

Electrical and Computer Engineering, Nanoelectronics and Nanotechnology (BSECE)

Electrical Engineering Advanced Technical Component Area Nanoelectronics and Nanotechnology

Students in this technical component area learn about the materials and devices used in modern electronic and optoelectronic systems. Through required and electives courses, students learn about the fundamentals of charge transport and interactions with light in semiconductors. They learn about devices beginning with diodes and transistors, the building blocks of integrated circuits, and extending to photodiodes, semiconductor lasers, photodetectors and photovoltaic devices. They learn about microelectronics fabrication techniques. And they are introduced to quantum mechanics, particularly as it applies to electronic and optoelectronic materials and devices. Students may also explore device applications through digital and analog circuit design. With exposure to the topics in this area, students are well positioned to work in a wide variety of fields that rely on semiconductor devices, such as computers, telecommunications, the automotive industry, and consumer electronics.

Total Hours Required: 125

Plan of Study

The Plan of Study is a suggested four-year course sequence to support academic planning and serves as a helpful guide. Currently enrolled students should meet with their academic advisor to tailor their course selections and timelines to their individual goals and circumstances.

Course	Title	Hours
Year 1		
Semester 1		
ECE 302	Introduction to Electrical Engineering	3
ECE 306	Introduction to Computing	3
M 408C	Differential and Integral Calculus	4
RHE 306	Rhetoric and Writing	3
First-Year Signature Course (090)		3
Hours		16
Semester 2		
ECE 319K	Introduction to Embedded Systems	3
M 408D	Sequences, Series, and Multivariable Calculus	4
PHY X03K & PHY X05M	Engineering Physics I and Laboratory For Physics 302K, 303K, and 317K	4
Visual and Performing Arts (050)		3
Free Elective		1
Hours		15
Year 2		
Semester 1		
ECE 411	Circuit Theory	4
M 427J	Differential Equations with Linear Algebra	4
PHY X03L & PHY X05N	Engineering Physics II and Laboratory For Physics 302L, 303L, and 317L	4

Social and Behavioral Sciences (080)		3
Hours		15
Semester 2		
ECE 312	Software Design and Implementation I	3
ECE 313	Linear Systems and Signals	3
M 340L	Matrices and Matrix Calculations	3
Free Elective		3
Humanities (040)		3
Hours		15
Year 3		
Semester 1		
ECE 333T	Engineering Communication	3
ECE 351K	Probability and Random Processes	3
M 427L	Advanced Calculus for Applications II	4
ECE 325	Electromagnetic Engineering	3
GOV 310L	American and Texas Government	3
Hours		16
Semester 2		
Advanced technical elective		3
ECE 339	Solid-State Electronic Devices	3
ECE 440	Integrated Circuit Nanomanufacturing Techniques	4
ECE 334K	Quantum Theory of Electronic Materials	3
Free elective (mathematics or basic science)		4
Hours		17
Year 4		
Semester 1		
ECE 364D	Introduction to Engineering Design	3
Free Elective		3
ECE 348	Laser and Optical Engineering	3
U.S. History (060)		3
ECE 347	Modern Optics	3
Hours		15
Semester 2		
ECE 464K	Senior Design Project	4
Free Elective		3
ECE 339S	Solar Energy Conversion Devices	3
U.S. History (060)		3
GOV 312L	Issues and Policies in American Government	3
Hours		16
Total Hours		125

Requirements

All requirements are listed below, starting with the most specialized moving to the most general. Additional requirements may follow the table, so be sure to read the entire page. Some required courses listed below may also satisfy [General Education](#) requirements, including [Core Curriculum](#).

Code	Title	Hours
Concentration		
ECE 325	Electromagnetic Engineering	3
ECE 339	Solid-State Electronic Devices	3
ECE 440	Integrated Circuit Nanomanufacturing Techniques	4
M 427L	Advanced Calculus for Applications II	4
Hours chosen from:		12
ECE 334K	Quantum Theory of Electronic Materials	
ECE 438	Fundamentals of Electronic Circuits I Laboratory	
ECE 338L	Analog Integrated Circuit Design	
ECE 339S	Solar Energy Conversion Devices	
ECE 347	Modern Optics	
ECE 348	Laser and Optical Engineering	
ECE 360S	Digital Integrated Circuit Design	

ECE 460R	Introduction to VLSI Design	
<i>Subtotal</i>		26
Degree (see details below)		61
Free electives: Additional coursework to reach total hours required.		11
<i>Subtotal</i>		72
General Education		
<u>Remaining Core Curriculum (42 hours total)</u>		27
<u>Foreign Language other than English, Beginning Proficiency</u>		
<i>Subtotal</i>		27
<u>College Requirements - Engineering</u>		
<u>General University Requirements</u>		
Total Hours		125

