



College of Engineering
The Klipsch School of
Electrical and Computer Engineering

BSEE REQUIREMENTS

2019-2020, Rev 1

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.

This document presents a summary of the requirements for earning a Bachelor of Science degree in Electrical Engineering (BSEE) from New Mexico State University (NMSU). It is intended as a guide, and is in no way meant to replace or amend the 2019-2020 Undergraduate Catalog.

Catalog Selection: The requirements outlined below are specific to the 2019-2020 catalog and may be different from those of other catalogs. The requirements set forth in the 2019-2020 catalog are in effect from the beginning of the 2019 summer term until the end of the 2024 spring term. Students graduating after their catalog of matriculation has expired may meet the requirements of any catalog in effect at the time of graduation. Note, however, that changing catalogs may render classes already taken inapplicable toward graduation. Always check with an advisor before deciding to change catalogs.

Departmental Responsibilities: The Klipsch School is responsible for:

1. Providing current lists of approved elective courses for each category. The lists of approved electives are subject to change at any time. To ensure proper course selection, when registering be sure to use an up-to-date list available at ece.nmsu.edu
2. Assisting students in curriculum planning, selection of electives, and scheduling. Each semester, before registering for classes, all undergraduate students must be advised or mentored. The department office maintains a list of mentor assignments.

Student Responsibilities: *It is the responsibility of each student to ensure that all the requirements for graduation have been met.* In general, each student is responsible for:

1. Following all university regulations, as listed in the 2019-2020 NMSU Catalog. The catalog is the ultimate authority when it comes to regulations, this BSEE REQUIREMENTS handout is merely a summary of the information specific to Electrical Engineering students.

2. Following all college requirements, as listed in the 2019-2020 NMSU catalog. A few of the college requirements are highlighted below:
 - a. **Students must earn a grade of C- or better in all** engineering, technology, math and science **courses required** for the degree and also courses taken to satisfy the general education requirements for Area I-Communications, Area II-Mathematics/Algebra, and Area III-Laboratory Science. If a grade lower than C- is earned in any of these courses, the student is required to retake the course immediately during the next semester it is offered.
 - b. An undergraduate student may attempt an engineering, math, or physical science course no more than three times to earn a passing grade of C- or better. Anytime a student earns less than a C-, a meeting with the appropriate Engineering academic advisor is required to develop a plan for addressing this issue. If the student fails to pass any of these courses **after three attempts**, then the student will not be able to continue as an Engineering major and will be counseled on other degree options.
3. Following all departmental requirements, as listed in the 2019-2020 NMSU catalog. In particular, be aware that elective choices must be made such that:
 - a. The selected course is a **currently** approved elective in the desired category.
 - b. A minimum of 120 credits is completed, of which 45 must be numbered 300-499.
4. Taking courses in the proper sequence. Most courses have co- and/or prerequisites. These are listed in the course descriptions of the 2019-2020 NMSU catalog. A prerequisite **must** have been completed (**with a grade of 'C-', or better**) prior to enrolling in the class, while a co-requisite may be taken either at the same time, or prior to, the class. Enrolling in a class without the proper preparation is grounds for administrative removal from the course, potentially impacting on full-time status, financial aid eligibility, and/or graduation plans

Note also that some prerequisites apply universally and are not listed for individual classes. For example: the university has made ENGL 111 a prerequisite to **all** courses numbered 300-499. The college has made MATH 192 a co-requisite to all engineering courses numbered 300-499.

5. Monitoring their official NMSU email account. Each student is issued an email address in the @nmsu.edu domain. This address is used for official communication and students are responsible for all messages sent to that address.

Transfer Credit: Credit earned at other institutions is generally accepted, however:

- Engineering credit must be earned at an ABET accredited school.
- Physics must be calculus-based.
- If the NMSU requirement includes a laboratory, the transfer credit must include a lab.
- A grade of 'C-', or better, must have been earned.
- Cornerstone and Capstone, and EE Electives may not be transferred.

