Electrical Engineering Semester-Wise Degree Plan (2022-2023)

DEGREE PLAN: BS in Electrical Engineering							
Freshman Year							
Fall		**Hours**		**Spring**		**Hours**	
ENGL 1301	Composition I	3		ENGL 1302	Composition II	3	
HIST 1301	History of the U.S. to 1877	3		HIST 1302	History of the U.S. Since 1877	3	
MATH 2413	Calculus I	4		PLSC 2305	American National Politics	3	
CHEM 1311	General Chemistry I	3		MATH 2414	Calculus II	4	
CHEM 1111	Gen Chemistry I Laboratory	1		PHYS 2325	University Physics I	3	
EENG 1303	Object-Oriented Programming	3		PHYS 2125	University Physics I lab	1	
		17				17	34
Sophomore Year							
Fall		**Hours**		**Spring**		**Hours**	
MATH 2415	Calculus III	4		EENG 3373	Engineering Probability and Statistics	3	
PHYS 2326	University Physics II	3		MATH 3320	Differential Equations	3	
PHYS 2126	University Physics II Lab	1		ENGR 2305	Fundamentals of Circuit Analysis	3	
MATH 3310	Linear Algebra	3		EENG 2105	Fundamental of Circuit Lab	1	
EENG 2320	Foundations of Electrical Engineering	3		EENG 2310	Digital Circuits Design	3	
PLSC 2306	State and Local Politics	3		EENG 2110	Digital Circuits Laboratory	1	
		17				14	31
Junior Year							
Fall				**Spring**			
EENG 3303	Electromagnetic Fields	3		EENG 3309	Electronic Circuits Analysis II	3	
EENG 3380	Signals and Systems	3		EENG 4340	Control Systems	3	
EENG 3304	Electric Circuits II	3		EENG 3307	Microprocessors	3	
COMM 1315	Intro to Public Speaking	3		EENG 4330	Electric Machines	3	
EENG 3306	Electronic Circuits Analysis I	3		ENGR 4195	Professional Practice	1	
EENG 3106	Electronic Circuits Analysis I Lab	1		ENGL 23xx	Lang/Phil/Cultural Course	3	
		16				16	32
Senior Year							
Fall				**Spring**			
EENG 4325	Communication Theory	3		EENG 4460	Senior Design	4	
Visual/Performing Arts		3		ENG43xx	Technical Elective	3	
EENG 4310	Electric Power Systems	3		ENG43xx	Technical Elective	3	
EENG 4110	Electric Power Systems Lab	1			Social and Behavioral Science Course	3	
EENG 3314	Power Electronics	3					
ENG43xx	Technical Elective	3					
		16				13	29
					Total hours		126

Descriptions of Electrical Engineering Courses
(Updated September 26, 2022)

EENG 1303 Object-Oriented Programming in Java (3-0)
Introduction to object-oriented programming using the Java language. Primitive data types and expressions; application program interfaces; applets, debugging techniques and integrated development environments are covered. Students will learn to use existing classes; selection and iteration control structures; and data structures. Prerequisite: College Algebra or equivalent.

ENGR 2305 Fundamentals of Circuits Analysis (3-0)
Define voltage, current, electrical energy & power, and the basic circuit elements. Kirchhoff's Laws and systematic formulation of circuit analysis; mesh and nodal analysis; Thevenin and Norton's Theorems; operational amplifiers & storage elements; first order circuits; AC steady-state circuit analysis using phasors. Complex power in ac systems. Prerequisite: PHYS 2326. University Physics II.

EENG 2105 Fundamentals of Circuit Analysis Laboratory (0-1)
Laboratory experiments supporting theoretical principles presented in ENGR 2305 involving DC and AC circuit theory, network theorems, time, and frequency domain circuit analysis. Introduction to principles and operation of basic laboratory equipment; laboratory report preparation. Corequisite: ENGR 2305.

EENG 2310 Digital Circuits Design (3-0)
Introduction to number system; Boolean algebra; logic operations; combinational logic circuit design; Karnaugh maps; sequential circuit design including registers and counters. Three hours of lecture and three-hour lab per week.
Prerequisite: PHYS 2326

EENG 2110 Digital Circuits Laboratory (0-1)
Laboratory experiments on logic operations; combinational logic circuit design; Karnaugh maps; sequential circuits including flip flops, and counters. Prerequisite: PHYS 2326

EENG 2320 Foundations of Electrical Engineering (3-0)
Introduction to (a) Boolean algebra logic, set theory, graph and trees as applied to electrical circuits, image compression and network systems, (b) complex variables as applied to electrical circuit theory, electromagnetism and electrostatics; and (c) Some of the problem solving via MATLAB. Topics will be covered in the context of Electrical Engineering and examples will be given with applications of Electrical Engineering. Prerequisites: MATH 2414

EENG 3106 Electronic Circuit Analysis Laboratory I (0-1)
Semiconductor devices; diode characteristics; diode circuits and applications: wave shaping and rectifier circuits; transistor biasing (bipolar junction transistors and field effect transistors); low frequency transistor amplifier design; multi-stage amplifier design. Corequisite: EENG 3306.

EENG 3303 Electromagnetic Fields (3-0)
Vector analysis; static electric field; steady electric currents; static magnetic fields; time varying fields and Maxwell's equations; plane electromagnetic waves; transmission lines; introduction to waveguides; introduction to antennas. Prerequisites: ENGR 2305 and MATH 3320.

