

ELECTRICAL ENGINEERING (ELECTROMAGNETICS AND PHOTONICS) - BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Overview

The Electrical Engineering Bachelor of Science program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s), and Similarly Named Engineering Programs. This particular concentration in the B.S. EE program gives students the opportunity to explore more deeply the area of **electromagnetics and photonics**.

Electrical Engineering Program Educational Objectives

Below are the program educational objectives (PEOs) that describe the expected accomplishments of graduate during their first few years after graduation.

1. Our graduates will obtain relevant, productive employment in the private sector, government and/or pursue an advanced degree.
2. Our graduates will be using their engineering foundation to innovate solutions to the problems of the real world.

Transfer Credit Guidelines for Electrical Engineering Degrees

Credit earned at other institutions are generally accepted; however, the following restrictions apply to transfer credits:

- Engineering credit must be earned at an ABET accredited school.
- Physics coursework must be calculus based.
- If the NMSU required course includes a lab, the transfer credit must include a lab.
- A grade of C- or better, must have been earned for transfer coursework.
- E E Courses numbered 300/3000 or higher, Cornerstone and Capstone courses may not be transferred for credit.
- Transfer credits for courses above 300/3000 level are not accepted.

Requirements (123-127 credits)

Students must complete all University degree requirements, which include: General Education requirements, Viewing a Wider World requirements, and elective credits to total at least 124 credits with 48 credits in courses numbered 300 or above. Developmental coursework will not count towards the degree requirements and/or elective credits, but may be needed in order to take the necessary English and Mathematics coursework.

Bachelor of Science in Electrical Engineering students must earn a grade of C- or better in all engineering, technology, math and science courses (including associated prerequisite courses) required for the degree. If a grade lower than C- is earned in any of these courses, the student is required to retake the course immediately the next semester it is offered.

Students who earn a grade less than a C- the first time will be contacted by the department and/or academic advising center and advised about this policy and resources to help in their academic success. If the student

fails to achieve a C- or better in any of these courses a second time, then the student must submit a written request to the Associate Dean of Academics in the College of Engineering to enroll in the course a third time. The student should explain the circumstances impacting their grade and the actions planned to improve their performance.

Prefix	Title	Credits
General Education		
<i>Area I: Communications</i>		
<i>English Composition - Level 1</i>		4
ENGL 1110G	Composition I	
or ENGL 1110H	Composition I Honors	
or ENGL 1110M	Composition I	
<i>English Composition - Level 2¹</i>		3
<i>Oral Communication¹</i>		3
<i>Area II: Mathematics</i>		
MATH 1511G	Calculus and Analytic Geometry I ²	
or MATH 1511H	Calculus and Analytic Geometry I Honors	
<i>Area III: Laboratory Sciences</i>		
CHEM 1215G	General Chemistry I Lecture and Laboratory for STEM Majors	
PHYS 1310G & PHYS 1310L	Calculus -Based Physics I and Calculus -Based Physics I Lab	
<i>Area IV: Social/Behavioral Sciences¹</i>		3
<i>Area V: Humanities¹</i>		3
<i>Area VI: Creative and Fine Arts¹</i>		3
<i>General Education Elective</i>		4
MATH 1521G	Calculus and Analytic Geometry II	
or MATH 1521H	Calculus and Analytic Geometry II Honors	
Departmental/College Requirements		
<i>Program Specific Requirements</i>		
<i>Mathematics and Natural Science</i>		18
MATH 3160	Introduction to Ordinary Differential Equations	
PHYS 1320G & PHYS 1320L	Calculus -Based Physics II and Calculus -Based Physics II Lab	
ENGR 190	Introduction to Engineering Mathematics	
E E 200	Linear Algebra, Probability and Statistics Applications	
E E 240	Multivariate and Vector Calculus Applications	
<i>STEM</i>		6
Choose two STEM Electives ³		
<i>Electrical and Computer Engineering</i>		43
ENGR 120	DC Circuit Analysis	
ENGR 130	Digital Logic	
ENGR 140	Introduction to Programming and Embedded Systems	
ENGR 230	AC Circuit Analysis	
E E 300	Cornerstone Design	
E E 317	Semiconductor Devices and Electronics I	
E E 320	Signals and Systems I	
E E 325	Signals and Systems II	
E E 340	Fields and Waves	
E E 362	Introduction to Computer Organization	
ENGR 401	Engineering Capstone I ⁴	
ENGR 402	Engineering Capstone II	
<i>E E Concentration Required Courses</i>		6-7
E E 454	Antennas and Radiation ⁵	
or E E 541	Antennas and Radiation	