Table 1

BSEE Degree Requirements 2019-2020

General Education Requirements (41 credits)

State of New Mexico General Education Common Core (35 credits)		Credits
Area I: Written Communication	Two courses ¹	7
Oral Communication	One course ¹	3
Area II: Mathematics	Calculus I (MATH 191)	4
Area III: Laboratory Science	General Chemistry I ² (CHEM 111)	4
	Engineering Physics I ² (PHYS 215)	4
Area IV: Social & Behavioral Sciences	One course ¹	3
Area V: Humanities	One course ¹	3
Area VI: Creative & Fine Arts	One course ¹	3
Gen. Education Elective	Calculus II (MATH 192)	4
NMSU General Education Requirements (6 credits)		
Viewing a Wider World Electives	Two courses ^{1,3}	6

Program Specific Requirements (80-82 credits)

Mathematics & Natural Science (14 credits)		
EE 200 Linear Algebra, Probability and Statistics Applications ²		4
EE 240 Multivariate and Vector Calculus Applications		3
MATH 392 Differential Equations		3
PHYS 216 and PHYS 216L Engineering Physics II ²		4
Engineering (59-61 credits)		
ENGR 100 Introduction to Engineering		3
EE 100 Introduction to Electrical and Computer Engineering ²		4
EE 112 Embedded Systems ²		4
EE 212 Introduction to Computer Architecture and Organization ²		4
EE 230 Circuit Analysis and Introduction to Electronics ²		4
EE 300 Cornerstone Design ⁴		2
EE 317 Semiconductor Devices and Electronics ^{2,4}		4
EE 320 Signals and Systems I ⁴		3
EE 325 Signals and Systems II ^{2,4}		4
EE 333 AC Circuit Analysis and Introduction to Power Systems ^{2,4}		3
EE 340 Fields and Waves ^{2,4}		4
EE 402 or ENGR 401 Capstone Design I ⁴		3
EE 404 or ENGR 402 Capstone Design II ⁴		3
EE Concentration Courses (Four courses from Table 2) ⁴		12 or 13
Two STEM Electives (Two courses from Table 4) ³		6
Object-Oriented Programming (One course from Table 3)		3 or 4

TOTAL 121 - 123

Notes:

1. See the 2019-2020 Undergraduate Catalog for course lists and details.
2. Including laboratory.
3. Three 300+ courses (9 credits) in one specific subject count as a VWW course for that subject. Commonly, E E students take upper division MATH or C S courses as STEM Electives. For that reason, it is advised NOT to take a VWW course from the College of Arts and Sciences, at least until all STEM Electives are chosen.
4. Transfer credit not accepted for all E E courses numbered 300 and above.

Table 2 Electrical and Computer Engineering Concentrations

Select One Concentration Area or No Concentration

Completed Concentration will be Appear on Transcript and Diploma

The sub-fields of Communications and Signal Processing, Computers and Microelectronics, Control and Power, and Electromagnetics and Photonics are significant areas within the broader field of electrical engineering. This concentration give students the opportunity to specialize by a suitable choice of junior/senior elective courses. The goal is to enhance prospects for employment and/or graduate study.

Communications and Signal Processing (12 credits)

Required (3 cr each):

- EE 395 Introduction to Digital Signal Processing
- EE 496 Introduction to Communications Systems

Choose two such that at least one has EE prefix (3 cr each):

- | | |
|---|--|
| EE 444 Advanced Image Processing | C S 477 Digital Game Design |
| EE 446 Digital Image Processing | C S 478 Computer Security |
| EE 447 Neural Signal Processing | C S 483 Introduction to Robotics |
| EE 460 Space System Design, Analysis | C S 486 Bioinformatics |
| EE 469 Communications Networks | MATH 471 Complex Variables |
| EE 497 Digital Communication Systems I | MATH 472 Fourier Series, Boundary Value Prob |
| C S 343 Algorithm Design & Implementation | MATH 473 Calculus of Variations, Optimal Cntrl |
| C S 372 Data Structures and Algorithms (4 cr) | MATH 480 Matrix Theory, Appl. Lin. Algebra |
| C S 453 Python Programming I | MATH 481 Advanced Linear Algebra |
| C S 475 Artificial Intelligence I | MATH 491 Introduction to Real Analysis I |
| C S 476 Computer Graphics I | STAT 470 Probability: Theory & Applications |

