

Electrical Engineering, B.S.E.E.

Degree Offered

- Bachelor of Science in Electrical Engineering (B.S.E.E.)

Nature of the Program

Electrical engineers design, develop, test, and oversee the manufacture and maintenance of equipment that uses electricity, including subsystems for power generation and transmission, sensors, electronics, instrumentation, controls, communications and signal processing. The Bachelor of Science degree in Electrical Engineering is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>, under the General Criteria and the Program Criteria for Electrical Engineering.

In the first two years of electrical engineering, coursework is limited to those subjects that are essential as preparatory courses for more technical courses in the third and fourth years. Fundamental courses in electrical engineering are introduced in the second year. In the third and fourth years, the curriculum provides advanced instruction through required courses and electives. These electives are included in the curriculum to allow the student to acquire additional depth in the student's selected field of electrical engineering.

Program Educational Objectives

The Program Educational Objectives (PEO) of the Electrical Engineering (EE) program at West Virginia University is to produce graduates who will apply their knowledge and skills to achieve success in their careers in industry, research, government service or graduate study. It is expected that in the first five years after graduation our graduates will achieve success and proficiency in their profession, be recognized as leaders, and contribute to the well-being of society.

[Click here to view the Suggested Plan of Study \(p. 4\)](#)

Curriculum in Electrical Engineering

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. (<http://registrar.wvu.edu/gef/>)

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

Code	Title	Hours
General Education Foundations		
F1 - Composition & Rhetoric		3-6
ENGL 101 & ENGL 102 or ENGL 103	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Reasoning		3-4
F4 - Society & Connections		3
F5 - Human Inquiry & the Past		3
F6 - The Arts & Creativity		3
F7 - Global Studies & Diversity		3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)		9
Total Hours		31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

Degree Requirements

Students must meet the following criteria to qualify for a Bachelor of Science in Electrical Engineering degree:

- Complete a minimum of 120 credit hours
- Satisfy WVU's undergraduate degree requirements

- Satisfy Statler College's undergraduate degree requirements (<http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/#policies>)
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an overall grade point average of 2.00 or better
- Attain a WVU grade point average of 2.00 or better
- Attain a Statler grade point average of 2.00 or better
- A maximum of one math or science courses with a grade of D+, D, or D- may apply towards a Statler College degree
- Complete a survey regarding their academic and professional experiences at WVU, as well as post-graduation job placement or continuing education plans.

The Statler GPA is computed based on all work taken at WVU with a subject code within Statler College (BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, ENGR, ENVE, ETEC, IENG, IH&S, MAE, MINE, PDA, PNGE, ROBE, SAFM, SENG) excluding ENGR 140, ENGR 150, and CS 101. The WVU GPA is computed based on all work taken at WVU. The Overall GPA is computed based on all work taken at WVU and transfer work.

Curriculum Requirements

Code	Title	Hours
	University Requirements	19
	Fundamentals of Engineering Requirements	5
	Math and Science Requirements	30
	Electrical Engineering Program Requirements	66
	Total Hours	120

University Requirements

Code	Title	Hours
	General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)	
	Outstanding GEF Requirements 1, 4, 5, 6, and 7	18
ENGR 191	First-Year Seminar	1
	Total Hours	19

Fundamentals of Engineering Requirements

Code	Title	Hours
	A minimum grade of C- is required in all Fundamentals of Engineering courses.	
ENGR 101	Engineering Problem Solving 1	2
	Engineering Problem Solving (Select one of the following):	3
CHE 102	Introduction to Chemical Engineering	
ENGR 102	Engineering Problem Solving 2	
ENGR 103	Introduction to Nanotechnology Design	
MAE 102	Introduction to Mechanical and Aerospace Engineering Design	
	Total Hours	5

Math and Science Requirements

Code	Title	Hours
	A minimum grade of C- is required in all Math and Science courses.	
MATH 155	Calculus 1 (GEF 3)	4
MATH 156	Calculus 2	4
MATH 251	Multivariable Calculus	4
MATH 261	Elementary Differential Equations	4
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory (GEF 8)	4
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory (GEF 8)	4
STAT 215	Introduction to Probability and Statistics	3
	Math/Science Elective (Select one of the following):	3

