ELECTRICAL ENGINEERING
- BACHELOR OF SCIENCE IN
ELECTRICAL ENGINEERING

Electrical Engineering Program Educational Objectives
The Klipsch School is dedicated to providing a quality, hands-on, educational experience for our students. 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 (120 credits)

General Education

State of New Mexico Common Core

Area I: Communications
ENGL 111G  Rhetoric and Composition  4
Written Communications Elective  3
Oral Communications Elective  3

Area II: Mathematics
MATH 191G  Calculus and Analytic Geometry I  4

Area III: Natural Science
CHEM 111G  General Chemistry I  4
PHYS 215G  Engineering Physics I  3
PHYS 215GL  Engineering Physics I Laboratory  1

Area IV & V: Social and Behavioral Sciences & Humanities and Fine Arts
Select 15 total credits from Area IV and V, with at least 6 credits from each area:  15

Area IV: Social and Behavioral Sciences:
Select 6-9 credits from Economics, Political Science, Psychology, Sociology, and Anthropology electives  3

Area V: Humanities and Fine Arts:
Select 6-9 credits from History, Philosophy, Literature, Art, Music, Dance, Theater, or Foreign Language electives  2

Institution Specific General Education
Viewing a Wider World Electives (PHIL 323V strongly recommended)  6

Program Specific Requirements

Mathematics and Natural Science
MATH 192G  Calculus and Analytic Geometry II  4
MATH 392  Introduction to Ordinary Differential Equations  3
PHYS 216G  Engineering Physics II  3
PHYS 216GL  Engineering Physics II Laboratory  1
E E 200  Linear Algebra, Probability and Statistics Applications  4
E E 240  Multivariate and Vector Calculus Applications  3

STEM
Select one course from STEM electives  3

Electrical and Computer Engineering
ENGR 100  Introduction to Engineering  3
E E 100  Introduction to Electrical and Computer Engineering  4
E E 112  Embedded Systems  4
E E 212  Introduction to Computer Organization  4
E E 230  AC Circuit Analysis and Introduction to Power Systems  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 402  Capstone Design  3

E E Concentration Courses (14 or 15 cr)  14

Object-Oriented Programming
Select one course from the following (3 or 4 cr):
C S 151  C++ Programming  3
C S 152  Java Programming  3
C S 154  Python Programming II  3
C S 172  Computer Science I  3
C S 271  Object Oriented Programming  3

Total Credits  120

1 See the required courses (http://catalogs.nmsu.edu/nmsu/essential-information-students/general-education-courses) section of the catalog for a full list of courses.
2 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 (http://ece.nmsu.edu/undergraduate/bsee-stem-electives).
3 For a list of approved E E Concentration Courses, see below.

Concentration Courses

Undergraduate students are given the opportunity to specialize in one concentration area. Once fulfilled, this concentration appears on the student’s transcript. Concentrations include a minimum of 11 credits hours of coursework in:

• Communications and Signal Processing
• Computers and Microelectronics
• Control and Power
• Electromagnetics and Photonics
• Space Systems

Alternately, students can elect to have no concentration. In this case students are required to complete 14 or 15 credits hours, which includes one required course from three different concentrations, plus a second STEM elective.
### Concentration: Communications and Signal Processing (14 credits)

**Required:**
- E E 395 Introduction to Digital Signal Processing 4
- E E 496 Introduction to Communication Systems 4

**Choose two, such that at least one has E E prefix:**
- E E 446 Digital Image Processing 4
- E E 447 Neural Signal Processing 4
- E E 460 Space System Mission Design and Analysis 4
- E E 469 Communications Networks 4
- C S 343 Algorithm Design & Implementation 4
- C S 372 Data Structures and Algorithms 4
- C S 453 Python Programming I 4
- C S 475 Computer Security 4
- C S 486 Bioinformatics 4
- MATH 471 Complex Variables 4
- MATH 472 Fourier Series and Boundary Value Problems 4
- MATH 473 Calculus of Variations and Optimal Control 4
- MATH 480 Matrix Theory and Applied Linear Algebra 4
- MATH 481 Advanced Linear Algebra 4
- STAT 470 Probability Theory and Applications 4

