

Introduction to Electrical Engineering

Introduction to Electrical Engineering Technology

Key concepts, tools, and career pathways

1. What Is Electrical Engineering Technology (EET)?

Aspect	Description
Focus	Application of electrical engineering principles to design, build, test, and maintain electronic/electrical systems.
Difference from Pure EE	- EE???theory, advanced math, research - EET???hands?on implementation, practical problem solving, instrumentation
Typical Work Settings	Manufacturing plants, power utilities, telecommunications, automotive, aerospace, renewable?energy firms, R&D labs, service & maintenance companies.
Core Goal	Turn engineering concepts into functional, reliable, and cost?effective products or services.

2. Core Subject Areas

Subject	Core Topics	Typical Lab/Project Work
Circuit Analysis	Ohm's law, Kirchhoff's laws, AC/DC analysis, Thevenin/Norton equivalents	Build and test breadboard circuits; use multimeters and oscilloscopes.
Digital Logic & Microcontrollers	Boolean algebra, combinational/sequential logic, PLCs, Arduino/ARM programming	Design a traffic?light controller; program sensor?driven devices.
Electronics	Semiconductor devices (diodes, transistors, MOSFETs), amplifiers, op?amps, power supplies	Assemble and characterize a low?noise audio amplifier.
Power Systems	Generation, transmission, distribution, transformers, protective relays, power factor correction	Simulate a three?phase distribution network; perform fault analysis.

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Subject	Core Topics	Typical Lab/Project Work
Technology		
Control Systems	Feedback fundamentals, PID tuning, sensors & actuators, SCADA basics	Implement a temperature control loop for an HVAC system.
Instrumentation & Measurement	Signal conditioning, data acquisition, sensor types, calibration techniques	Use LabVIEW or Python to log and analyze sensor data.
Communications	Analog/digital modulation, RF basics, Ethernet, wireless standards	Build a simple FM transmitter or a Bluetooth-enabled data logger.
Renewable Energy & Smart Grids	Solar PV, wind turbines, battery management, grid integration	Design a rooftop PV system with MPPT controller.
Technical Drawing & CAD	Schematic capture, PCB layout, 3D modeling (SolidWorks, AutoCAD)	Create a PCB for a wearable health monitor.
Safety & Standards	NEC, IEC, OSHA, lockout/tagout, ESD protection	Conduct a safety audit of a lab workstation.

3. Typical Tools & Equipment

Category	Examples	Purpose
Measurement	Digital multimeter, clamp meter, oscilloscope, spectrum analyzer	Verify voltage, current, frequency, waveform integrity.
Prototyping	Breadboards, soldering stations, 3D printers, laser cutters	Rapidly build and iterate hardware concepts.
Simulation	SPICE (LTspice, PSpice), MATLAB/Simulink, Multisim	Predict circuit behavior before physical build.
Programming	C/C++, Python, LabVIEW, ladder logic (PLC)	Control microcontrollers, automate tests, process data.
Design	Altium Designer, Eagle, KiCad (PCB), SolidWorks (mechanical)	Produce production-ready schematics and layouts.
Power Test	Power analyzer, harmonic analyzer, insulation tester	Evaluate efficiency, power quality, safety compliance.

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4. Typical Project Workflow

Technology

1. Problem Definition – Clar