Computers and Microelectronics (12 credits)

Required (3 cr each):

- EE 462 Computer Systems Architecture
- EE 480 Introduction to Analog and Digital VLSI

Choose two such that at least one has EE prefix (3 cr each):

- | | |
|--|---|
| EE 412 ASIC Design | C S 343 Algorithm Design & Implementation |
| EE 425 Introduction to Semiconductor Devices | C S 370 Compilers and Automata Theory (4 cr) |
| EE 432 Power Electronics | C S 371 Software Development (4 cr) |
| EE 443 Mobile Application Development | C S 372 Data Structures and Algorithms (4 cr) |
| EE 458 Hardware Security and Trust | C S 453 Python Programming I |
| EE 467 ARM SOC Design | C S 474 Operating Systems I |
| EE 469 Communications Networks | C S 478 Computer Security |
| EE 482 Electronics II | C S 480 Linux System Administration |
| EE 485 Analog VLSI Design | C S 481 Visual Programming |
| CHME 467 Nanoscience and Nanotechnology | C S 482 Database Management Systems I |
| | C S 491 Parallel Programming |

Table 2 continues on next page.

Table 2 (Cont'd)

Control and Power (12 credits)

Required (4 cr each):

EE 431 & EE 431L Power Systems II
EE 493 Power Systems III

Choose two such that at least one has EE prefix (3 cr each):

EE 432 Power Electronics	CHME 361 Engineering Materials
EE 475 Automatic Control Systems	M E 481 Alternative and Renewable Energy
EE 476 Computer Control Systems	M E 487 Mechatronics
C S 343 Algorithm Design & Implementation	MATH 480 Matrix Theory, App. Linear Algebra
C S 483 Introduction to Robotics	

Electromagnetics and Photonics (14 credits)

Required (7 credits):

EE 454 Antennas and Radiation (4 cr)
EE 473 Introduction to Optics (3 cr)

Choose two such that at least one has EE prefix (3 cr each):

EE 425 Introduction to Semiconductor Devices	CHME 467 Nanoscience and Nanotechnology
EE 449 Smart Antennas	M E 328 Engineering Analysis II
EE 452 Introduction to Radar	ASTR 402 Intro to Astronomical Observations
EE 453 Microwave Engineering	MATH 471 Complex Variables
EE 478 Fundamentals of Photonics (4 cr)	MATH 472 Fourier Series, Boundary Value Prob.
EE 479 Lasers and Applications (4 cr)	MATH 480 Matrix Theory, App. Linear Algebra
CHME 311 Engineering Data Analysis	PHYS 315 Modern Physics
	PHYS 471 Modern Experimental Optics

Space Systems Concentration (12 credits)

Required (3 cr each):

EE 460 Space System Mission Design and Analysis
ASTR 402 Intro to Astronomical Observations

Choose two, such that one must be an EE course: (3 cr each):

EE 395 Introduction to Digital Signal Processing
EE 454 Antennas and Radiation (4 cr)
EE 473 Introduction to Optics
EE 478 Fundamentals of Photonics (4 cr)
EE 496 Intro to Communications Systems
A E 362 Orbital Mechanics
ASTR 401 Topics in Modern Astrophysics

No Concentration (12 credits total)

One of the required courses from three different concentrations (9 credits)
A third course from Table 4, STEM Elective (3 credits)

Table 3 Object-Oriented Programming Elective

Select One Course (3 or 4 credits)

C S 151	C++ Programming	(3 cr)
C S 152	Java Programming	(3 cr)
C S 154	Python Programming II	(3 cr)
C S 172	Computer Science I (Java)	(4 cr)
C S 271 ¹	Object-Oriented Programming (C++)	(4 cr)

Notes:

1. Recommended elective, after completing E E 112, Embedded Systems.

Table 4 STEM Electives

Select One Course (3 credits)

1. Any additional 300+ course in E E from Table 2
2. Any 300+ in A E, C E, CHME, I E, M E (see Exception List below)
3. Any 300+ in ASTR, BIOL, CHEM, C S, MATH, PHYS, STAT (see Exception List below)