or E E 452	Introduction to Radar	
or E E 548	Introduction to Radar	
E E 473	Introduction to Optics ⁵	
<i>E E Concentration Electives: Choose two courses from the following (one must be an E E course):</i> ⁶		6-8
E E 449	Smart Antennas	
or E E 549	Smart Antennas	
E E 452	Introduction to Radar ⁷	
or E E 548	Introduction to Radar	
E E 453	Microwave Engineering	
or E E 521	Microwave Engineering	
E E 454	Antennas and Radiation ⁷	
or E E 541	Antennas and Radiation	
E E 478	Fundamentals of Photonics	
or E E 528	Fundamentals of Photonics	
CHME 467	Nanoscience and Nanotechnology	
M E 328	Engineering Analysis II	
ASTR 402	Astronomical Observations and Techniques	
MATH 4210	Complex Variables	
MATH 4220	Fourier Series and Boundary Value Problems	
MATH 4230	Applied Linear Algebra	
PHYS 315	Modern Physics	
PHYS 471	Modern Experimental Optics	
Non-Departmental Requirements (in addition to Gen.Ed)		
Viewing a Wider World Electives ⁸		6
<i>Programming Elective</i>		
Select one course from the following:		3-4
CSCI 1240	C++ Programming I ⁹	
or CSCI 4510	C++ Programming	
CSCI 1210	Java Programming ⁹	
or CSCI 4505	Java Programming	
CSCI 1220	Computer Programming Fundamentals: Python ⁹	
or CSCI 4520	Python Programming I	
CSCI 1225	Python Programming II ⁹	
or CSCI 4525	Python Programming II	
CSCI 1720	Computer Science I	
CSCI 2210	Object-Oriented Programming	
Second Language: (not required)		
Electives, to bring the total credits to 123		0
Total Credits		123-127

¹ See the General Education (<https://catalogs.nmsu.edu/nmsu/general-education-viewing-wider-world/>) section of the catalog for a full list of courses.

² MATH 1511G Calculus and Analytic Geometry I is required for the degree but students may need to take any prerequisites needed to enter MATH 1511G Calculus and Analytic Geometry I first.

³ STEM Elective: Course at the 300/3000 level or above from E E that is not used to satisfy any other E E program requirement or courses at the 300/3000 level or above from A E, C E, CHME, I E, M E, ASTR, BIOL, CHEM, CSCI, MATH, PHYS and STAT. Excluded courses include VWW courses and those which are substantially equivalent to an E E course. Click to view a list of excluded STEM Electives (<https://ece.nmsu.edu/undergrad-study/BSEE-STEM-electives.html>).

⁴ The prerequisite for ENGR 401 Engineering Capstone I for BSEE students is E E 300 Cornerstone Design.

⁵ Students must take (E E 454 Antennas and Radiation or E E 541 Antennas and Radiation or E E 452 Introduction to Radar or E E 548 Introduction to Radar) which are currently offered in the Fall semester and E E 473 Introduction to Optics which is currently offered in the Spring semester

⁶ Some of these elective courses may have additional prerequisites.

⁷ This course can satisfy either an E E Concentration Required Course or an E E Concentration Elective, but not both.

⁸ See the Viewing a Wider World (<https://catalogs.nmsu.edu/nmsu/general-education-viewing-wider-world/#viewingawiderworldtext>) section of the catalog for a full list of courses.

⁹ Only one of the 100/1000-level or the 400/4000-level course may be taken to satisfy degree requirements. Students may not take the 100/1000-level of a course to satisfy the programming elective requirement and the 400/4000-level of the same course to satisfy other degree requirements.

A Suggested Plan of Study for Students

This roadmap assumes student placement in MATH 1511G Intermediate Algebra and ENGL 1110G Rhetoric and Composition. The contents and order of this roadmap may vary depending on initial student placement in mathematics and English. It is only a suggested plan of study for students and is not intended as a contract. Course availability may vary from fall to spring semester and may be subject to modification or change.

