

**ELEC 64A Course Outline as of Fall 2016****CATALOG INFORMATION**

Dept and Nbr: ELEC 64A Title: ELEC CONSTRUCTION 1

Full Title: Electronic Construction 1

Last Reviewed: 2/7/2022

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	2.00	Lecture Scheduled	1.00	17.5	Lecture Scheduled	17.50
Minimum	2.00	Lab Scheduled	3.00	8	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	4.00		Contact Total	70.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 35.00

Total Student Learning Hours: 105.00

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

Techniques in layout, fabrication, assembly, wiring, testing and identification of components for the electronic chassis and printed circuit fabrication. The course includes general safety, the use and care of hand tools, soldering and de-soldering techniques.

**Prerequisites/Corequisites:****Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: Techniques in layout, fabrication, assembly, wiring, testing and identification of components for the electronic chassis and printed circuit fabrication. The course includes general safety, the use and care of hand tools, soldering and de-soldering techniques. (Grade Only)

Prerequisites/Corequisites:

Recommended:

Limits on Enrollment:

Transfer Credit: CSU;  
Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>CSU Transfer:</b>	Transferable	Effective: Fall 2016	Inactive:
<b>UC Transfer:</b>		Effective:	Inactive:

### **CID:**

### **Certificate/Major Applicable:**

Major Applicable Course

## **COURSE CONTENT**

### **Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Differentiate between safe and unsafe techniques in the use of laboratory equipment and electronic fabrication tools.
2. Demonstrate proper soldering techniques.
3. Construct an electronic device using a schematic and device specifications.

### **Objectives:**

Upon completion of this course the student will be able to:

1. Distinguish the correct tool or tools to perform an assigned task.
2. Interpret a schematic diagram and translate information into construction of a circuit board.
3. Assemble electrical terminals and printed circuit boards, applying high quality techniques for soldering and de-soldering wires and components.
4. Determine optimal configuration of circuits in relationship to components.
5. Compare original calculated measurements from schematic to constructed board and identify and repair discrepancies.
6. Calculate voltage, current, and resistance measurements from a circuit board.
7. Inspect, evaluate, and repair assembled printed circuit boards through the replacement of soldered components.
8. Draw a schematic diagram from a printed circuit board in order to identify and replace faulty components.

### **Topics and Scope:**

- I. Electrical Safety
  - A. Avoiding electrical shock
  - B. Proper use of tools
  - C. General first aid techniques
- II. Basic concepts and Tools
  - A. Concepts

1. proper use
  2. maintenance
  3. safety
- B. Hand tools
1. soldering iron
  2. microscope
  3. de-soldering tools
  4. wire cutter
  5. pliers
  6. routing tools
- III. Schematic Drawings
- A. Use of schematic drawings
  - B. Proper identification of electronic symbols
  - C. Identification of polarity on components
  - D. Identifying and repairing discrepancies in calculated measurements
- IV. Electrical Fabrication
- A. Wire assemblies
  - B. Proper connection to terminals
  - C. Connection to printed circuit boards
- V. Cable Assemblies
- A. Fabrication of coaxial lines
  - B. Fabrication of shielded pairs
  - C. Proper assembly of BNC (British Naval Connectors)
  - D. Fabrication of ribbon cable connection
- VI. Printed Circuit Board Assembly
- A. Component inspection
  - B. Soldering to circuit boards
    1. Soldering techniques
      - a. Tinning
      - b. Splicing
      - c. Soldering
      - d. Solder feeding
    2. Removing excess leads and resin
- VII. Chassis Assemblies
- A. Fabrication of chassis
  - B. Mounting components
  - C. Connecting components to circuit boards
- VIII. Troubleshooting Electrical Circuits
- A. Basic test procedures
  - B. Identification of faulty components
  - C. Proper removal and replacement of faulty components
  - D. Connecting wires and components to terminals and boards
    1. Coaxial and shielded pair coaxial cable assembly
    2. Printed circuit board assembly technique
    3. Chassis assembly
    4. Chassis wiring procedures
  - E. Ohm's law

## LABORATORY MATERIAL

- I. Proper lead dressing of wires
- II. Fabrication of splices

- III. Fabrication of test leads
- IV. Fabrication of ribbon cable connection
- V. Component identification
- VI. Schematic design and layout of a printed circuit board with mathematical calculations
- VII. Orientation, mounting, and soldering components to printed circuit board
- VIII. Fabrication of chassis
- IX. Assembly of components and printed circuits to the chassis, including surface mount components
- X. Troubleshooting of power supply

### Assignment:

1. Homework problems (1-4)
2. Hands-on skill demonstration (performance): given a simple circuit board, use test equipment to troubleshoot.
  - A. Discuss what is wrong and how to repair it.
  - B. If it is working properly, explain why.
3. Final project: Proper fabrication and demonstration of project constructed during the course (Power Supply).
4. Exams: safety; component identification; hands on test for soldering skills and component fabrication.

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems

Problem solving  
25 - 40%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Class performances

Skill Demonstrations  
50 - 60%

**Exams:** All forms of formal testing, other than skill performance exams.

Multiple choice

Exams  
5 - 25%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

ATTENDANCE AND TIMELY ASSIGNMENT  
COMPLETION

Other Category  
0 - 15%

**Representative Textbooks and Materials:**

N. Ahlhelm. An Introduction to High Reliability Soldering and Circuit Board Repair Paperback, 4th edition. CreateSpace Independent Publishing Platform; July 2013