

BSEE Degree Plan
Bachelor of Science in Electrical Engineering: 2015-16

Freshman Year

Fall Semester Hrs		Spring Semester Hrs	
ENG 1003 Composition I	3	ENG 1013 Composition II	3
ENGR 1402 Concepts of Engineering	2	PHYS 2034 University Physics I	4
MATH 2204 Calculus I	4	ENGR 1412 Software Applications for Engineers	2
CHEM 1011 General Chemistry I Lab	1	MATH 2214 Calculus II	4
SCOM 1203 Oral Communications	3	ENGR 2421 Electric Circuits I lab	1
CHEM 1013 General Chemistry I	3	ENGR 2423 Electric Circuits I	3
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	16		17

Sophomore Year

Fall Semester Hrs		Spring Semester Hrs	
EE 2322 Electrical Workshop	2	CS 2114 Structured Programming	4
ENGR 2401 Applied Engineering Statistics	1	EE 3313 Electric Circuits II	3
ENGR 2403 Statics	3	EE 3331 Digital Electronics I Lab	1
PHYS 2044 University Physics II	4	EE 3333 Digital Electronics I	3
MATH 3254 Calculus III	4	ENGR 3443 Engineering Thermodynamics I	3
+ Humanities Elective	<u>3</u>	MATH 4403 Differential Equations	<u>3</u>
	17		17

Junior Year

Fall Semester Hrs		Spring Semester Hrs	
EE 3343 Engineering Fields & Waves	3	EE 3373 Probability and Random Signals	3
EE 3353 Signals and Systems	3	EE 3383 Principles and Practices in Electrical Eng	3
EE 3363 Semiconductor Materials and Devices	3	EE 4333 Communications Theory	3
EE 3401 Electronics I Lab	1	EE 4373 Electronics II	3
EE 3403 Electronics I	3	EE 4773 Electronics II Lab	<u>3</u>
ENGR 4453 Num. Methods for Engineers	<u>3</u>		15
	16		

Senior Year

Fall Semester Hrs		Spring Semester Hrs	
EE 4313 Control Systems	3	++ EE Elective	3
EE 4353 Power Systems	3	++ EE Elective	3
ENGR 3433 Engineering Economics	3	ENGR 4483, Senior Design II	2
ENGR 4463 Senior Design I	3	+++Technical Elective	3
ENGR 4401 Senior Seminar	1	+Fine Arts Elective	3
+ Social Science Elective	<u>3</u>		<hr style="width: 100%; border: 0.5px solid black;"/>
	16		14

TOTAL 128

- Text in **RED** indicates change in the title with the old course number
- Text in **GREEN** indicates a new course with new course number in **BLUE**

Summary:

Gen Ed: 38 credits

Communication (ENG 1003, ENG 1013, and SCOM 1203)	9	
Mathematics (MATH 2204)	4	
Arts (MUS 2503, THEA 2503, or ART 2503)	3	
Humanities (ENG 2003, ENG 2013, or PHIL 1103)	3	
Social Science (HIST 2763, HIST 2773, or POSC 2103)	3	
Higher Math (MATH 2214, and MATH 3254)	8	
Science (CHEM 1013, CHEM 1011, and PHYS 2034)	8	
Total	38	38

Required Math and Science : 07 credits

MATH 4403 Differential Equations	3	
PHYS 2044 University Physics II	4	
Total	07	45

Engineering Core Courses

ENGR 1402 Concepts of Engineering	2	
ENGR 1412 Software Applications for Engineers	2	
ENGR 2401 Applied Engineering Statistics	1	
ENGR 2403 Statics	3	
ENGR 2423 Electric Circuits I	3	
ENGR 2421 Electric Circuits I Lab	1	
ENGR 3433 Engineering Economics	3	
ENGR 3443 Engineering Thermodynamics	3	
ENGR 4401 Senior Seminar	1	
ENGR 4453 Numerical Methods for Engineers	3	
ENGR 4464 Senior Design I	3	
ENGR 4482 Senior Design II	2	
Total	27	72

Electrical Engineering Foundation: 33 credits

CS 2114 Structured Programming	4	
EE 2322 Electrical Workshop (Sophomore level)	2	
EE 3313 Electric Circuits II	3	
EE 3331 Digital Electronics I Lab	1	
EE 3333 Digital Electronics I	3	
EE 3343 Engineering Fields and Waves	3	
EE 3353 Signals and Systems	3	
EE 3363 Semiconductor Materials and Devices	3	
EE 3373 Probability and Random Signals (Junior level)	3	
EE 3383 Principles and Practices in Electrical Engineering	3	
EE 3401 Electronics I Lab	1	
EE 3403 Electronics I	3	
EE 4333 Communication Theory	3	
Total	35	107

