

# Engineering Physics: Electrical Applications Option

## Bachelor of Science (BS)

# Electrical Applications Option

Physics is perhaps the most fundamental of the sciences. It involves the study of the nature of basic things such as motion, forces, energy, matter, heat, sound, light, and the atom. Engineering is the profession in which basic knowledge from the mathematical and natural sciences is applied to develop new ways to utilize the materials and forces of nature for the benefit of society.



Engineering physics is an interdisciplinary degree program combining the study of physics and engineering into one curriculum. Students acquire a deep knowledge of physical and mathematical principles and learn to apply this knowledge to meet the needs of society. The interdisciplinary nature of this program produces graduates who can work in many diversified fields and who can easily adapt their skills to the needs of employers.

The engineering physics program is an engineering program that is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>, which is the agency that accredits all engineering programs in the United States. Our seniors take the Fundamentals of Engineering (FE) Exam, which is the first step to becoming a Registered Professional Engineer (PE). About 85% of our seniors pass this exam, which is well above the national average.

### Engineering physics students will...

- Have the 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.
- Have the ability to use the techniques, skills, and modern tools necessary for physics and engineering careers.
- Have the broad education necessary to understand the impact of physics and engineering solutions in a global, economic, environmental and societal context.

### Becoming Career Ready...

/ Faculty-mentored research and guidance will help you develop the professional skills needed for success in a competitive job market and/or advanced study in graduate and professional programs.

/ Electrical Applications graduates work in a wide range of sectors including aerospace, automotive, energy, IT and telecommunications. Examples of job titles include design engineer, electrical engineer, electronics engineer and systems analyst.

/ 100% of Southeast programs offer real-world experience. Electrical Applications students earn this experience through using modern tools used throughout the curriculum that are necessary for physics and engineering careers. Students may also do an internship to gain more experience in the field.

/ The path to a successful career starts with you! You can maximize your career development by working closely with Career Services and Southeast faculty – they are here to help you connect your passions, interests and skills to jobs and opportunities in the field. Career Services provides professional career counseling and coaching, resume critiques, practice interviews, job search strategies, career events, networking opportunities and more.

### Internship and Employment Opportunities of Recent Graduates:

- Century Link Technology Solutions
- National Information Solutions Cooperative
- TG Missouri
- Schaefer's Electrical Enclosures
- Southeast Missouri State University
- Southeast Hospital
- BIS Industrial Services
- Honeywell F M & T
- Lighting Science Group Corporation
- Wright Patterson Air Force Base
- Boeing
- Lockheed Martin
- NASA
- National Geospatial Intelligence Agency
- Raytheon
- Rockwell Collins
- GeoEye, Inc.

### Graduate Schools and Programs of Recent Graduates:

- University of Arkansas – MicroEP Program
- Washington University – Physics
- University of Missouri – Aerospace Engineering
- University of Missouri – Physics
- Boise State University – Biomedical Engineering
- University of Kansas – Biomedical Engineering
- Southern Illinois University at Edwardsville - Comp. Engr.
- University of North Texas – Physics
- Purdue University – Aerospace Engineering
- University of Illinois – Electrical Engineering
- University of Michigan – Biomedical Engineering

### Admission Requirements

A high school student interested in majoring in engineering physics should complete four years of mathematics that include trigonometry and an introduction to calculus. Four years of science, which include both chemistry and physics, is highly recommended. A strong background in English is essential.

### Transfer and Dual Credit Students

If you have dual credit or transfer credit, please visit our transfer course equivalencies guide at [semo.edu/transfercredit](http://semo.edu/transfercredit).



**To learn more**  
Office of Admissions  
(573) 651-2590  
[admissions@semo.edu](mailto:admissions@semo.edu)  
[semo.edu](http://semo.edu)

**To explore**  
the College of Science, Technology,  
Engineering and Mathematics  
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[semo.edu/stem](http://semo.edu/stem)

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[semo.edu/advising](http://semo.edu/advising)

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This is a guide based on the 2019-2020 Undergraduate Bulletin and is subject to change. The time it takes to earn a degree will vary based on several factors such as dual enrollment, remediation, and summer enrollment. Students will meet with an academic advisor each semester and use Degree Works to monitor their individual progress.

### CURRICULUM CHECKLIST

*"Critical Courses" are italicized and bolded. Data shows that students who have completed this course in the first two years and have earned the noted grade are most likely to complete this program of study.*

#### Engineering Physics: Electrical Applications Option – 62 Hours

A grade of 'C' or better is required in each course that is a prerequisite course.