BIOL 115 & 115L	Principles of Biology and Principles of Biology Laboratory
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory
CHEM 116 & 116L	Fundamentals of Chemistry 2 and Fundamentals of Chemistry 2 Laboratory
MATH 343	Introduction to Linear Algebra
MATH 375	Applied Modern Algebra
MATH 420	Numerical Analysis 1
MATH 441	Applied Linear Algebra
MATH 456	Complex Variables
MATH 465	Partial Differential Equations
PHYS 211	Introduction to Mathematical Physics
PHYS 314	Introductory Modern Physics
PHYS 321	Optics
PHYS 331	Theoretical Mechanics 1
PSIO 241	Elementary Physiology
PSIO 441	Mechanisms of Body Function
STAT 312	Intermediate Statistical Methods
STAT 331	Sampling Methods
STAT 461	Introduction to Probability Theory

Total Hours

30

Electrical Engineering Program Requirements

Code	Title	Hours
CPE 271	Introduction to Digital Logic Design	3
CPE 271L	Digital Logic Laboratory	1
CPE 310	Microprocessor Systems	3
CPE 310L	Microprocessor Systems Laboratory	1
CS 110	Introduction to Computer Science	3
CS 110L	Introduction to Computer Science Laboratory	1
EE 221	Introduction to Electrical Engineering	3
EE 221L	Introduction to Electrical Engineering Laboratory	1
EE 223	Electrical Circuits	3
EE 223L	Electrical Circuits Laboratory	1
EE 327	Signals and Systems 1	3
EE 329	Signals and Systems 2	3
EE 335	Electromechanical Energy Conversion and Systems	3
EE 335L	Electromechanical Energy Conversion and Systems Laboratory	1
EE 345	Engineering Electromagnetics	3
EE 251	Digital Electronics	3
EE 251L	Digital Electronics Laboratory	1
EE 355	Analog Electronics	3
EE 355L	Analog Electronics Laboratory	1
CSEE 380	Engineering for Societal Impact	2
CSEE 480S or CSEE 480	Capstone Project - Design	2
CSEE 481S or CSEE 481	Capstone Project - Implementation	3
Engineering Science Elective (Select one of the following):		3
CE 443	Environmental Science and Technology	
CHE 221	Material and Energy Balance	

IENG 316	Industrial Quality Control	
IENG 377	Engineering Economy	
MAE 241	Statics	
MAE 320	Thermodynamics	
MSEN 350	Materials Science	
EE Technical Elective (400-level or higher course in EE subject code) *		3
Lane Department Electives (400-level or higher courses in BIOM, CPE, CS, CSEE, CYBE, EE, or ROBE subject codes) *		6
Technical Electives (300-level or higher courses in BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, ENVE, ETEC, IENG, MAE, MINE, PNGE, ROBE, BIOL, CHEM, PHYS, STAT, or MATH subject codes) *		6
Total Hours		66

*

A maximum of 3 credit hours of any 490 or 491 may be used toward elective requirements.

Suggested Plan of Study

It is important for students to take courses in the order specified as closely as possible; all prerequisites and concurrent requirements must be observed. A typical B.S.E.E. degree program that completes degree requirements in four years is as follows.

First Year

Fall	Hours	Spring	Hours
ENGL 101 (GEF 1)		3 ENGR 102	3
ENGR 101		2 MATH 156 (GEF 8)	4
ENGR 191		1 PHYS 111 & 111L (GEF 8)	4
MATH 155 (GEF 3)		4 GEF 6	3
GEF 4		3	
GEF 5		3	
	16		14

Second Year

Fall	Hours	Spring	Hours
CPE 271		3 CS 110	3
CPE 271L		1 CS 110L	1
EE 221		3 EE 223	3
EE 221L		1 EE 223L	1
MATH 251		4 EE 251	3
PHYS 112 & 112L (GEF 8)		4 EE 251L	1
		MATH 261	4
	16		16

Third Year

Fall	Hours	Spring	Hours
EE 327		3 CPE 310	3
EE 335		3 CPE 310L	1
EE 335L		1 EE 329	3
EE 355		3 EE 345	3
EE 355L		1 Math/Science Elective	3
STAT 215		3 CSEE 380	2
ENGL 102 (GEF 1)		3	
	17		15

Fourth Year

Fall	Hours	Spring	Hours
CSEE 480S		2 CSEE 481S	3
EE Technical Elective		3 Lane Department Elective	3
Engineering Science Elective		3 Technical Elective	3

