*Mapping the Fundamentals of Engineering (**FE**) **exam topics** to **ECE courses**.*

Topics	*Topic details*	*ECE Courses*
Mathematics	Algebra and trigonometry, Complex numbers, Discrete mathematics, Analytic geometry, Calculus (e.g., differential, integral, single-variable, multivariable), Ordinary differential equations, Linear algebra, and Vector analysis	*Math 180, 181, 210, 220, 310* *ECE 115*
Probability and Statistics	Measures of central tendencies and dispersions (e.g., mean, mode, standard deviation), Probability distributions (e.g., discrete, continuous, normal, binomial, conditional probability), and Expected value (weighted average)	*ECE 341*
Ethics and Professional Practice	Codes of ethics (e.g., professional and technical societies, NCEES *Model Law*and *Model Rules*), Intellectual property (e.g., copyright, trade secrets, patents, trademarks), and Safety (e.g., grounding, material safety data, PPE, radiation protection)	*ENGR 100* *ECE 333* *ECE 396* *ECE 499*
Engineering Economics	Time value of money (e.g., present value, future value, annuities), Cost estimation, Risk identification, and Analysis (e.g., cost-benefit, trade-off, break-even)	*ECE 396* *ECE 346* *IE 201*
Properties of Electrical Materials	Semiconductor materials (e.g., tunneling, diffusion/drift current, energy bands, doping bands, p-n theory), Electrical (e.g., conductivity, resistivity, permittivity, magnetic permeability, noise), and *Thermal (e.g., conductivity, expansion)*	*ECE 346* *ECE 322* *ECE 340* *ECE 468* *PHYS 260*
Circuit Analysis (DC and AC Steady State)	KCL, KVL, Series/parallel equivalent circuits, Thevenin and Norton theorems, Node and loop analysis, Waveform analysis (e.g., RMS, average, frequency, phase, wavelength), Phasors, and Impedance	*ECE 225* *ECE 115* *ECE 468* *ECE 340* *ECE 423*

Linear Systems	Frequency/transient response, Resonance, Laplace transforms, and Transfer functions	*ECE 310* *ECE 468* *ECE 350* *ECE 451*
Signal Processing	Sampling (e.g., aliasing, Nyquist theorem), Analog filters, and Digital filters (e.g., difference equations, Z-transforms)	*ECE 317* *ECE 417* *ECE 225* *ECE 310* *ECE 418*
Electronics	Models, biasing, and performance of discrete devices (e.g., diodes, transistors, thyristors), Amplifiers (e.g., single-stage/common emitter, differential, biasing), Operational amplifiers (e.g., ideal, nonideal), Instrumentation (e.g., measurements, data acquisition, transducers), and Power electronics (e.g., rectifiers, inverters, converters)	*ECE 340* *ECE 115* *ECE 468* *ECE 342* *ECE 346*
Power Systems	Power theory (e.g., power factor, single and three phase, voltage regulation), Transmission and distribution (e.g., real and reactive losses, efficiency, voltage drop, delta and wye connections), Transformers (e.g., single-phase and three-phase connections, reflected impedance), and Motors and generators (e.g., synchronous, induction, dc)	*ECE 458* *ECE 442* *ECE 445* *ECE 468*
Electromagnetics	Electrostatics/magnetostatics (e.g., spatial relationships, vector analysis), Electrodynamics (e.g., Maxwell equations, wave propagation) and Transmission lines (high frequency)	*ECE 322* *ECE 423* *ECE 424* *PHYS 142*
Control Systems	Block diagrams (e.g. feedforward, feedback), Bode plots, Closed-loop response, open-loop response, and stability, and Controller performance (e.g., steady-state errors, settling time, overshoot)	*ECE 350* *ECE 451*
Communications	Basic modulation/demodulation concepts (e.g., AM, FM, PCM), Fourier	*ECE 311* *ECE 432* *ECE 310*

	transforms/Fourier series, Multiplexing (e.g., time division, frequency division, code division), and Digital communications	
Computer Networks	Routing and switching, Network topologies (e.g., mesh, ring, star), Network types (e.g., LAN, WAN, internet), Network models (e.g., OSI, TCP/IP), Network intrusion detection and prevention (e.g., firewalls, endpoint detection, network detection), and Security (e.g., port scanning, network vulnerability testing, web vulnerability testing, penetration testing, security triad)	*ECE 333* *ECE 436* *ECE 434*
Digital Systems	Number systems, Boolean logic, Logic gates and circuits, Logic minimization (e.g., SOP, POS, Karnaugh maps), Flip-flops and counters, Programmable logic devices and gate arrays, State machine design, and Timing (e.g., diagrams, asynchronous inputs, race conditions and other hazards)	*ECE 265* *ECE 115* *ECE 342* *ECE 465*
Computer Systems	Microprocessors, Memory technology and systems, and Interfacing	*ECE 266* *ECE 366* *ECE 466*
Software Engineering	Algorithms (e.g., sorting, searching, complexity, big-O), Data structures (e.g., lists, trees, vectors, structures, arrays), and Software implementation (e.g., iteration, conditionals, recursion, control flow, scripting, testing)	*CS 107* *CS 151* *CS 251* *CS 401*