**Total Credits:** 14

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### Concentration: Computers and Microelectronics (14 credits)

**Required:**
- E E 462 Computer Systems Architecture 4
- E E 480 Introduction to Analog and Digital VLSI 4

**Choose two, such that at least one has E E prefix:**
- E E 412 ASIC Design 4
- E E 425 Introduction to Semiconductor Devices 4
- E E 443 Mobile Application Development 4
- E E 467 ARM SOC Design 4
- E E 469 Communications Networks 4
- E E 482 Electronics II 4
- E E 485 Analog VLSI Design 4
- E E 486 Digital VLSI Design 4
- CHME 467 Nanoscience and Nanotechnology 4
- C S 343 Algorithm Design & Implementation 4
- C S 370 Compilers and Automata Theory 4
- C S 371 Software Development 4
- C S 372 Data Structures and Algorithms 4
- C S 453 Python Programming I 4
- C S 474 Operating Systems I 4
- C S 478 Computer Security 4
- C S 480 Linux System Administration 4

**Total Credits:** 14

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### Concentration: Control and Power (14 credits)

**Required:**
- E E 431 Power Systems II and Power Systems II Laboratory 4
- E E 475 Automatic Control Systems 4

**Choose two, such that at least one has E E prefix:**
- E E 426 Introduction to Smart Grid 4
- E E 432 Power Electronics 4
- E E 476 Computer Control Systems 4
- E E 493 Power Systems III 4
- CHME 361 Engineering Materials 4
- M E 481 Alternative and Renewable Energy 4
- M E 487 Mechatronics 4
- C S 343 Algorithm Design & Implementation 4
- C S 483 Introduction to Robotics 4
- MATH 480 Matrix Theory and Applied Linear Algebra 4

**Total Credits:** 14

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### Concentration: Electromagnetics and Photonics (14 credits)

**Required:**
- E E 454 Antennas and Radiation 4
- E E 473 Introduction to Optics 4

**Choose two, such that at least one has E E prefix:**
- E E 425 Introduction to Semiconductor Devices 4
- E E 449 Smart Antennas 4
- E E 452 Introduction to Radar 4
- E E 453 Microwave Engineering 4
- E E 478 Fundamentals of Photonics 4
- E E 479 Lasers and Applications 4
- CHME 311 Engineering Data Analysis 4
- CHME 467 Nanoscience and Nanotechnology 4
- M E 328 Engineering Analysis II 4
- ASTR 402 Introduction to Astronomical Observations and Techniques 4
- MATH 471 Complex Variables 4
- MATH 472 Fourier Series and Boundary Value Problems 4
- MATH 480 Matrix Theory and Applied Linear Algebra 4
- PHYS 315 Modern Physics 4
- PHYS 471 Modern Experimental Optics 4

**Total Credits:** 14

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### Concentration: Space Systems (14 credits)

**Required:**
- E E 460 Space System Mission Design and Analysis 3
- A E 362 Orbital Mechanics 3

**Choose two:**
- E E 395 Introduction to Digital Signal Processing 3

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### Concentration: Electrical Engineering - Bachelor of Science in Electrical Engineering

**Concentration: Communications and Signal Processing (14 credits)**

**Required:**
- E E 395 Introduction to Digital Signal Processing 4
- E E 496 Introduction to Communication Systems 4

**Choose two, such that at least one has E E prefix:**
- E E 446 Digital Image Processing 4
- E E 447 Neural Signal Processing 4
- E E 460 Space System Mission Design and Analysis 4
- E E 469 Communications Networks 4
- C S 343 Algorithm Design & Implementation 4
- C S 372 Data Structures and Algorithms 4
- C S 453 Python Programming I 4
- C S 475 Computer Security 4
- C S 486 Bioinformatics 4
- MATH 471 Complex Variables 4
- MATH 472 Fourier Series and Boundary Value Problems 4
- MATH 473 Calculus of Variations and Optimal Control 4
- MATH 480 Matrix Theory and Applied Linear Algebra 4
- MATH 481 Advanced Linear Algebra 4
- STAT 470 Probability Theory and Applications 4

