

# ELECTRICAL ENGINEERING (SPACE SYSTEMS ENGINEERING) - BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

## Overview

The Bachelor of Science in Electrical Engineering (B.S. EE) program of the Klipsch School is accredited by the Engineering Accreditation Commission of ABET, Inc. This particular concentration in the B.S. EE program gives students the opportunity to explore more deeply the area of **space systems**.

## 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.

## Requirements (123-126 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 and also courses taken to satisfy the general education requirements for Area I-Communications, Area II-Mathematics, and Area III-Laboratory Sciences. 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
<b>General Education</b>		
<i>Area I: Communications</i>		
<i>English Composition - Level 1</i>		
ENGL 1110G	Composition I	4
<i>English Composition - Level 2<sup>1</sup></i>		
		3
<i>Oral Communication<sup>1</sup></i>		
		3
<i>Area II: Mathematics</i>		

MATH 1511G	Calculus and Analytic Geometry I <sup>2</sup>	4
<i>Area III/IV: Laboratory Sciences and Social/Behavioral Sciences</i>		11
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 Sciences (3 credits)<sup>1</sup></i>		
<i>Area V: Humanities<sup>1</sup></i>		3
<i>Area VI: Creative and Fine Arts<sup>1</sup></i>		3
<i>General Education Elective</i>		
MATH 1521G	Calculus and Analytic Geometry II	4
<b>Viewing A Wider World</b>		
Viewing a Wider World Electives <sup>3</sup>		6
<b>Departmental/College Requirements</b>		
<i>Program Specific Requirements</i>		
<i>Mathematics and Natural Science</i>		
MATH 3160	Introduction to Ordinary Differential Equations	3
PHYS 1320G & PHYS 1320L	Calculus -Based Physics II and Calculus -Based Physics II Lab	4
ENGR 190	Introduction to Engineering Mathematics	4
E E 200	Linear Algebra, Probability and Statistics Applications	4
E E 240	Multivariate and Vector Calculus Applications	3
<i>STEM</i>		
Choose two STEM Electives <sup>4</sup>		6
<i>Electrical and Computer Engineering</i>		
ENGR 120	DC Circuit Analysis	4
ENGR 130	Digital Logic	4
ENGR 140	Introduction to Programming and Embedded Systems	4
ENGR 230	AC Circuit Analysis	4
E E 300	Cornerstone Design	2
E E 317	Semiconductor Devices and Electronics I	4
E E 320	Signals and Systems I	3
E E 325	Signals and Systems II	4
E E 340	Fields and Waves	4
E E 362	Introduction to Computer Organization	4
ENGR 401	Engineering Capstone I <sup>5</sup>	3
ENGR 402	Engineering Capstone II	3
<i>E E Concentration Required Courses</i>		
E E 460	Space System Mission Design and Analysis <sup>6</sup>	3
ASTR 402	Astronomical Observations and Techniques <sup>6</sup>	3
or ASTR 401	Topics in Modern Astrophysics	
or A E 362	Orbital Mechanics	
<i>E E Concentration Electives: Choose two courses from the following (one must be an E E course):<sup>7</sup></i>		6-8
E E 395	Introduction to Digital Signal Processing	
E E 454	Antennas and Radiation	
or E E 541	Antennas and Radiation	
E E 473	Introduction to Optics	
E E 478	Fundamentals of Photonics	
or E E 528	Fundamentals of Photonics	
E E 496	Introduction to Communication Systems	
A E 362	Orbital Mechanics <sup>8</sup>	
ASTR 401	Topics in Modern Astrophysics <sup>8</sup>	
ASTR 402	Astronomical Observations and Techniques <sup>8</sup>	
<b>Non-Departmental Requirements (in addition to Gen.Ed/VWW)</b>		
<i>Programming Elective</i>		

Select one course from the following:	3-4
C S 151 C++ Programming <sup>9</sup>	
or C S 451 C++ Programming	
C S 152 Java Programming <sup>9</sup>	
or C S 452 Java Programming	
C S 153 Python Programming I <sup>9</sup>	
or C S 453 Python Programming I	
C S 154 Python Programming II <sup>9</sup>	
or C S 452 Java Programming	
C S 172 Computer Science I	
C S 271 Object Oriented Programming	
<b>Second Language: (not required)</b>	
<b>Electives, to bring the total credits to 123</b>	<b>0</b>
<b>Total Credits</b>	<b>123-126</b>

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

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> STEM Elective: Course at the 300 level or above from E E that is not used to satisfy any other E E program requirement or courses at the 300 level or above from A E, C E, CHME, I E, M E, ASTR, BIOL, CHEM, C S, 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>).