Degree-Bachelor of Science in Electrical and Computer Engineering

Code	Title	Hours
<i>Electrical and Computer Engineering Courses</i>		
ECE 302	Introduction to Electrical Engineering (part II science and technology)	3
or ECE 302H	Introduction to Electrical Engineering: Honors	
ECE 306	Introduction to Computing	3
ECE 411	Circuit Theory	4
ECE 312	Software Design and Implementation I	3
or ECE 312H	Software Design and Implementation I: Honors	
ECE 313	Linear Systems and Signals	3
ECE 319K	Introduction to Embedded Systems	3
or ECE 319H	Introduction to Embedded Systems: Honors	
ECE 333T	Engineering Communication	3
ECE 351K	Probability and Random Processes	3
ECE 364D	Introduction to Engineering Design	3
or ECE 364E	Interdisciplinary Entrepreneurship	
Hours chosen from: senior design project		4
ECE 464G	Multidisciplinary Senior Design Project	
ECE 464H	Honors Senior Design Project	
ECE 464K	Senior Design Project	
ECE 464R	Research Senior Design Project	
ECE 464S	Start-Up Senior Design Project	
<i>Advanced Technical Elective: Within Any Core of Electrical Engineering</i>		
Within any core of Electrical Engineering, Hours chosen from:		3
One upper-division electrical engineering course		
ECE 316	Digital Logic Design	
<i>Mathematics</i>		
Choose a sequence below:		8
Sequence 1:		
M 408C	Differential and Integral Calculus	
M 408D	Sequences, Series, and Multivariable Calculus	
Sequence 2:		
M 408K	Differential Calculus	
M 408L	Integral Calculus	
M 408M	Multivariable Calculus	
M 427J	Differential Equations with Linear Algebra	4
M 340L	Matrices and Matrix Calculations	3
<i>Physics</i>		
PHY 303K	Engineering Physics I	3
PHY 105M	Laboratory For Physics 302K, 303K, and 317K	1

PHY 303L	Engineering Physics II	3
PHY 105N	Laboratory For Physics 302L, 303L, and 317L	1
<i>Rhetoric and Writing</i>		
RHE 306	Rhetoric and Writing	3
Total Hours		61

Additional Requirements and Policies

Enrollment in ECE 333T, ECE 160, ECE 260, ECE 360, ECE 460, and ECE 379K requires completion of ECE 312 or ECE 313 with a grade of at least C-.

Pre-approved courses are used to fulfill technical core, advanced math and/or science and core technical electives; other elective courses must be approved by the electrical and computer engineering faculty before the student enrolls in them.

Transfer Coursework: No more than 25 semester credit hours of transfer electrical and computer engineering coursework may be counted for credit toward the electrical and computer engineering degree.

Free Electives Policy

Must include at least one advanced mathematics or basic science course (three hours); no more than three hours of lower-division coursework; all coursework must count for a major in the offering department; all coursework must be taken in residence, except that up to three credit hours can be transferred with approval; no course can duplicate a course the student has taken or is required to take as part of the other Electrical and Computer Engineering coursework requirements.

Upper-Division Technical Component Areas

Electrical and computer engineering students must choose an advanced technical component area from the electrical engineering or computer engineering concentrations. Concentrations give students the flexibility to tailor their upper-division academic program to meet a variety of career goals, while ensuring that they graduate with a robust grounding in one or more selected technical or specialty areas.

For all concentrations, the student must complete all courses in the area on the letter-grade basis. Detailed guidelines for choosing areas and elective courses within each area are published on the electrical and computer engineering department website. Approved electives for each area may be subject to periodic change as needs arise.

Electrical Engineering Option

Advanced Technical Component (mathematics) is four hours and one Advanced Technical Component Requirement is three hours.

Computer Engineering Option

Advanced Technical Component (mathematics) is three hours and one Advanced Technical Component Elective is four hours.

Alternate Mathematics Courses

For students who choose an advanced technical component area in computer engineering:

Code	Title	Hours
M 427L	Advanced Calculus for Applications II	4
M 328K	Introduction to Number Theory	3
M 343K	Introduction to Algebraic Structures	3
M 344K	Intermediate Symbolic Logic	3
M 348	Scientific Computation in Numerical Analysis	3
M 358K	Applied Statistics	3

M 374M	Mathematical Modeling in Science and Engineering	3
C S 341	Automata Theory	3
C S 346	Cryptography	3

For students who choose an advanced technical component area in electrical engineering:

Code	Title	Hours
M 325K	Discrete Mathematics	3
M 328K	Introduction to Number Theory	3
M 346	Applied Linear Algebra	3
M 348	Scientific Computation in Numerical Analysis	3
M 358K	Applied Statistics	3
M 361	Theory of Functions of a Complex Variable	3
M 362M	Introduction to Stochastic Processes	3
M 372K	Partial Differential Equations and Applications	3
M 374	Fourier and Laplace Transforms	3
M 374M	Mathematical Modeling in Science and Engineering	3