Lane Department Elective	3 Technical Elective	3
GEF 7	3	
	14	12

Total credit hours: 120

Area of Emphasis

- Artificial Intelligence

AREA OF EMPHASIS IN ARTIFICIAL INTELLIGENCE

Code	Title	Hours
CS 472	Artificial Intelligence	3
CS 474	Introduction to Responsible and Safe AI	3
Select two of the following:		6
CPE 420	Introduction to Neural Networks	
CS 460	Introduction to Big Data Engineering	
CS 473	Introduction to Data Mining	
CS 476S	Applied Artificial Intelligence Studio	
EE 465	Introduction to Digital Image Processing	

Total Hours 12

Accelerated Program

- BSEE Electrical Engineering and MSEE Electrical Engineering (p. 5)

Accelerated Bachelor's/Master's in Electrical Engineering

Students must fulfill all degree requirements for the B.S.EE in Electrical Engineering and all the requirements of the M.S.EE in Electrical Engineering. Students must also meet all the requirements of the ABM.

ABM REQUIREMENTS

Code	Title	Hours
Undergraduate Coursework		108
Shared Bachelor's/Master's Coursework		12
Graduate Coursework		19
Total Hours		139

SHARED COURSEWORK CURRICULUM REQUIREMENTS

Code	Title	Hours
Courses completed must be at the 400 or 500 level. At least one course must be at the 500 level.		
See BSEE and MSEE for list of elective course options		
Courses:		
EE Technical Elective		3
Lane Department Elective		3
Lane Department Elective		3
Technical Elective		3
Total Hours		12

SUGGESTED PLAN OF STUDY

It is important for students to take courses in the order specified as closely as possible; all prerequisites and concurrent requirements must be observed. A typical accelerated ABM program in electrical engineering with coursework option that completes degree requirements in five years is as follows.

First Year

Fall	Hours	Spring	Hours
ENGL 101 (GEF 1)		3 ENGR 102	3
ENGR 101		2 MATH 156 (GEF 8)	4
ENGR 191		1 PHYS 111 & PHYS 112L (GEF 8)	4
MATH 155 (GEF 3)		4 GEF 6	3
GEF 4		3	
GEF 5		3	
		16	14

Second Year

Fall	Hours	Spring	Hours
CPE 271 & 271L		4 CS 110 & 110L	4
EE 221 & 221L		4 EE 223 & 223L*	4
MATH 251		4 EE 251 & 251L	4
PHYS 112 & 112L (GEF 8)		4 MATH 261	4
		16	16

Third Year

Fall	Hours	Spring	Hours
EE 327*		3 CPE 310 & 310L	4
EE 335 & 335L*		4 CSEE 380	2
EE 355 & 355L		4 EE 329*	3
ENGL 102 (GEF 1)		3 EE 345	3
STAT 215		3 Math/Science Elective	3
		17	15

Fourth Year

Fall	Hours	Spring	Hours
CSEE 480		2 CSEE 481	3
Engineering Science Elective**		3 EE Technical Elective (MSEE CW Elective, 400 level +)**	3
Lane Department Elective (400 level +)**		3 Technical Elective (MSEE CW Elective, 500 level +)**	3
Lane Department Elective (400 level +)**		3 Technical Elective	3
GEF 7		3	
		14	12

Fifth Year

Fall	Hours	Spring	Hours
EE 796		1 MSEE Core Course	3
MSEE Core Course		3 MSEE AOE or Additional Elective	3
MSEE Core Course		3 MSEE AOE or Additional Elective	3
MSEE AOE or Additional Elective		3	
		10	9

Total credit hours: 139

*

Offered once per year in semester shown.

**

Indicates shared course between BS and MS programs

Lane Department Dual Degree Programs

Students can simultaneously pursue two bachelor's degrees in the Lane Department. To successfully complete both degrees, students must meet all requirements of both programs and complete a minimum of 150 credit hours. As part of those 150 credit hours, 30 credit hours must be unique from the primary degree course requirements. Exact credit hours and classes will vary per student based on their choice of technical electives and emphasis courses.

The most common Lane Department major combinations are:

- Computer Engineering and Electrical Engineering
- Computer Engineering and Computer Science

Please refer to the catalog descriptions of each individual program for course and academic requirements which can include minimum grades and GPA, and elective choices.

Program Educational Objectives

The Program Educational Objectives (PEO) of the Bachelor of Science in Electrical Engineering (B.S.E.E.) program at West Virginia University is to produce graduates who will apply their knowledge and skills to achieve success in their careers in industry, research, government service or graduate study. It is expected that in the first five years after graduation our graduate will achieve success and proficiency in their profession, be recognized as leaders, and contribute to the well-being of society.

Student Outcomes

Upon graduation, all Bachelor of Science in Electrical Engineering students will have:

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.