<sup>5</sup> The prerequisite for ENGR 401 Engineering Capstone I for BSEE students is E E 300 Cornerstone Design.

<sup>6</sup> Students must take E E 460 Space System Mission Design and Analysis which is currently offered in the Spring semester and (ASTR 401 Topics in Modern Astrophysics or ASTR 402 Astronomical Observations and Techniques which are currently offered in the Spring semester or A E 362 Orbital Mechanics which is currently offered in the Fall semester).

<sup>7</sup> Some of these elective courses may have additional prerequisites.

<sup>8</sup> This course can satisfy either an E E Concentration Required Course or an E E Concentration Elective, but not both.

<sup>9</sup> 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 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.

<b>First Year</b>		
<b>Fall</b>		<b>Credits</b>
ENGR 190	Introduction to Engineering Mathematics	4
ENGL 1110G	Composition I	4
CHEM 1215G	General Chemistry I Lecture and Laboratory for STEM Majors	4
ENGR 120	DC Circuit Analysis	4
<b>Credits</b>		<b>16</b>

<b>Spring</b>		
MATH 1511G	Calculus and Analytic Geometry I	4
General Education Requirement (Area I, IV, V, VI or VWW) <sup>2</sup>		3
ENGR 130	Digital Logic	4
ENGR 140	Introduction to Programming and Embedded Systems	4
<b>Credits</b>		<b>15</b>

<b>Second Year</b>		
<b>Fall</b>		
MATH 1521G	Calculus and Analytic Geometry II	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
<b>Credits</b>		<b>16</b>

<b>Spring</b>		
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 Requirement (Area I, IV, V, VI or VWW) <sup>2</sup>		3
Choose one Programming course from the following:		3-4
C S 151 or C S 451	C++ Programming or C++ Programming	
C S 152 or C S 452	Java Programming or Java Programming	
C S 153 or C S 453	Python Programming I or Python Programming I	
C S 154 or C S 454	Python Programming II or Python Programming II	
C S 172	Computer Science I	
C S 271	Object Oriented Programming	
E E 240	Multivariate and Vector Calculus Applications	3
<b>Credits</b>		<b>16-17</b>

<b>Third Year</b>		
<b>Fall</b>		
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) <sup>2</sup>		3
General Education Requirement (Area I, IV, V, VI or VWW) <sup>2</sup>		3
<b>Credits</b>		<b>15</b>

<b>Spring</b>		
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 or VWW) <sup>2</sup>		3
<b>Credits</b>		<b>15</b>

**Fourth Year****Fall**

ENGR 401	Engineering Capstone I	3
Space Systems Elective <sup>3,6</sup>		3-4
Choose one of the following:		3-4
Space Systems Elective <sup>3,4</sup>		
A E 362	Orbital Mechanics	
STEM Elective <sup>4,5</sup>		3
General Education Requirement (Area I, IV, V, VI or VWW) <sup>2,4</sup>		3

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<b>Credits</b>	<b>15-17</b>
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**Spring**

ENGR 402	Engineering Capstone II	3
E E 460	Space System Mission Design and Analysis <sup>6</sup>	3
ASTR 402	Astronomical Observations and Techniques <sup>6</sup>	3
or ASTR 401	or Topics in Modern Astrophysics	
or A E 362	or Orbital Mechanics	
STEM Elective <sup>4,5</sup>		3
General Education Requirement (Area I, IV, V, VI or VWW) <sup>2,4</sup>		3

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<b>Credits</b>	<b>15</b>
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<b>Total Credits</b>	<b>123-126</b>
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<sup>1</sup> 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.

<sup>2</sup> See the General Education and 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.

<sup>3</sup> Students must take E E 460 Space System Mission Design and Analysis which is currently offered in the Spring semester and (ASTR 401 Topics in Modern Astrophysics or ASTR 402 Astronomical Observations and Techniques which are currently offered in the Spring semester or A E 362 Orbital Mechanics which is currently offered in the Fall semester).

<sup>4</sup> STEM Elective: Course at the 300 level or above from E E that is not used to satisfy any other E E program requirement or courses at the 300 level or above from A E, C E, CHME, I E, M E, ASTR, BIOL, CHEM, C S, 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>).

<sup>5</sup> 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/VWW electives in their final year. Students are strongly advised to consult with their ECE Faculty Mentor for assistance in planning their final year.

<sup>6</sup> At least one Space Systems Elective must be from the E E Prefix. See E E Concentration Electives in the Degree Requirements section above.