ELTEC 205
Electronics Fabrication and Assembly Techniques
3 Units

Introduction to fabrication and assembly techniques used in the electronics industry. Soldering, circuit board repair, and component identification, manual and automated techniques used in circuit assembly and product manufacture are included. Field trips are not required. Course is not applicable to the associate degree.

II. LEARNING CONTEXT
Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. COURSE CONTENT

1. Required Content:
   a. Electronic Components and Symbols
   b. Soldering Materials and Techniques
   c. Electronic Circuit Repair and Rework
   d. Electronics Manufacturing Processes
   e. Drilling, Reaming and Punching
   f. Printed Circuit Board Design
   g. Surface Mount Technology
   h. Printed Circuit Hardware
   i. Printed Circuit Board Fabrication
   j. Chassis Hardware and Assembly
   k. Harness and Cable Fabrication
   l. Mass Soldering Methods
   m. Integrated Circuit Fabrication
   n. Electronic Packaging
   o. Automated Fabrication Techniques
   p. Design Factors in Electronic Products

2. Required Lab Content:
a. Solder grid
b. Desoldering
c. PCB soldering
d. Resistor order
e. Surface mount soldering
f. Dip soldering
g. Cable and D-sub soldering, heat shrink tubing
h. Resistor temperature coefficients
i. Project, product design
j. CAD software
k. Project layout
l. Silk screening PCBs, purchasing
m. PCB manufacture
n. PCB assembly, SFT
o. Silkscreen enclosure
p. Fabricate enclosure
q. Chassis wiring
r. Project, final assembly, test

B. HOURS AND UNITS

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<td>18.00</td>
<td>1.00</td>
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<tr>
<td>Lab</td>
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C. METHODS OF INSTRUCTION (TYPICAL)

Instructors of the course might conduct the course using the following method:

1. Lecture
2. Lab demonstrations
3. Course topic discussions
4. Presentations via media (DVD, Videos, etc)

D. ASSIGNMENTS (TYPICAL)

1. EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS

Time spent on coursework in addition to hours of instruction (lecture hours)

Daily reading assignments from the text and handouts.
Daily homework problems and research from the text and handouts.

Research project on purchasing practices and sources.

2. **EVIDENCE OF CRITICAL THINKING**
   Assignments require the appropriate level of critical thinking

   Assignments:

   1. Determine and describe the process that the manufacturer uses to put the "lead" in a wood pencil by observation only. (manufacturing)

   2. Empirically measure the temperature coefficient of five common electronic components as provided in lab.

   Exam Questions:

   1. List the three main types of flux discussed in class, and two characteristics of each:

   2. What is meant by the "plastic range" of solder?

   3. Describe the process of setting up a chassis-wiring harness board:

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E. **TEXTS AND OTHER READINGS (TYPICAL)**


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III. **DESIRED LEARNING**

A. **COURSE GOAL**
   As a result of satisfactory completion of this course, the student should be prepared to:

   Understand the process of fabricating electronic products. They should also be able to do basic component identification, circuit board design, assembly and soldering, and basic rework.

B. **STUDENT LEARNING GOALS**
   Mastery of the following learning goals will enable the student to achieve the overall course goal.

1. **Required Learning Goals**
   Upon satisfactory completion of this course, the student will be able to:

   a. Identify and describe the components found in electronics circuits.

   b. Utilize the basic hand and power tools used in circuit board fabrication and soldering.

   c. Compare and contrast the different types of soldering processes, alloys, and fluxes.

   d. Explain the basic steps in the manufacture and assembly of printed circuit boards.

2. **Lab Learning Goals**
   Upon satisfactory completion of the lab portion of this course, the student will be able to:

   a. Properly use a soldering iron to make good electrical connections on a variety of electronic components.

   b. Design and fabricate a printed circuit board starting from a schematic drawing of the circuit.
c. Remove and replace electronic components on a printed circuit board without damaging the board.

IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT
   1. Quizzes
   2. Student participation in course topic and discussions
   3. Homework
   4. Weekly lab exercises

B. SUMMATIVE ASSESSMENT
   1. Mid Term
   2. Final
   3. Comprehensive lab projects