

Computer Engineering, B.S.Cp.E.

Degree Offered

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

Nature of the Program

The effects of computer engineering are seen in all facets of our lives. Computer engineers develop systems that can perform very useful operations such as what can be found in high-end computers, devices for networking switches and hubs and for manufacturing control, and systems in automobiles, fax machines, and microwave ovens. Even cell phones have sophisticated computational operations that provide useful features and capabilities, and the work of computer engineers has enabled this technology to be readily available.

The Bachelor of Science in Computer Engineering degree program provides students with the knowledge and skills to ensure successful employment and advancement as an engineer, as well as, to pursue further education. We give students a solid foundation in mathematics and the sciences with a special emphasis on the fundamentals of computer science and electrical engineering relevant to computer engineering. We provide the general education to put the technical knowledge into perspective. The student can pursue special areas of interest through several elective courses. Upon graduation the student will be well prepared to be successful and productive in the workforce.

One of the key features of engineering that sets it apart from other disciplines is design. Design is the creative process of putting ideas, components, and systems together to develop solutions to problems and needs. The curriculum encourages design-oriented thinking at a fundamental level and culminates in the capstone senior design course sequence in which many factors such as technical, economic, environmental, ethical and legal, health and safety, manufacturability, political, social, sustainability, and realistic standards are considered. The program further encourages the development of good communication skills in written, oral and electronic forms.

Educational Objectives

After graduation, students will accomplish one or more of the following objectives:

- **Professional Practice:** Computer engineering graduates will be successful in professional practice in engineering.
- **Post-graduate Education:** Computer engineering graduates will be successful in pursuing advanced education.
- **Advancement:** Computer engineering graduates will successfully advance in their careers.

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.

Curriculum Requirements

Code	Title	Hours
	University Requirements	16
	Program Requirements	6
	Math and Science Requirements	31
	Computer Engineering Major Requirements	73
	Total Hours	126

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, 5, 6, and 7	15
WVUE 191	First Year Seminar	1
	Total Hours	16

An overall 2.0 Professional GPA is required. Professional GPA includes ENGL 305 and all Math, Science and Engineering Major courses.

Program Requirements

Code	Title	Hours
ECON 401	Managerial Economics (GEF 4)	3
WRIT 305	Technical Writing	3
	Total Hours	6

Math and Science Requirements

Code	Title	Hours
MATH 155	Calculus 1 (GEF 3)	4
MATH 156	Calculus 2 (GEF 8)	4
MATH 251	Multivariable Calculus	4
MATH 261	Elementary Differential Equations	4
MATH 448	Probability and Statistics	3
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory	4
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory (GEF 2)	4
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory (GEF 8)	4
	Total Hours	31

Computer Engineering Major Requirements

Code	Title	Hours
CPE 271 & 271L	Introduction to Digital Logic Design and Digital Logic Laboratory	4
CPE 320 & CPE 321	Microprocessor Systems and Microprocessor Systems Laboratory	4
CPE 421	Embedded Systems	4
CPE 442	Introduction to Digital Computer Architecture	3
CS 121	Computer Science 1	4
CS 122	Computer Science 2	4
CS 201	Data Structures	3
CS 220	Discrete Mathematics	3
CS 222	Intro Software Engineering	3
CS 265	C Programming	2

CS 320	Analysis of Algorithms	3
CS 321	Introduction to Networking	3
CS 355	Computer Systems	3
CS 450	Operating Systems Structure	4
EE 101	Introduction to Electrical and Computer Engineering	1
EE 221 & 221L	Introduction to Electrical Engineering and Introduction to Electrical Engineering Laboratory	4
EE 223 & 223L	Electrical Circuits and Electrical Circuits Laboratory	4
EE 311	Junior Instrumentation Lab	1
EE 327	Signals and Systems 1	3
EE 365 & EE 366	Analog Electronics and Analog Electronics Laboratory	4
EE 400	Community Service	0
EE 480	Capstone Project - Design	3
EE 481	Capstone Project - Implementation	3
Computer Engineering Electives		3
CPE 450	Introduction to Microelectronics Circuits	
CPE 455	VLSI Design	
CPE 462	Wireless Networking	
CPE 493	Special Topics	

Total Hours 73

Suggested Plan of Study

First Year

Fall	Hours	Spring	Hours
ENGL 101 (GEF 1)		3 ENGL 102 (GEF 1)	3
MATH 155 (GEF 3)		4 MATH 156 (GEF 8)	4
WVUE 191		1 EE 101	1
CS 121		4 CS 122	4
CHEM 115 & 115L (GEF 8)		4 GEF 5	3
		16	15

Second Year

Fall	Hours	Spring	Hours
MATH 251		4 MATH 261	4
PHYS 111 & 111L (GEF 2)		4 PHYS 112 & 112L (GEF 8)	4
EE 221 & 221L		4 CPE 271 & 271L	4
CS 201		3 EE 223 & 223L	4
CS 265		2	
		17	16

Third Year

Fall	Hours	Spring	Hours
EE 365		3 EE 311	1
EE 366		1 CPE 421	4
EE 327		3 CS 220	3
CPE 320		3 CS 222	3
CPE 321		1 CS 355	3
MATH 448		3	

GEF 6		3		
		17		14
Fourth Year				
Fall	Hours		Spring	Hours
EE 480		3	EE 481	3
CPE 442		3	EE 400	0
CS 320		3	ECON 401	3
CS 321		3	WRIT 305	3
CS 450		4	CPE Elective	3
			GEF 7	3
		16		15

Total credit hours: 126

Major Learning Outcomes

COMPUTER ENGINEERING

1. Problem Solving

Students will attain an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. Engineering Design

Students will attain 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. Effective Communication

Students will attain an ability to communicate effectively with a range of audiences.

4. Engineering Responsibilities

Students will attain 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. Teamwork

Students will attain 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. Engineering Experimentation

Students will attain an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. Learning

Students will attain an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.