.412	(Cases in Workplace Ethics)	3
EN.660.455	Reimagining The City to Resist Climate Change	3
EN.660.463	Engineering Management & Leadership	3
EN.661.315	Culture of the Engineering Profession	3

**2. Ethical Reflection ePortfolio Assignment:** All WSE students must be assessed as at least proficient in one or more ethical reflection ePortfolio assignments. Courses that include at least one assignment eligible for the ethical reflection ePortfolio assignment requirement can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching the tag listed below:

Code	Title	Credits
EN Foundational Ability tag FA5eP		

**FA6 CONCEIVING OF AND REALIZING PROJECTS**

All WSE students must be assessed as at least proficient in two or more conceiving of and realizing projects ePortfolio assignments. Courses that include at least one assignment eligible for the conceiving of and realizing projects ePortfolio assignment requirement can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching the tag listed below:

Code	Title	Credits
EN	Foundational Ability tag FA6eP	

## MAJOR REQUIREMENTS

### MATHEMATICS

A total of 20 credits in mathematics is required. If a student receives a waiver for Calculus I and/or II or transfers in courses with fewer credits than the corresponding JHU course credits, they must make up the difference by completing additional mathematics coursework.

Grades of C- or higher are required. No Satisfactory/Unsatisfactory (S/U) grades will be accepted.

Code	Title	Credits
AS.110.109	Calculus II (For Physical Sciences and Engineering) (FA2 Requirement)	4
or AS.110.107	Calculus II (For Biological and Social Science)	
AS.110.201	Linear Algebra	4
or AS.110.212	Honors Linear Algebra	
or EN.553.295	Linear Algebra for Data Science	
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
AS.110.302	Differential Equations and Applications	4
EN.553.311	Intermediate Probability and Statistics (FA2 Requirement)	4
or EN.553.420	Probability	
or EN.553.421	Honors Probability	
<b>Total Credits</b>		<b>20</b>

**BASIC SCIENCES**

A total of 16 credits in basic sciences is required. One physics lecture and its associated laboratory will apply to both the FA2 requirement and the Electrical Engineering Basic Sciences requirement.

Students who fall short of the required 16 credits due to receiving laboratory course waivers from Physics I and/or II exam credit, or transferring courses with fewer credits than the equivalent JHU offerings, must complete additional coursework with a Natural Sciences (N) area designation to fulfill the credit requirement.

Grades of C- or higher are required. No Satisfactory/Unsatisfactory (S/U) grades will be accepted.

Code	Title	Credits
AS.030.101	Introductory Chemistry I	3
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1

Basic Science Elective with N, EN, or QN area designation(s) <sup>1</sup>	3
<b>Total Credits</b>	<b>16</b>

<sup>1</sup> Courses coded as NS are not allowed. Introduction to Computing courses may not be used to fulfill the requirement.

**PROGRAMMING REQUIREMENT**

A grade of C- or higher is required. No Satisfactory/Unsatisfactory (S/U) grade will be accepted.

Code	Title	Credits
EN.601.220	Intermediate Programming	4
<b>Total Credits</b>		<b>4</b>

**CORE REQUIREMENTS**

Grades of C- or higher are required, but students must obtain a minimum 2.0 GPA in the 45 required ECE credits, which include ECE Core Courses, Advanced Labs, and ECE Electives. A maximum of 6 credits of Computer Science (EN.601) courses may be used towards the 45 ECE credit requirement. No Satisfactory/Unsatisfactory (S/U) grades will be accepted.

A maximum of 6 Customized Academic Learn (CAL) credits may be counted toward either the ECE Elective requirement or the Other Engineering Courses requirement, but not both. Any CAL credits beyond the 6 credits will count towards the Free Electives.

**ECE CORE COURSES**

Code	Title	Credits
EN.520.137	First Year ECE Design	4
EN.520.142	Digital Systems Fundamentals (FA6eP - project 1)	3
EN.520.214	Signals and Systems	4
EN.520.219	Introduction to Electromagnetics	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
EN.520.498	Capstone Design Project I (FA5eP, FA6eP - project 2)	3
EN.520.499	Capstone Design Project II (FA1.1eP, FA1.2eP, FA6eP - project 2)	3
<b>Total Credits</b>		<b>25</b>

**ADVANCED LABS**

Students must complete a total of 6 credits of Advanced Lab courses, chosen from the ECE Advanced Labs and Other Engineering Advanced Labs lists. ECE Advanced Labs count toward the required 45 core credits. Courses from the Other Engineering Advanced Labs list may simultaneously fulfill both the Advanced Labs and Other Engineering Courses requirements.

