

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

<i>Topics</i>	<i>Topic details</i>	<i>ECE Courses</i>
<i>Mathematics</i>	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	<i>Math 180, 181, 210, 220, 310 ECE 115, most ECE courses</i>
<i>Probability and Statistics</i>	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)	<i>ECE 341</i>
<i>Ethics and Professional Practice</i>	Codes of ethics (e.g., professional and technical societies, NCEES <i>Model Law</i> and <i>Model Rules</i> ), Intellectual property (e.g., copyright, trade secrets, patents, trademarks), and Safety (e.g., grounding, material safety data, PPE, radiation protection)	<i>ENGR 100 ECE 333 ECE 396 ECE 499</i>
<i>Engineering Economics</i>	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)	<i>ECE 346 ECE 396 IE 201</i>
<i>Properties of Electrical Materials</i>	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  <i>Thermal (e.g., conductivity, expansion)</i>	<i>ECE 322 ECE 340 ECE 346 ECE 468 PHYS 260</i>
<i>Circuit Analysis (DC and AC Steady State)</i>	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	<i>ECE 115 ECE 225 ECE 340 ECE 423 ECE 468</i>

<i>Linear Systems</i>	Frequency/transient response, Resonance, Laplace transforms, and Transfer functions	<i>ECE 310 ECE 350 ECE 451 ECE 468</i>
<i>Signal Processing</i>	Sampling (e.g., aliasing, Nyquist theorem), Analog filters, and Digital filters (e.g., difference equations, Z-transforms)	<i>ECE 225 ECE 310 ECE 317 ECE 417 ECE 418</i>
<i>Electronics</i>	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)	<i>ECE 115 ECE 340 ECE 342 ECE 346 ECE 468</i>
<i>Power Systems</i>	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)	<i>ECE 442 ECE 445 ECE 458 ECE 468</i>
<i>Electromagnetics</i>	Electrostatics/magnetostatics (e.g., spatial relationships, vector analysis), Electrodynamics (e.g., Maxwell equations, wave propagation) and Transmission lines (high frequency)	<i>ECE 322 ECE 421 ECE 423 ECE 424 PHYS 142</i>
<i>Control Systems</i>	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)	<i>ECE 350 ECE 451</i>
<i>Communications</i>	Basic modulation/demodulation concepts (e.g., AM, FM, PCM), Fourier	<i>ECE 310 ECE 311 ECE 432</i>

	transforms/Fourier series, Multiplexing (e.g., time division, frequency division, code division), and Digital communications	
<i>Computer Networks</i>	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)	<i>ECE 333 ECE 434 ECE 436</i>
<i>Digital Systems</i>	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)	<i>ECE 115 ECE 265 ECE 342 ECE 465</i>
<i>Computer Systems</i>	Microprocessors, Memory technology and systems, and Interfacing	<i>ECE 266 ECE 366 ECE 466</i>
<i>Software Engineering</i>	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)	<i>CS 107 CS 151 CS 251 CS 401</i>