##### Required Courses:\*

- \_\_\_ EP100 Physics and Engineering Concepts (3)
- \_\_\_ EP240 Circuit Analysis (4)
- \_\_\_ EP261 Engineering Mechanics - Statics (3)
- \_\_\_ EP262 Engineering Mechanics - Dynamics (3)
- \_\_\_ EP305 Digital System Design (3)
- \_\_\_ EP310 Microcontroller and Embedded Systems (3)
- \_\_\_ EP340 Electronic Circuits (4)
- \_\_\_ EP361 Thermal Analysis (3)
- \_\_\_ EP372 Signals and Systems (3)
- \_\_\_ EP374 Control Systems (3)
- \_\_\_ EP380 Engineering Design and Research (1)
- \_\_\_ EP462 Materials Science (3)
- \_\_\_ EP480 Capstone Design I (1)
- \_\_\_ EP481 Capstone Design II (3)
- \_\_\_ PH230/030 General Physics I (5)
- \_\_\_ PH231/031 General Physics II (5)
- \_\_\_ PH341 Optics (3)
- \_\_\_ PH360 Modern Physics (3)
- \_\_\_ PH371 Electromagnetics (3)
- \_\_\_ UI330 Experimental Methods (3)

##### Support Courses:

A grade of 'C' or better is required in each course that is a prerequisite course.

*This sequence of mathematics courses constitutes a minor, but it must be declared.*

- \_\_\_ CH185/085/005 General Chemistry (5)
- \_\_\_ CS177 Programming for Scientists and Engineers (3)
- \_\_\_ **MA140 Analytic Geometry and Calculus I (5)**
- \_\_\_ MA145 Analytic Geometry and Calculus II (4)
- \_\_\_ MA244 Analytic Geometry and Calculus III (4)
- \_\_\_ MA345 Linear Algebra (3)
- \_\_\_ MA350 Differential Equations (3)
- \_\_\_ MN120 Fundamentals of the Engineering Design Process (3)

**NOTE: Seniors are required to take the Fundamentals of Engineering Exam in their last semester.**

**General Education Requirements** – some requirements may be fulfilled by coursework in major program

- Social and Behavioral Sciences – 6 hours
- Constitution Requirement – 3 hours
- Written Communication – 6 hours
- Oral Communication – 3 hours
- Natural Sciences – 7 hours (from two disciplines, one to include a lab)
- Mathematics – 3 hours
- Humanities & Fine Arts – 9 hours (from at least two disciplines)
- Additional requirements – 5 hours (to include UI100 for native students)
- Civics examination

\*Many major courses are on a set rotation and dependent on when prerequisites are completed. The actual semester a course is taken may vary based on the rotation.

\*\* SC105 highly recommended by department

### SAMPLE FOUR-YEAR PLAN

	Fall Semester		Spring Semester	
	Course #	Hrs	Course #	Hrs
<b>FIRST YEAR</b>	UI100	3	EN100	3
	CH185/085/005	5	MA145	4
	CS177	3	MN120	3
	EP100	3	PH230/030	5
	<b>MA140</b>	5		
	<b>Total</b>	<b>19</b>	<b>Total</b>	<b>15</b>
Milestone: maintain 2.0 cumulative GPA				

<b>SECOND YEAR</b>	EP261	3	EP240	4
	MA244	4	EP262	3
	PH231/031	5	EP305	3
	General Education	3	MA350	3
			General Education	3
	<b>Total</b>	<b>15</b>	<b>Total</b>	<b>16</b>
Milestone: maintain 2.0 cumulative GPA				

*(Summer courses are encouraged to avoid 18-hour semesters.)*

<b>THIRD YEAR</b>	EP310	3	EP340	4
	EP361	3	EP380	1
	PH360	3	EP462	3
	UI330	3	MA345	3
	General Education	3	General Education	3
		General Education	3	
	<b>Total</b>	<b>15</b>	<b>Total</b>	<b>17</b>
Milestone: maintain 2.0 cumulative GPA				

<b>FOURTH YEAR</b>	EP372	3	EP374	3
	EP480	1	EP481	3
	PH371	3	PH341	3
	General Education	3	General Education	3
	General Education	3	General Education	3
	<b>Total</b>	<b>16</b>	<b>Total</b>	<b>15</b>
Milestone: maintain 2.0 cumulative GPA				

A "Milestone" signifies a significant stage for a student in the completion of a degree.

**Degree requirements for all students:** a minimum of 120 credit hours, completion of the General Education program, completion of 39 senior division hours (300-599), Writing Proficiency Exam (WP003). Refer to the Undergraduate Bulletin or Degree Works for additional graduation requirements for your program.