EENG 3304 Electric Circuits II (3-0)
Second-order circuits; AC circuits; AC power analysis; three-phase circuits; magnetically coupled circuits; frequency and filters; introduction to Laplace and Fourier transforms. Prerequisites: ENGR 2305.

EENG 3306 Electronic Circuit Analysis I (3-0)
Introduction to semiconductor devices; junction diode characteristics; analog diode circuits; Bipolar Junction Transistor (BJT) and Field Effect Transistor (FET) characteristics and models; transistor biasing and low frequency amplifier analysis and designs; multi-stage amplifiers, nonlinear (harmonic) distortion; transistor audio amplifiers. Prerequisites: ENGR 2305.

EENG 3307 Microprocessors (3-0)
Microprocessor/microcontroller architectures, instruction set, assembly and C language programming, addressing modes, input output ports, I/O programming, interrupts. Three hours of lecture per week with integrated laboratory sessions. Prerequisites: EENG 2310 and EENG 1303.

EENG 3309 Electronic Circuit Analysis II (3-0)
Operational amplifiers; frequency response of passive and active networks; feedback concepts and oscillators; small-signal analysis; load-line analysis; introduction to nonlinear electronic circuits; digital circuits. Prerequisite: EENG 3306.

EENG 3314 Power Electronics (3-0)
The use of solid state components in power systems; rectifiers; controlled rectifiers circuits; AC voltage controllers; Thyristor commutation techniques; DC-DC Converters; Inverters. Prerequisites: EENG 3304, EENG 3309.

ENGR 3373 Engineering Probability and Statistics (3-0)
Fundamental concepts of discrete and continuous random variables. Mean, variance and covariance for random variables. The creation and proper utilization of statistical decision models for engineering analysis and design.
Pre-requisites: MATH 2415 Calculus III.

EENG 3380 Signals and Systems (3-0)
Types of signals; types of systems; properties of systems; convolution; Fourier series, Fourier transforms; Laplace transforms; Difference equations; Z-transform; Discrete-time systems; applications and design concepts. Prerequisites: ENGR 2305, MATH 2415, and MATH 3320.

EENG 4302 Digital Systems (3-0)
Hardware description language such as VHDL; design of digital systems using VHDL; digital systems design using FPGAs and software simulation. Prerequisite: EENG 3307.

EENG 4310 Electric Power Systems (3-0)
Three-phase circuits; transformers; transmission line parameters; transmission line modeling and steady-state analysis; power flow analysis. Prerequisites: EENG 3303, EENG 3304.

EENG 4110 Electric Power Systems Laboratory (0-1)
Laboratory experience to accompany EENG 4310. Co-requisite: EENG 4310.

EENG 4312 Instrumentation Systems (3-0)
Data acquisition of both analog and digital signals; analysis of sensor data; characterization of signal noise; Internet of Things (IoT) devices and introduction to various buses. EENG 3307.

EENG 4320 Computer Architecture and Design (3-0)
Introduction to computer architecture, RISC/CISC architectures, instruction set design, data path, ALU and control unit design, pipelining of Instruction execution, memory, cache and I/O design; virtual memory concepts Three hours of lecture per week. Prerequisite: EENG 3307

EENG 4325 Communication Theory (3-0)
Analog and Digital modulation techniques, effects of noise in modulation, signal to noise ratio, digital data transmission, probability of error, bandwidth requirements and sampling theorem. Prerequisite: ENGR 2305, EENG 3380

EENG 4330 Electric Machines (3-0)
Magnetic circuits and magnetic materials; Transformers; Electromechanical energy

conversion principles; Rotating electric machines and their magnetic field interactions; Electrical circuit models to quantify machine and power system interactions; Power, torque, speed, and performance of synchronous and induction machines. Prerequisites: EENG 3303, EENG 3304.

EENG 4335 Direct Generation Methods (3-0)
The conversion of energy directly into electricity without the usual electric machines are considered. Different forms of energy storage are studied. Technologies considered include solar panels, heat transfer, chemical and fuel cells. Prerequisite: ENGR 2305.

EENG 4340 Control Systems (3-0)
Introduction to control system, modeling of systems, state variable analysis, feedback control and performance, stability, Root locus, Nyquist diagrams and Bode plots, frequency response of the system. The computer as a simulation tool for control system design and analysis is introduced. Prerequisites: MATH 3320, EENG 3380.

EENG 4380 Special Topics in Electrical Engineering (3-0)
Occasionally offered special topics as course in Electrical Engineering to be used as a senior-level elective course. Prerequisites: Specified by the instructor

EECS 4391 Independent Study in Electrical Engineering (3-0)
Instructor specified and directed independent study course in electrical engineering. Work or study should be equivalent to an average of 3 hours student effort per week. Final report is required. Prerequisites: Senior standing and consent of the instructor

EENG 4460 Senior Design (4-0)
A capstone design course that builds on previous course work, including all stages of the design process taking into account myriad realistic constraints such as manufacturability, sustainability, economic, environmental, safety, use of applicable standards and reliability issues. Oral presentation, written report and demonstration at the senior design expo. Prerequisites: EENG 3307.

ENGR 4195 Professional Practice (1-0)
Introduction to the engineering profession with emphasis on professional and ethical responsibility. The impact of engineering solutions in a global, economic, environmental, and societal context is discussed. Professional registration is discussed and an engineering field examination is given. Prerequisite(s): Senior standing in engineering.