First Year

Fall		Credits
ENGR 190	Introduction to Engineering Mathematics	4
ENGL 1110G	Composition I	4
or ENGL 1110H	or Composition I Honors	
or ENGL 1110M	or Composition I	
CHEM 1215G	General Chemistry I Lecture and Laboratory for STEM Majors	4
ENGR 120	DC Circuit Analysis	4
Credits		16
Spring		
MATH 1511G	Calculus and Analytic Geometry I ¹	4
or MATH 1511H	or Calculus and Analytic Geometry I Honors	
General Education Course ²		3
ENGR 130	Digital Logic	4
ENGR 140	Introduction to Programming and Embedded Systems	4
Credits		15

Second Year

Fall		Credits
MATH 1521G	Calculus and Analytic Geometry II	4
or MATH 1521H	or Calculus and Analytic Geometry II Honors	
PHYS 1310G & PHYS 1310L	Calculus -Based Physics I and Calculus -Based Physics I Lab	4
E E 200	Linear Algebra, Probability and Statistics Applications	4
ENGR 230	AC Circuit Analysis	4
Credits		16
Spring		
MATH 3160	Introduction to Ordinary Differential Equations	3
PHYS 1320G & PHYS 1320L	Calculus -Based Physics II and Calculus -Based Physics II Lab	4
General Education Course ²		3

Choose one Programming course from the following:	3-4
CSCI 1240 or CSCI 4510	C++ Programming I or C++ Programming
CSCI 1210 or CSCI 4505	Java Programming or Java Programming
CSCI 1220 or CSCI 4520	Computer Programming Fundamentals: Python or Python Programming I
CSCI 1225 or CSCI 4525	Python Programming II or Python Programming II
CSCI 1720	Computer Science I
CSCI 2210	Object-Oriented Programming
E E 240	Multivariate and Vector Calculus Applications
Credits	16-17

Third Year**Fall**

E E 300	Cornerstone Design	2
E E 320	Signals and Systems I	3
E E 340	Fields and Waves	4
General Education Requirement (Area I, IV, V, VI or VWW) ²		3
General Education Requirement (Area I, IV, V, VI or VWW) ²		3
Credits		15

Spring

E E 325	Signals and Systems II	4
E E 317	Semiconductor Devices and Electronics I	4
E E 362	Introduction to Computer Organization	4
General Education Requirement (Area I, IV, V, VI or VWW) ²		3
Credits		15

Fourth Year**Fall**

ENGR 401	Engineering Capstone I	3
Electromagnetics & Photonics Elective ^{5,6}		3-4
E E 454 or E E 541 or E E 452 or E E 548	Antennas and Radiation ³ or Antennas and Radiation or Introduction to Radar or Introduction to Radar	3-4
STEM Elective ^{4,5}		3
General Education Requirement (Area I, IV, V, VI or VWW) ²		3
Credits		15-17

Spring

ENGR 402	Engineering Capstone II	3
E E 473	Introduction to Optics ³	3
Electromagnetics & Photonics Elective ^{5,6}		3-4
STEM Elective ^{4,5}		3
General Education Requirement (Area I, IV, V, VI or VWW) ²		3
Credits		15-16
Total Credits		123-127

¹ MATH 1511G Calculus and Analytic Geometry I is required for the degree but students may need to take any prerequisites needed to enter MATH 1511G Calculus and Analytic Geometry I first.

² See the General Education (<https://catalogs.nmsu.edu/nmsu/general-education-viewing-wider-world/#viewingawiderworldtext>) section of the catalog for a full list of courses.

³ Students must take (E E 454 Antennas and Radiation or E E 541 Antennas and Radiation or E E 452 Introduction to Radar or E E 548 Introduction to Radar) which are currently offered in the Fall semester and E E 473 Introduction to Optics which is currently offered in the Spring semester.

⁴ STEM Elective: Course at the 300/3000 level or above from E E that is not used to satisfy any other E E program requirement or courses at the 300/3000 level or above from A E, C E, CHME, I E, M E, ASTR, BIOL, CHEM, CSCI, MATH, PHYS and STAT. Excluded courses include VWW courses and those which are substantially equivalent to an E E course. Click to view a list of excluded STEM Electives (<https://ece.nmsu.edu/undergrad-study/BSEE-STEM-electives.html>).

⁵ Depending on availability of specific courses in the fall or spring semester, students may need to reorganize the ECE Electives, STEM electives, and/or General Education electives in their final year. Students are strongly advised to consult with their ECE Faculty Mentor for assistance in planning their final year.

⁶ At least one Electromagnetics & Photonics Elective Course must be from the E E Prefix. See E E Concentration Electives in the Degree Requirements section above.