STEM Elective Exception List (Courses NOT allowed as STEM Electives)

C E/CHME/E E/E T/I E/M E 330	Environmental Management Seminar I
CHME 430	Environmental Management Seminar II
C E 355V ¹	Technology and the Global Environment
CHME 395V ¹	Brewing Science and Society
ASTR 301V ¹	Revolutionary Ideas in Astronomy
ASTR 305V ¹	The Search for Life in the Universe
ASTR 308V ¹	Into the Final Frontier
ASTR 330V ¹	Planetary Exploration
CHEM 310V ¹	Chemistry and Society
C S 450 ²	C Programming
C S 451	C++ Programming (similar to C S 151)
C S 452	Java Programming (similar to C S 152)
C S 460-469	... Transition (courses intended for C S graduate students only)
C S 473 ²	Architectural Concepts I
C S 484 ²	Computer Networks I
C S 494 ²	Introduction to Smart Grids
E E 490 ⁴	Special Topics courses that are 1 credit (for Supplemental Instruction)
MATH 313	Fundamentals of Algebra and Geometry I (for math education majors)
MATH 316	Calculus with Hands-on Applications (for math education majors)
MATH 391 ²	Vector Analysis
MATH 392 ³	Introduction to Ordinary Differential Equations
MATH 411V ¹	Great Theorems: The Art of Mathematics
PHYS 303V ¹	Energy and Society in the New Millennium
PHYS 305V ¹	The Search for Water in the Solar System
PHYS 473 ²	Introduction to Optics
PHYS 477 ²	Fiber Optic Communication
PHYS 478 ²	Fundamentals of Photonics
PHYS 479 ²	Lasers and Applications
STAT 371 ²	Statistics for Engineers and Scientists I

Notes:

1. All Viewing a Wider World Courses NOT allowed
2. Courses with similar/same content found in E E courses NOT allowed
3. BSEE program required course
4. E E 490 Special Topics 3 credit courses are allowed as STEM electives

Table 5Co- and Pre-requisites, (**Required courses in 2019-2020 catalog in bold**)

Course	Title	Pre-requisites ¹	Pre/Co-requisites
E E 100	Intro to Electrical & Computer Engineering		MATH 190
E E 112	Embedded Systems		E E 100
E E 200	Linear Algebra, Probability, Statistics Apps	E E 112 and MATH 192	
E E 212	Intro to Computer Archit. & Organization	E E 100 and MATH 190	E E 112
E E 230	Circuit Analysis & Intro to Electronics	E E 100 and MATH 192	PHYS 216
E E 240	Multivariate and Vector Calculus Apps	E E 112 and MATH 192	
E E 300	Cornerstone Design	E E 112, E E 212 and E E 230	
E E 317	Semicond. Devices & Electronics I	E E 230 and CHEM 111	
E E 320	Signals & Systems I	E E 200 and E E 230	MATH 392
E E 325	Signals & Systems II	E E 320 and MATH 392	
E E 333	AC Circuit Analysis & Intro to Power Sys.	E E 230	
E E 340	Fields and Waves	E E 230, E E 240, and PHYS 216	
E E 395	Introduction to Digital Signal Processing	E E 325	
E E 400	Undergraduate Research	Consent of Instructor	
E E 402	Capstone Design I	E E 300, E E 317, E E 325, E E 333 & E E 340	
E E 404	Capstone Design II	E E 300, E E 317, E E 325, E E 333, E E 340 & E E 402	
E E 412	ASIC Design		E E 480
E E 425	Introduction to Semiconductor Devices	E E 317 and E E 340	
E E 431	Power Systems II	E E 333	
E E 432	Power Electronics	E E 317 and E E 333	E E 325
E E 443	Mobile Application Development	C S 151, C S 152, C S 172, C S 271, C S 451 or C S 452	
E E 444	Advanced Image Processing	E E 446	
E E 446	Digital Image Processing	E E 395	
E E 447	Neural Signal Processing	E E 325	
E E 449	Smart Antennas	E E 325 and E E 340	
E E 452	Introduction to Radar	E E 325 and E E 340	
E E 453	Microwave Engineering	E E 340	
E E 454	Antennas and Radiation	E E 340	
E E 458	Hardware Security and Trust	E E 212	
E E 460	Satellite Design	Junior Standing (really PHYS 216)	
E E 461	Program Management	Junior Standing (recommended PHYS 216)	
E E 462	Computer Systems Architecture I	E E 212	
E E 465	Machine Learning I	E E 200	
E E 467	ARM SOC Design	E E 212 and E E 317	
E E 469	Digital Communications Networks	E E 100, E E 112 and (E E 200 or STAT 371)	
E E 473	Introduction to Optics	PHYS 216 or PHYS 217	
E E 475	Automatic Control Systems	E E 325	
E E 476	Computer Control Systems	E E 325	
E E 478	Optical Sources, Detectors, and Radiometry	PHYS 216 or PHYS 217	
E E 479	Lasers and Applications	E E 340 or PHYS 461	
E E 480	Introduction to VLSI	E E 212 and E E 317	
E E 482	Electronics II	E E 317	
E E 485	Analog VLSI Design	E E 320 and E E 480	
E E 490	Selected Topics	Consent of Instructor	
E E 493	Power Systems III	E E 333	E E 431
E E 496	Introduction to Communications Systems	E E 325	
E E 497	Digital Communications Systems I	E E 200 and E E 325	