Code	Title	Credits
	Advanced Lab Courses (see below for the list)	6
<b>Total Credits</b>		<b>6</b>

**ECE Advanced Labs**

ECE Advanced Labs count toward the required 45 core credits.

Code	Title	Credits
EN.520.363	ECE Ideation and Design Lab	3
EN.520.412	Machine Learning for Signal Processing	3
EN.520.424	FPGA Synthesis Lab	3
EN.520.427	Design of Advanced Instruments and Systems	3
EN.520.433	Medical Image Analysis	3
EN.520.440	Machine Intelligence on Embedded Systems	3
EN.520.450	Advanced Micro-Processor Lab	3
EN.520.454	Control Systems Design	3
EN.520.463	ECE Ideation and Design Lab	3
EN.520.468	Electronics Design Lab	3
EN.520.483	Bio-Photonics Laboratory	3
EN.520.487	Clinical Diagnostic Devices and Methods	3
EN.520.491	Cad Design of Digital VLSI Systems I (Seniors)	3
EN.520.492	Mixed-Mode VLSI Systems	3
EN.520.495	Microfabrication Laboratory <sup>1</sup>	4

<sup>1</sup> This course can be also count as a mechanical engineering course, fulfilling the Other Engineering requirement. Students must pick one or the other.

## Other Engineering Advanced Labs

Other Engineering Advanced Lab courses may also count toward the Other Engineering Courses requirement.

Code	Title	Credits
EN.510.433	Senior Design Research	3
EN.510.434	Senior Design/Research II	3
EN.530.403	MechE Senior Design Project I	4
EN.530.404	MechE Senior Design Project II	4
EN.530.420	Robot Sensors/Actuators	4
EN.530.421	Mechatronics	3
EN.530.474	Effective and Economic Design for Biomedical Instrumentation	4
EN.540.418	Projects in the Design of a Chemical Car	2
EN.540.419	Projects in the Design of a Chemical Car	2
EN.540.421	Project in Design: Pharmacodynamics	3
EN.540.432	Project in Design: Pharmacokinetics	3
EN.580.311	Design Team Health-Tech Project I	4
EN.580.312	Design Team Health-Tech Project II	4
EN.580.411	Design Team Health-Tech Project I	4
EN.580.412	Design Team Health-Tech Project II	4
EN.580.437	Biomedical Data Design	4
EN.580.438	Biomedical Data Design II	4
EN.580.471	Principles of Design of BME Instrumentation	4
EN.580.472	Honors Instrumentation	4
EN.580.480	Precision Care Medicine I	4
EN.580.481	Precision Care Medicine II	4
EN.580.493	Imaging Instrumentation	4
EN.580.494	Build an Imager	3
EN.601.315	Databases	3
EN.601.411	Computer Science Innovation & Entrepreneurship II	3
EN.601.415	Databases	3

EN.601.417		3
EN.601.421	Object Oriented Software Engineering	3
EN.601.443	Security & Privacy in Computing	3
EN.601.447	Computational Genomics: Sequences	3
EN.601.451	Introduction to Computational Immunogenomics	3
EN.601.454	Introduction to Augmented Reality	3
EN.601.456	Computer Integrated Surgery II	3
EN.601.461	Computer Vision	3
EN.601.466	Information Retrieval and Web Agents	3
EN.601.468	Machine Translation	3
EN.601.471	Natural Language Processing: Self-Supervised Models	3
EN.601.482	Machine Learning: Deep Learning	4
EN.601.484	Explainable AI Design & Human-AI Interaction	3
EN.601.496	Computer Integrated Surgery II - Teams	3

## ECE ELECTIVES

Between 11 - 20 credits of ECE Electives are required to meet the 45 credit ECE requirement.