**Total Credits:** 14
E E 454 Antennas and Radiation
E E 473 Introduction to Optics
E E 478 Fundamentals of Photonics
E E 496 Introduction to Communication Systems

Total Credits 14

No Concentration (15 credits)

Choose three required 4-credit courses from 3 different concentrations:

- E E 395 Introduction to Digital Signal Processing
  or E E 496 Introduction to Communication Systems
- E E 462 Computer Systems Architecture
  or E E 480 Introduction to Analog and Digital VLSI
- E E 431 Power Systems II
  & 431 L Power Systems II Laboratory
  or E E 475 Automatic Control Systems
- E E 454 Antennas and Radiation
  or E E 473 Introduction to Optics

Choose a second STEM elective: 1

Total Credits 15

1 Second STEM Elective: A second 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 (http://ece.nmsu.edu/undergraduate/bsee-stem-electives).

The Freshman Year

Incoming freshmen are expected to be eligible for MATH 191G Calculus and Analytic Geometry I. A typical first year of study for E E students includes the following 30 credits:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Freshman</td>
<td></td>
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<tr>
<td>Fall</td>
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<tr>
<td>E E 100</td>
<td>Introduction to Electrical and Computer</td>
<td>4</td>
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<tr>
<td></td>
<td>Engineering</td>
<td></td>
</tr>
<tr>
<td>ENGR 100</td>
<td>Introduction to Engineering</td>
<td>3</td>
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<tr>
<td>ENGL 111G</td>
<td>Rhetoric and Composition</td>
<td>4</td>
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<tr>
<td>MATH 191G</td>
<td>Calculus and Analytic Geometry I 1</td>
<td>4</td>
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<tr>
<td></td>
<td>Credits</td>
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<tr>
<td>Spring</td>
<td></td>
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</tr>
<tr>
<td>CHEM 111G</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>E E 112</td>
<td>Embedded Systems</td>
<td>4</td>
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<tr>
<td>MATH 192G</td>
<td>Calculus and Analytic Geometry II</td>
<td>4</td>
</tr>
<tr>
<td>General Education Requirement from either Area I or IV</td>
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<tr>
<td></td>
<td>Credits</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Total Credits</td>
<td>30</td>
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</tbody>
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1 Eligibility for MATH 191G Calculus and Analytic Geometry I must be established with AP Calculus credit or by taking the Math Placement Exam, administered by the Math Learning Center.

Related Areas of Study

Electrical and computer engineering students wishing to broaden their educational experience may elect to earn additional bachelor’s degrees in:

- Engineering Physics
- Computer Science
- Mathematics
- Physics

Klipsch School students may also choose to earn a minor in one or more of the following fields:

- Computer Engineering
- Computer Science
- Mathematics
- Physics

Students must consult with an academic advisor in the offering department for specific requirements related to additional degrees and minors.

Dual Degree (BS/MS) Program

This program option is designed to provide a means for ECE undergraduates to obtain both a BSEE and a MSEE degree with 144 credit hours of coursework (normally: BSEE = 120 hours, MSEE = 30 hours; total =150 hours). Students electing this option will follow the existing undergraduate curriculum for the first six semesters. In the final undergraduate year, two graduate courses (>500 level) will be taken in lieu of two E E concentration courses. The student receives a BSEE degree at this point. A MSEE program can be completed with 24 additional credit hours. Students must obtain prior approval of the department before starting this program option.

Transfer Credit

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

- Engineering credit must be earned at an ABET accredited school.
- Physics must be calculus based.
- If the NMSU requirement includes a lab, the transfer credit must include a lab.
- A grade of C-, or better, must have been earned.
- E E Concentration Courses, Cornerstone and Capstone courses may not be transferred.
- Upper division E E core classes can only receive transfer credit after review and approval of the course area faculty.