

## Electronics for Electricians

This five-day course begins with a fundamental review of basic series and parallel circuits, Ohm's and Kirchoff's Laws, and methods for calculating current and voltage. AC circuit fundamentals are also covered including inductive and capacitive circuits. Other topics include test equipment, semiconductors and diodes, transistors, silicon controlled rectifiers and triacs, and finally, analog integrated circuits and systems.

### I. Direct Current Review

- Basic Series Circuits
- Basic Parallel Circuits
- Series/parallel Circuits
- Ohms and Kirchoff's Law
- Calculating Current and Voltage

### II. AC Circuit Fundamentals

- Inductive and Capacitive Reactance
- Inductive Alternating Current Circuits
- Capacitive Alternating Current Circuits
- Inductive and Capacitive Circuits in Combination
- Resonant and Non-Resonant AC Circuits

### III. Test Equipment Used in Electrical/Electronic testing

- Volt-Ohm Meters
- Digital Multimeters
- Analog vs. Digital Measuring Instruments
- Signal Sources
- Oscilloscopes
- Interpreting Test Instrument Specifications
- Practical Applications of Test Instruments

### IV. Semiconductors - Diodes

- Semiconductor Materials and Characteristics
- Semiconductor Rectifier Diodes
- Diode Biasing, Ratings and Types

- Use of Data Sheets and Cross-Reference Manuals
- Power Rectification in AC Circuits
- Diode Application in DC Power Supplies
- Other Types of Diodes - Light Emitting Diodes, Tunnel, Gunn, and Schockly Diodes
- Protection of Diode Circuits
- Testing, Troubleshooting, and Repair

### V. Semiconductors - Bipolar Transistors

- Transistor Construction
- Transistor Biasing, Ratings, and Types
- Use of Data Sheets and Cross-Reference Manuals
- Typical Transistor Circuit Arrangements
- Common Base Transistor Circuit Applications
- Common Emitter Transistor Circuit Applications
- Common Collector Transistor Circuit Applications
- Special Considerations for Power Transistors
- Protection of Transistor Circuits from Over Voltage and Over Current
- Transistor Applications in Transistors Regulated Power Supplies
- Testing, Troubleshooting, and Repair

## **VI. Semiconductors - Other Types of Transistors**

- Field Effect Transistors (FETS)
- Metal Oxide Field Effect Transistors
- Special Considerations for Handling MOSFETS
- Power MOSFETS and Their Applications
- Unijunction Transistors and Their Applications
- Testing, Troubleshooting, and Repair of Non-Bipolar Semiconductor Circuits

## **VII. Silicon Controlled Rectifiers and Tracs**

- SCR Construction and Theory of Operation
- Triac Construction and Theory of Operation
- Triggering of SCR and Triac Circuits
- Dv/Dt and Snubber Network Protection of SCR and Triac Circuits
- Special Considerations for Current Limiting Fuses Used for SCR and Triac Protection
- Use of SCR and Triac Data Sheets and Cross- Reference Manuals
- Special Considerations for Power SCR's and Triacs
- Heat Sinking of Power SCR's and Triacs
- Special Considerations for Water Cooled SCR's and Triacs
- Testing, Troubleshooting, and Repair

## **VIII. Analog Integrated Circuits and Systems**

- Operational Amplifier Applications
- Operational Amplifier Summer Applications
- Operational Amplifier Integrator Applications
- Operational Amplifier Differentiator Applications
- Special Considerations for the Frequency
- Response of Operational Amplifier Circuits
- Testing, Troubleshooting, and Repair
- Integrated Circuit Voltage Regulator Applications
- Use of Integrated Circuit Op-Amp and Voltage Regulators to Regulate Series Pass Transistor Output Power Supplies
- Use of Analog Integrated Circuit Data Sheets and Cross-Reference Manuals
- Testing, Troubleshooting, and Repair of Integrated Circuit Voltage Regulators
- Other Types of Analog Integrated Circuits