- A maximum of 6 credits of Computer Science (EN.601) coursework may be applied toward the 45 required ECE credits. Gateway Computing (EN.500.11x) and one Bootcamp course (EN.500.13x) may be counted as a Computer Science substitution toward this requirement.
- If Gateway Computing and a Bootcamp course are applied to the 45 ECE credits, they may not also be used to fulfill the Other Engineering Courses requirement.
- A maximum of 6 credits of Customized Academic Learning (CAL) may be applied toward either the ECE Electives requirement or the Other Engineering Courses requirement. CAL coursework from Electrical Engineering (EN.520) may only be applied toward the ECE Electives requirement.
- If CAL coursework from Computer Science (EN.601) is pursued, then up to 6 credits of this CAL can be counted as a Computer Science substitution toward this requirement.

Code	Title	Credits
ECE Elective courses		11-20
<b>Total Credits</b>		<b>11-20</b>

## OTHER ENGINEERING COURSES

At least 6 credits of Other Engineering Courses are required.

- Eligible courses must carry an E area designation and may be from the Krieger School of Arts & Sciences (AS.xxx) or from outside the following Whiting School of Engineering departments/centers: Applied Mathematics & Statistics (EN.553), Center for Leadership Education (EN.66x), Electrical & Computer Engineering (EN.520), and General Engineering (EN.500). Gateway Computing (EN.500.11x) and one Bootcamp course (EN.500.13x), although offered through General Engineering, are exceptions and may count toward the 6-credit Other Engineering Courses requirement if they are not applied toward the ECE Electives requirement.
- The total number of credits needed will vary depending on whether Gateway Computing is counted under ECE Electives or Other Engineering Courses. Courses from the Other Engineering Advanced

Labs may also be applied toward the Other Engineering Courses requirement.

- A maximum of 6 credits of Customized Academic Learning (CAL) may be applied toward either the ECE Electives requirement or the Other Engineering Courses requirement. CAL coursework from engineering departments outside of AMS, CLE, ECE, or General Engineering may only be applied toward the Other Engineering Courses requirement.

Grades of C- or higher are required. No Satisfactory/Unsatisfactory (S/U) grades will be accepted.

Code	Title	Credits
Other Engineering Course outside of AMS, CLE, ECE, or Gen Eng		6
<b>Total Credits</b>		<b>6</b>

## FREE ELECTIVES

Grades of D or higher are required. Satisfactory (S) grades will be accepted.

Code	Title	Credits
Elective courses to reach 126 credits		

## Sample Program Starting with Calculus I

### First Year

First Semester	Credits	Second Semester	Credits
AS.110.108 (FA2 Calculus I Requirement)	4	AS.110.109 (FA2 Calculus II Requirement)	4
AS.171.101 or 107 <sup>1</sup>	4	AS.171.102 or 108 <sup>1</sup>	4
AS.173.111 <sup>1</sup>	1	AS.173.112 <sup>1</sup>	1
EN.500.113 (FA2 Computing and Data Science Requirement, Other Engineering Course 1)	3	EN.520.137	4
FYS or Design Cornerstone	2-3	EN.520.142 (FA6eP – Project 1)	3
<b>14-15</b>		<b>16</b>	

### Second Year

First Semester	Credits	Second Semester	Credits
AS.030.101	3	AS.110.201	4
AS.110.202	4	EN.520.214	4
EN.520.230	3	EN.520.219	3
EN.520.231	2	EN.520.232 (ECE Elective 1)	3
EN.601.220	4	EN.520.233 (ECE Elective 2)	2
<b>16</b>		<b>16</b>	

### Third Year

First Semester	Credits	Second Semester	Credits
AS.110.302	4	EN.520.353 (ECE Elective 5)	4
ECE Elective 3	3	EN.553.311 (FA2 Probability and Statistics Requirement)	4
ECE Elective 4	3	ECE Elective 6	3
EN.661.315 (FA5 Foundational Course in Ethical Reflection) <sup>3</sup>	3	3 Basic Science Elective	3

Course with EN Foundational Ability tag FA3 (Creative Expression)	3 Course with EN Foundational Ability tag FA4 (Engagement with Society)	3
<b>16</b>		<b>17</b>

### Fourth Year

First Semester	Credits	Second Semester	Credits
EN.520.498 (FA5eP, FA6eP – Project 2)		3 EN.520.499 (FA1.1eP, FA1.2eP, FA6eP – Project 2)	3
Advanced Lab 1 <sup>3</sup>		3 Advanced Lab 2 <sup>3</sup>	3
ECE Elective 7		4 Other Engineering Course 2	3
EN.661.110 (FA1 Foundational Course in Writing)		3 EN.661.250 (FA1 Foundational Writing in Oral Communication)	3
Course with EN Foundational Ability tag FA3 or FA4		3 Course with EN Foundational Ability tag FA3 or FA4	3
<b>16</b>		<b>15</b>	

### Total Credits 126-127

<sup>1</sup> One of the natural science courses with its associated laboratory will satisfy the FA2 requirement. The other natural science courses with their associated laboratories will satisfy the Basic Sciences requirement for the major.