Electrical Engineering Design and Analysis: 12 credits

EE 4313 Control Systems	3	
EE 4353 Power Systems	3	
EE 4373 Electronics II	3	
EE 4773 Electronics II Lab	3	
Total	12	119

++ Suggested Electrical Engineering Electives (any two): 6/7 credits

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|----|---|---|
| 1. | EE 4303 Electromagnetic Waves | 3 |
| 2. | EE 4323 Electrical Machinery | 3 |
| 3. | EE 4343 Digital Signal Processing | 3 |
| 4. | EE 4344 Embedded Systems | 4 |
| 5. | EE 4354 Intelligent Control Systems | 4 |
| 6. | EE 4383 Digital Electronics II | 3 |
| 7. | EE 4393 Digital Communications | 3 |
| 8. | Any upper level Computer Science course | 3 |

Electrical Engineering electives can be chosen from the above by the candidate, approved by the advisor and the director.

Total	6-8	125-127
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+++ Suggested Technical Elective (any one) : 3 credits

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|----|--|---|
| 1. | ENGR 2413 Mechanics of Materials | 3 |
| 2. | ME 3613 Control Systems for Mechanical Engineers | 4 |
| 3. | ENGR 3423 Dynamics | 3 |
| 4. | PHYS 3303 Modern Physics | 3 |
| 5. | Any upper level Math Course | 3 |
| 6. | Any upper level Computer Science course | 3 |
| 7. | Any upper level Engineering course | 3 |

Technical elective can be chosen from the above, approved by the advisor and the director.

Total	3	128-130
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Electrical Engineering (EE): Course Descriptions

EE 2322 Electrical Workshop

Develop understanding and skills related to various workshop processes involved in electrical engineering. Workshop safety, electrical wiring and assembly, winding practice, domestic electrical appliances, soldering and de-soldering techniques, electronic project construction techniques, use of electronic bench equipment, preparation of reports. Prerequisite, C or better in PHYS 2044, Corequisite: ENGR 2423 and ENGR 2421. Fall.

EE 3313 Electric Circuits II

Transient analysis, average power, RMS values, mutual inductance, transformers, resonance, network theorems and principles, polyphase networks, complex power, and introduction to Fourier series and transforms. Prerequisite, C or better in MATH 2214 and ENGR 2423. Spring.

EE 3331 Digital Electronics I Laboratory

Experimentation and design with digital electronic and computer components and circuits including logic gates, flip flops, counters, and registers. Practical applications in timing and control. Logic families such as TTL, ECL, and CMOS. Prerequisite, C or better in ENGR 2421. Corequisite, EE 3333. Spring, Fall.

EE 3333 Digital Electronics I

Introduction to the analysis and design of digital and computer circuits, Boolean algebra, binary arithmetic, combinational logic, sequential logic, registers, counters, adders, comparators, and computer organization. Prerequisite, C or better in either CS 2114 or ENGR 2423. Fall.

EE 3343 Engineering Fields and Waves

Study of time invariant electric and magnetic fields in free space and in materials, electrical current flow as a function of electric field, magnetic flux, interaction of magnetic fields with electrical current and voltage, electrical and magnetic potentials, time changing electric and magnetic fields, and introduction to Maxwell's Equations. Prerequisites, C or better in MATH 3254 and EE 3313. Fall.

EE 3353 Signals and Systems Methods of analysis of continuous and analog systems and associated synthesis, simulation, and design, system response in the time and frequency domains, Laplace transforms, Fourier series and transforms, transfer functions, and convolution. Prerequisite, C or better in EE 3313. Corequisite, MATH 4403. Fall.

EE 3363 Semiconductor Materials and Devices

Semiconductor materials and theory of solid state electronic devices. Semiconductor growth and processing techniques. Semiconductor parameters such as bandgap, mobility, carrier densities, diffusion length, carrier lifetime, and energy level distribution. P-n junctions and Schottky barriers. Various semiconductor devices, Constraints, limitations, and fabrication processes for various devices. Prerequisite, C or better in CHEM 1013, PHYS 2034, Co-requisite EE 3403. Fall.

EE 3373 Probability and Random Signals

Application of probabilistic models and analysis techniques to engineering signals and systems with inherent randomness. Topics include probability theory, probability density functions, random variables, random vectors, estimation, detection, discrete and continuous processes, modeling, and power spectra. Prerequisites C or better in EE 3313, Corequisite MATH 4403. Spring.

EE 3383 Principles and Practices in Electrical Engineering

Principles of and good practices in electrical engineering, professional organizations, literature, intellectual property, licensure, ethics and regulations, vendors, products, specifications, procurement, communications and human relations, resource management, product certification and manufacturability, and modern tools and issues. Prerequisites, C or better in EE 3313 and EE 3403. Spring.

