

ELECTRICAL ENGINEERING (ARTIFICIAL INTELLIGENCE, MACHINE LEARNING, & DATA SCIENCE) - BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Overview

The Electrical Engineering BS 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 **communications and signal processing**.

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 (123-124 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 123 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.

BSEE 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. A student may attempt any of these courses no more than three times to earn a passing grade of C- or

better. Students who earn a grade less than a C- will be contacted by the department head or academic advising center and advised about this policy and resources to help in their academic success. If the student fails to pass any of these courses after three attempts, then the student will not be able to continue as an electrical engineering major and will be counseled on other degree options. Students may request an exception to this policy through written appeal to the Associate Dean for Academics in the College of Engineering.

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 Communications¹</i>		3
<i>Area II: Mathematics</i>		
<i>MATH 1511G</i>		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
E E 495	Introduction to Digital Signal Processing ⁵	
E E 465	Machine Learning I ⁵	
<i>E E Concentration Electives: Choose two courses from the following (one must be an E E course):</i> ⁶		6-7
E E 406	Quantum Computing	
E E 444	Advanced Image Processing	
E E 446	Digital Image Processing	
E E 447	Neural Signal Processing	
CSCI 3790	Algorithm Design & Implementation	
CSCI 3720	Data Structures and Algorithms	
CSCI 4425	Introduction to Deep Learning	
CSCI 4430	Graph Data Mining	
CSCI 4405	Artificial Intelligence I	
CSCI 4305	Bioinformatics	
CSCI 4415	Introduction to Data Mining	
CSCI 4215	Parallel Programming	
MATH 3120	Introduction to Analysis	
MATH 3130	Introduction to Geometry	
MATH 3140	Introduction to Numerical Methods	
MATH 4310	Introduction to Topology	
MATH 4230	Applied Linear Algebra	
MATH 4350	Advanced Linear Algebra	
Non-Departmental Requirements (in addition to Gen.Ed)		
Viewing a Wider World Electives ⁷		6
<i>Programming Elective</i>		
Select one course from the following:		3
CSCI 1220	Computer Programming Fundamentals: Python ⁸	
or CSCI 4520	Python Programming I	
CSCI 1225	Python Programming II ⁸	
or CSCI 4525	Python Programming II	
Second Language: (not required)		
Electives, to bring the total credits to 123		0
Total Credits		123-124

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 both E E 495 Introduction to Digital Signal Processing and E E 465 Machine Learning I, both of which are offered in the Fall semester.

⁶ Some of these elective courses may have additional prerequisites.

⁷ 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.

⁸ Only one of the 100-level or the 400-level course may be taken to satisfy degree requirements. Students may not take the 100-level of a course to satisfy the programming elective requirement and the 400-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 Calculus and Analytic Geometry I and ENGL 1110G. 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 or ENGL 1110H or ENGL 1110M	Composition I or Composition I Honors or Composition I	4
CHEM 1215G	General Chemistry I Lecture and Laboratory for STEM Majors	4
ENGR 120	DC Circuit Analysis	4
Credits		16

Spring

MATH 1511G or MATH 1511H	Calculus and Analytic Geometry I ¹ or Calculus and Analytic Geometry I Honors	4
General Education Requirement (Area I, IV, V, VI or VWW) ²		3
ENGR 130	Digital Logic	4
ENGR 140	Introduction to Programming and Embedded Systems	4
Credits		15

Second Year

Fall		Credits
MATH 1521G or MATH 1521H	Calculus and Analytic Geometry II or Calculus and Analytic Geometry II Honors	4
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
E E 240	Multivariate and Vector Calculus Applications	3
Choose one Programming course from the following:		3
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	
General Education Requirement (Area I, IV, V, VI or VWW) ²		3
Credits		16

Third Year

Fall		Credits
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 317	Semiconductor Devices and Electronics I	4
E E 325	Signals and Systems II	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
E E 495	Introduction to Digital Signal Processing ³	3
E E 465	Machine Learning I ³	3
STEM Elective ^{4,5}		3
General Education Requirement (Area I, IV, V, VI or VWW) ²		3
Credits		15
Spring		
ENGR 402	Engineering Capstone II	3
EE Concentration Elective ^{5,6}		3-4
EE Concentration Elective ^{5,6}		3
STEM Elective ^{4,5}		3
General Education Requirement (Area I, IV, V, VI or VWW) ²		3
Credits		15-16
Total Credits		123-124

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

³ Students must take both E E 495 Introduction to Digital Signal Processing and E E 465 Machine Learning I, both of which are offered in the Fall 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 Gen Ed 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 EE Concentration Elective Course must be from the E E Prefix. See E E Concentration Electives in the Degree Requirements section above.