<sup>2</sup> Students may choose a different course to fulfill the FA5 Foundational Course in Ethical Reflection, such as EN.660.412, EN.660.455, EN.660.463.

<sup>3</sup> Can be fulfilled by ECE Advanced Lab or Other Engineering Advanced Lab from the approved list.

## Sample Program Starting with Calculus II

This sample program is designed for students who have credits for Calculus I, which applies to FA2 Requirement.

### First Year

First Semester	Credits	Second Semester	Credits
AS.110.109 (FA2 Calculus II Requirement)	4	AS.110.201	4
AS.171.101 or 107 <sup>1</sup>	4	AS.171.102 or 108 <sup>1</sup>	4
AS.173.111 <sup>1</sup>	1	AS.173.112 <sup>1</sup>	1
EN.500.113 (FA2 Computing and Data Science Requirement, Other Engineering Course 1)	3	EN.520.137	4
FYS or Design Cornerstone	2-3	EN.520.142 (FA6eP – Project 1)	3
<b>14-15</b>		<b>16</b>	

### Second Year

First Semester	Credits	Second Semester	Credits
AS.030.101	3	AS.110.302	4
AS.110.202	4	EN.520.214	4
EN.520.230	3	EN.520.219	3
EN.520.231	2	EN.520.232 (ECE Elective 1)	3
EN.601.220	4	EN.520.233 (ECE Elective 2)	2
<b>16</b>		<b>16</b>	



**Third Year**

First Semester	Credits	Second Semester	Credits
ECE Elective 3	3	EN.520.353 (ECE Elective 6)	4
ECE Elective 4	4	ECE Elective 7	3
ECE Elective 5	3	Other Engineering Course 2	3
EN.553.311 (FA2 Probability and Statistics Requirement)	4	Basic Science Elective (N)	3
EN.661.315 (FA5 Foundational Course in Ethical Reflection Requirement) <sup>2</sup>	3	Course with EN Foundational Ability tag FA3 (Creative Expression)h Society)	3
<b>17</b>		<b>16</b>	

**Fourth Year**

First Semester	Credits	Second Semester	Credits
EN.520.498 (FA5eP, FA6eP – Project 2)	3	EN.520.499 (FA1.1eP, FA1.2eP, FA6eP – Project 2)	3
Advanced Lab 1 <sup>3</sup>	3	Advanced Lab 2 <sup>3</sup>	3
EN.661.110 (FA1 Foundational Course in Writing)	3	EN.661.250 (FA1 Foundational Course in Oral Communication)	3
Course with EN Foundational Ability FA4 (Engagement with Society)	3	Course with EN Foundational Ability tag FA3 or FA4	3
Course with EN Foundational Ability tag FA3 or FA4	3		
<b>15</b>		<b>12</b>	

**Total Credits 122-123**

**Total Credits: 126-127 after 4 credits of Calculus I are applied.**

<sup>1</sup> One of the natural science courses with its associated laboratory will satisfy the FA2 requirement. The other natural science courses with their associated laboratories will satisfy the Basic Sciences requirement for the major.

<sup>2</sup> Students may choose a different course to fulfill the FA5 Foundational Course in Ethical Reflection, such as EN.660.412, EN.660.455, EN.660.463.

<sup>3</sup> Can be fulfilled by ECE Advanced Lab or Other Engineering Advanced Lab from the approved list.

**Sample Program with Hopkins Semester**

This sample program is designed for students who have credits for Calculus I, which applies to the FA2 Requirement.

This is one example of how a student could structure their degree program to include a Hopkins Semester. Students may explore additional options with their professional academic advisor if their desired Hopkins Semester experience varies from what is presented here.