EE 3401 Electronics I Laboratory

Basic laboratory experiments in electronic circuits and solid state electronic devices. Prerequisite, C or better in ENGR 2421, Corequisite, EE 3403. Fall.

EE 3403 Electronics I

Theory, analysis, and introductory design of diode, bipolar junction transistor, operational amplifier, and field effect transistor devices and circuits. Prerequisite, C or better in ENGR 2423. Fall

EE 4303. Electromagnetic Waves

Study of electromagnetic waves in free space, dielectrics, and conductors, transmission lines, polarization, reflection, refraction, diffraction, waveguides, resonators, antennas, and radiation. Prerequisites, C or better in EE 3343 or PHYS 2044, and MATH 4403. Dual listed as EE 5303. Demand.

EE 4313 Control Systems

Analysis and design of linear feedback systems. Transfer functions, transient and steady state characterization, stability determination. Closed loop analysis and design using root locus and frequency domain methods. Prerequisites, C or better in MATH 4403, EE 3353, EE 3403, EE 3401. Fall

EE 4323 Electrical Machinery

Introduction to the analysis and design of electromechanical energy conversion systems, magnetic circuit theory, general transformer and machinery theory, and DC and AC motors and generators. Prerequisite, C or better in EE 3313 or ENGR 3423. Spring

EE 4333 Communication Theory

Fundamentals of communication systems. Review of signals and systems (mainly Fourier analysis). Analog and digital signals. Error detection and correction techniques. Analog carrier modulation techniques like amplitude modulation, frequency modulation and phase modulation for transmitting and receiving information signals. Channel noise, and performance of the various modulation techniques in the presence of channel noise. Methods of digital transmission of analog signals (Binary and M-ary PCM). Prerequisites EE 3353, ENGR 3403. Spring.

EE 4343 Digital Signal Processing

Continuous time (CT) and discrete time (DT) signals, sampling theorem, conversion from CT to DT and vice versa, convolution sum and difference equation, z – transform, LTI system, frequency analysis of DT signals and systems using Fourier transforms. Elementary infinite impulse response (IIR) and finite impulse response (FIR) filters using pole-zero assignment techniques, spectral analysis using Discrete/Fast Fourier Transform (DFT/FFT), C or better in EE 3353, Spring.

EE 4344 Embedded Systems

Introduction to microcontroller systems and designs. Programming and interfacing with microcontroller. Introduction to PLC and ladder logic programming. Prerequisites, C or better in EE 3333 and EE 3331. Dual listed as 5344. Demand.

EE 4353 Power Systems

Generation, transmission, and distribution of large scale electrical power, associated energy losses and practical design problems and complications. Transmission line analysis. Three phase power networks. Load monitoring and control. Prerequisite, C or better in EE 3313. Corequisite, MATH 4403. Fall.

EE 4354 Intelligent Control Systems

Introduction of fuzzy logic, fuzzy logic in control engineering, neural networks, Bayesian or belief networks, neuro-fuzzy systems, neuro-fuzzy controllers, controller design, application problems. Prerequisite for EE, C or better in EE 4313, Prerequisite for ME, C or better in ME 3613. Dual listed as EE 5354. Demand.

EE 4373 Electronics II

A continuation of EE 3403 with emphasis on the analysis, simulation, and design of feedback, operational amplifier systems, frequency response, integrated circuits, and power and wave shaping circuits. Prerequisite, C or better in EE 3313 and EE 3403. Spring.

EE 4773 Electronics II Laboratory

Electronic circuit design - oriented experiments, measurement, interfacing, and other electrical engineering topics. Prerequisites, C or better in EE 3313, EE 3333, EE 3331, and EE 3401, Corequisite, EE 4373. Spring.

EE 4383 Digital Electronics II

Continuation of the study of digital circuit design with emphasis on the design of larger systems and use of LSI components. Register transfer logic, computer interfacing and design, and microcomputer-based system design. Prerequisite, C or better in EE 3333. Demand.

EE 479V Special Problems in Electrical Engineering

Individually directed problems in electrical engineering primarily for juniors and seniors. A course outline and project summary listing the goals and expected outcomes must be approved by the student advisor and the program director. Prerequisites are dependent upon the nature of the special problem. Demand.

EE 4393 Digital Communications

Basic principles that underline the analysis and design of digital communication systems. PCM, DPCM, delta modulation, signal space representation of digitally modulated signals, the baseband and bandpass modulation, demodulation, coherent/non-coherent detection methods (and receiver structures) in AWGN channel, their error performance, communication over band-limited channels with ISI and AWGN, channel capacity, bandwidth efficiency, comparison of modulation techniques, link budget. Introduction to source coding, channel coding, spread-spectrum and multiple access techniques.

Prerequisites C or better in EE 4333. Demand.