



Electronics Foundation and Troubleshooting Course CGTCEFTC101

Course Description

The Electronics Foundation and Troubleshooting course provides 120 hours of detailed theory and extensive hands-on training for students who have limited experience working in the field of electronics. The course explores the following areas of electronic circuitry: Direct Current, Alternating Current, Solid State, Linear, and Digital electronic circuits. Troubleshooting and schematic reading are incorporated into the course work in all labs.

Prerequisites: None

Instructor to student ratio: 1:25

Course length: 120 hours

Training Syllabus: Electronics Foundation and Troubleshooting (CGTCEFTC101)

Week One – Analog Electronics

Day #1 – Direct Current Lesson Plan

- Lecture\Theory of Troubleshooting of the following:
 - Ohm's Law\Kirchoff's Laws
 - Series Circuits
 - Parallel Circuits
 - Series-Parallel Circuits
 - Complex Circuits

Day #2 – DC Lab\activities

- DC Measurements using the multimeter on the following circuit designs:
 - Series Circuits
 - Parallel Circuits
 - Series-Parallel Circuits
 - Complex Circuits

Day #3 – Alternating Current (Part #1) Lesson Plan

- Lecture\Theory of Troubleshooting of the following:
- AC Test Equipment
 - Oscilloscope
 - Frequency Generator
 - Frequency Counter
 - Schematic Reading
- Labs\Activities
 - Calculating Frequency, V_p , V_{p-p} , V_{rms} , V_{ave} , Instantaneous Voltage, Time\Angular Notation

Day #4 –Alternating Current (Part #2) Lesson Plan

- Lecture\Theory of Troubleshooting of the following:
 - Series RL
 - Parallel RL
 - Series RC
 - Parallel RC

- Labs\Activities: Phase relationships and measurements
 - Series RL
 - Parallel RL
 - Series RC
 - Parallel RC

Day #5 - Alternating Current (Part #3) Lesson Plan

- Lecture\Theory of Troubleshooting of the following:
 - RC TC\Transients
 - Resonant Circuits
 - Transformers
 - Relays & Switch Circuits
 - Limiter Clamper Circuits

Week Two – Analog Electronics

Day #6 - Lab\Activity

- Troubleshooting the following circuit designs:
 - RC TC\Transients
 - Resonant Circuits
 - Transformers
 - Relays & Switch Circuits
 - Limiter Clamper Circuits

Day #7 – Amplifiers (Part #1) Lesson Plan

- Lecture\Theory of Troubleshooting of the following:
 - Transistor Amplifiers – Common-Emitter\ Collector \ Base
 - Power Supply & Voltage Regulators
- Labs\Activities
 - Building\Troubleshooting Amplifier Circuits

Day #8 – Amplifiers (Part #2) Lesson Plan

- Lecture\Theory of Troubleshooting of the following:
 - Multistage & FET Amplifiers
 - Sine Wave Osc.
 - Non-Sine Wave Osc.
 - Multivibrator

- Lab\Activities: Build and Troubleshoot oscillators to include:
 - Sine Wave Osc.
 - Non-Sine Wave Osc.
 - Multivibrator

Day #9 – Amplifiers (Part #3) Lesson Plan

- Lecture\Theory of Troubleshooting of the following:
 - Schmitt Triggers & SCR Trigger Circuits
 - Operational Amplifiers

Day #10 - Labs\Activities

- Build and troubleshoot Op Amps to include:
 - Inverting Op Amps
 - Non-Inverting Op Amps
 - Differential Op Amps
 - Comparators

Week Three – Digital Electronics

Day #11 – Digital Circuits (Part #1) Lesson Plan

- Lecture\Theory of Troubleshooting of the following:
 - Digital logic circuits, Combinational Logic Circuit
 - Flip-Flop Circuits
 - Register and Memory Circuits

Day #12 - Labs\Activities

- Build and Troubleshoot the following:
 - Digital logic circuits, Combinational Logic Circuit
 - Flip-Flop Circuits
 - Register and Memory Circuits

Day #13 – Digital Circuits (Part #2) Lesson Plan

- Lecture\Theory of Troubleshooting of the following:
 - Arithmetic and Counting Circuits
 - D\A Conversion Circuits
- Labs\Activities - Build and Troubleshoot the following:
 - Counters
 - D/A converters

Day #14 – Digital Labs\Activities

- Switch Circuit
- RTL Circuits
- Transistor Logic Circuits
- DTL Circuits
- C-MOS Circuits



Day #15 – On-Base Continuum

- Review each competency area and the relevance to the specific workstations of the trainees. Presentation of individual workstations. Normally at least four different work areas such as in Building 640, 645, and 159.