**First Year**

First Semester	Credits	Second Semester	Credits
AS.110.109 (FA2 Calculus II Requirement)	4	AS.110.201	4
AS.171.101 or 107 <sup>1</sup>	4	AS.171.102 or 108 <sup>1</sup>	4
AS.173.111 <sup>1</sup>	1	AS.173.112 <sup>1</sup>	1

EN.500.113 (FA2 Computing and Data Science Requirement, Other Engineering Course 1)	3	EN.520.137	4
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FYS or Design Cornerstone	2-3	EN.520.142 (FA6eP – Project 1)	3
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**Second Year**

First Semester	Credits	Second Semester	Credits
AS.030.101	3	AS.110.302	4
AS.110.202	4	EN.520.214	4
EN.520.230	3	EN.520.219 <sup>3</sup>	3
EN.520.231	2	EN.520.232 (ECE Elective 1)	3
EN.601.220	4	EN.520.233 (ECE Elective 2)	2
EN.661.315 (FA5 Foundational Course in Ethical Reflection Requirement) <sup>2</sup>	3		

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**Third Year**

First Semester	Credits	Second Semester	Credits
Hopkins Semester		EN.520.344 (ECE Elective 3)	3
ECE Elective or Other Engineering Course	3	EN.520.353 (ECE Elective 4)	4
ECE Elective or Other Engineering Course	3	EN.553.311 (FA2 Probability and Statistics Requirement)	4
Free Elective	3	Basic Science Elective (N)	3
Free Elective	3	Course with EN Foundational Ability tag FA3 (Creative Expression)	3

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**Fourth Year**

First Semester	Credits	Second Semester	Credits
EN.520.498 (FA5eP, FA6eP – Project 2)	3	EN.520.499 (FA1.1eP, FA1.2eP, FA6eP – Project 2)	3
Advanced Lab 1 <sup>3</sup>	3	Advanced Lab 2 <sup>3</sup>	3
EN.661.110 (FA1 Foundational Course in Writing)	3	Other Engineering Course 2	3
Course with EN Foundational Ability tag FA4 (Engagement with Society)	3	EN.661.250 (FA1 Foundational Course in Oral Communication)	3
Course with EN Foundational Ability tag FA3 or FA4	3	Course with EN Foundational Ability tag FA3 or FA4	3
<b>15</b>		<b>15</b>	

**Total Credits 124-125**

**Total Credits: 128-129 after 4 credits of Calculus I are applied.**

<sup>1</sup> One of the natural science courses with its associated laboratory will satisfy the FA2 requirement. The other natural science courses with their associated laboratories will satisfy the Basic Sciences requirement for the major.

<sup>2</sup> Students may choose a different course to fulfill the FA5 Foundational Course in Ethical Reflection, such as EN.660.412, EN.660.455, EN.660.463.

<sup>3</sup> Can be fulfilled by ECE Advanced Lab or Other Engineering Advanced Lab from the approved list.

## Accreditation Statement

The B.S. in Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>, under the General Criteria and the Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and similarly Named Engineering Programs.

## Program Educational Objectives

The Program Educational Objectives (PEOs) for electrical engineering (EE) at the Johns Hopkins University describe what EE graduates are expected to attain within a few years of graduation. The PEOs are determined in consultation with the Electrical and Computer Engineering External Advisory Committee and approved by the ECE faculty.

The educational objectives of the EE program are:

- Our graduates will become successful practitioners or innovators in engineering and other diverse careers.
- Some graduates will pursue advanced degree programs in engineering and other disciplines.

## Student Outcomes

Students graduating with a B.S. in electrical engineering will have demonstrated:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to 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. An ability to communicate effectively with a range of audiences.
4. An ability to 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. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## Enrollments and Graduates

### Enrollment\*

Term	Total	First-Year	Sophomore	Junior	Senior
Fall 2017	63	13	18	20	12
Fall 2018	62	12	16	14	20
Fall 2019	64	20	10	21	13
Fall 2020	71	20	20	11	20

Fall 2021	76	19	23	20	14
Fall 2022	73	15	19	19	20
Fall 2023	83	25	19	16	23

### B.S. Degrees Awarded\*\*

Academic Year	Total
2017-2018	14
2018-2019	17
2019-2020	14
2020-2021	15
2021-2022	12
2022-2023	21

\* Based on Fall census each year

\*\* Includes August, December, and May conferrals each academic year