

Introduction to Medical Electronics

Course Description

This five-day course will introduce the student to the fundamentals of electricity and electronics as applied to medical instrumentals. The student will begin with fundamentals of DC and AC circuits, then study diodes, power supplies, operational amplifiers, digital circuits, transistors, JFETs and other electronics devices. Students will be taught to recognize and understand fundamental circuit designs. A comprehensive exam will be given at the end of the course and students must successfully complete that exam for satisfactory completion of the course.

Who Should Attend

Students do not need prior education in electronics, but must be willing and capable to comprehend materials at an accelerated rate. Students should have proficiency in basic math fundamentals before taking this class. Students will be required to supply and use a scientific calculator.

Day 1

- Math Review- Powers of 10, Units of Measurement, Basic Math Functions
- Ohm's Law, Power and Energy
- DC Resistance- Series, Parallel and Series-Parallel Circuits
- Sinusoidal Alternating Waveforms - Generation, Definitions, Phase, Voltage and Time
- Basic AC Components - Resistance, Inductance and Capacitance
- AC Resistance - Series and Parallel Circuits

Day 2

- Diode Models - Ideal, Practical and Complete
- Zener Diode
- LEDs and Diode Testing
- Transformers - Step-up, Step-down and Center Tap
- Rectification - Half, Full Wave and Center Tap

Day 3

- Rectification - Full Wave Bridge
- Linear Power Supply - Filtration
- Linear Power Supply - Regulation
- Linear Power Supply - Protection
- Switching Model Power Supply - Block Diagram and Circuit Analysis

Day 4

- Power Devices - SCR, TRIAC and DIAC
- Photo Detectors and Optio-isolators
- 555 Timing Circuits - Mono-stable, Bistable and Multi-vibrator
- Operational Amplifiers - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, Summing, Comparator, Integrators and Differentiators

Day 5

- Digital Logic Circuits and Binary System
- Introduction, Bipolar Junction Transistor Construction, Ratings, Characteristics, Specifications and Testing
- BJT Configurations and Amp Classifications - Common Emitter, Common Base, Common Collector, Class A, Class B and Class C
- JFET AC Operating Characteristics - Common-Source, Common-Drain, Common-Gate Amps, and Spec Sheets
- MOSFET Construction and Handling, D-MOSFETs and E-MOSFETs, Dual-Gate, Power and Complementary MOSFET Applications