Notes: 1. A grade of C-, or better, is required in all STEM courses for the major.

Table 6

Equivalent Courses between New and Old Curricula

New Curriculum (2016+ Catalog)		Old Curriculum (Prior to 2016 Catalog)	
Course	Title	Course	Title
E E 100	Introduction to Electrical & Computer Engin.	E E 162	Digital Circuit Design
E E 112	Embedded Systems	E E 161	Computer Aided Prob. Solving AND
		E E 260	Embedded Systems
E E 200	Linear Algebra, Probability, Statistics Apps	E E 210	Engineering Analysis I
E E 212	Intro to Computer Archit. & Organization	E E 363	Computer Systems Architecture I
E E 230	Circuit Analysis & Intro to Electronics	E E 280	DC & AC Circuits
E E 240	Multivariate and Vector Calculus Apps	E E 310	Engineering Analysis II
E E 300	Cornerstone Design		No equivalent course
E E 317	Semiconductor Devices and Electronics	E E 380	Electronics I
E E 320	Signals & Systems I	E E 312	Signals & Systems I
E E 325	Signals & Systems II	E E 314	Signals & Systems II
E E 333	AC Circuit Analysis & Intro to Power Sys.	E E 391	Intro to Electric Power Engineering
E E 340	Fields and Waves	E E 351	App. Electromagnetics
E E 402	Capstone Design I	E E 418	Capstone Design I
E E 404	Capstone Design II	E E 419	Capstone Design II

2019-2020 BSEE Roadmap (Sample Degree Plan)

(121 – 123 Credits)

FRESHMAN-FIRST YEAR			
FALL SEMESTER		SPRING SEMESTER	
Course #	CR	Course #	CR
EE 100 Intro Electrical & Comp. Engin.	4	CHEM 111 General Chemistry I	4
ENG 100 Freshman Experience	3	EE 112 Embedded Systems	4
ENGL 111G Rhetoric & Composition	4	MATH 192 Calculus II	4
MATH 191 Calculus I	4	<i>General Edu Req (I,IV,V, VI or VWW)</i>	3
	15		15

SOPHOMORE-SECOND YEAR			
FALL SEMESTER		SPRING SEMESTER	
Course #	CR	Course #	CR
EE 212 Intro Comp Arch & Org	4	MATH 392 Differential Equations	3
EE 200 Linear Alg, Prob & Stat Apps	4	EE 230 Circuits & Intro Electronics	4
PHYS 215 + 215L Physics I	4	EE 240 Multivariate & Vector Calc Apps	3
<i>General Edu Req (I,IV,V, VI or VWW)</i>	3	PHYS 216 + 216L Physics II	4
		<i>General Edu Req (I,IV,V, VI or VWW)</i>	3
	15		17

JUNIOR-THIRD YEAR			
FALL SEMESTER		SPRING SEMESTER	
Course #	CR	Course #	CR
EE 300 Cornerstone Design	2	EE 317 Semicond. & Electronics	4
EE 320 Signals & Systems I	3	EE 325 Signals & Systems II	4
EE 340 Fields & Waves	4	EE Concentration Required	3
EE 333 AC Circuits & Intro Power Sys.	3	<i>General Edu Req (I,IV,V or VWW)</i>	3
<i>General Edu Req (I,IV,V or VWW)</i>	3		
	15		14

SENIOR-FOURTH YEAR			
FALL SEMESTER		SPRING SEMESTER	
Course #	CR	Course #	CR
EE 402 or ENGR 401 Capstone Design I	3	EE 404 or ENGR 402 Capstone Des. II	3
EE Concentration Required	3	EE Concentration Elective	3
EE Concentration Elective (or 4 CR)	3	STEM Elective	3
STEM Elective	3	OO Programming Elective (or 4 CR)	3
<i>General Edu Req (I,IV,V, VI or VWW)</i>	3	<i>General Edu Req (I,IV,V, VI or VWW)</i>	3
(or 16 CR)	15	(or 16 CR)	15

2019-2020 BSEE Roadmap (Sample Degree Plan) (121 – 123 Credits)

Freshman		Sophomore		Junior		Senior	
15 credits	15 credits	15 credits	17 credits	15 credits	14 credits	15-16 credits	15-16 credits
4	4	4	3	4	4	3	3
MATH 191 Calculus I	MATH 192 Calculus II	E E 200 Linear Algebra, Prob. & Stat	E E 240 Multivariate & Vector Calc.	E E 340 Fields and Waves	E E 317 Semiconductors & Electronics	E E 402 or ENGR 401 Capstone Des. I	E E 404 or ENGR 402 Capstone Des. II
MATH 190 or MATH PLCMNT	MATH 191	E E 112 & MATH 192	E E 112 & MATH 192	E E 230, E E 240 & MATH 192	CHEM 111 & E E 230	E E 300, 317, 325 & E E 333, 340	E E 300, 317, 325 E E 333, 340, 402
3	4	4	4	3	4	3	3-4
ENGR 100 Intro to Engineering <i>(MATH 121)</i>	CHEM 111 General Chemistry I MATH 120	PHYS 215+215L Engineering Physics I MATH 191	PHYS 216+216L Engineering Physics II MATH 192 & PHYS 215	E E 320 Signals and Systems I E E 200 & E E 230 <i>(MATH 392)</i>	E E 325 Signals and Systems II E E 320 & MATH 392	E E Concentration Required 2 of 2	Object-Oriented Programming Elective
4	4	4	4	3	3	3-4	3
E E 100 Intro Elect. Engineering <i>(MATH 190)</i>	E E 112 Embedded Systems <i>(E E 100)</i>	E E 212 Computer Organization E E 100 & MATH 190 <i>(E E 112)</i>	E E 230 Circuits & Intro Electronics EE 100, MATH 192 <i>(PHYS 216)</i>	E E 333 AC Circuits & Intro Power Sys. E E 230	E E Concentration Required 1 of 2	E E Concentration Elective 1 of 2	E E Concentration Elective 2 of 2
4	3	3	3	2	3	3	3
ENGL 111 Rhetoric & Composition ENGLISH PLCMNT	COMM 265 Princ. Human Communication	ENGL 218 Technical & Sci. Communication ENGL 111	MATH 392 Differential Equations MATH 192	E E 300 Cornerstone Design E E 212 & E E 230	General Education Area IV, V, or VI 3 of 3	STEM Elective 1 of 2	STEM Elective 1 of 2
<u>LEGEND</u> Pre-requisite example – E E 100 Co-requisite example – <i>(MATH 190)</i>			3	3		3	3
			General Education Area IV, V, or VI 1 of 3	General Education Area IV, V, or VI 2 of 3		Gen. Ed. Viewing a Wider World 1 of 2	Gen. Ed. Viewing a Wider World 2 of 2

ECE Core Curriculum Flowchart (2019-2020)

