COURSE OUTLINE

ELEC 161 – ELECTRONIC FABRICATIONS

Prepared By:  David W Hartle

CANINO SCHOOL OF ENGINEERING TECHNOLOGY
ELECTRICAL ENGINEERING TECHNOLOGY
2015
A. **TITLE:** ELECTRONIC FABRICATIONS

B. **COURSE NUMBER:** ELEC 161

C. **CREDIT HOURS:** 2

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** (15 weeks)

F. **SEMESTER(S) OFFERED:** Fall

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   1 - 1 hour lecture with 1 - 2 hour Laboratory

H. **CATALOG DESCRIPTION:** Stresses practical fabrication techniques used in electronic and communication industries. Procedures focus on the basics of hand soldering, wiring, installing, testing and troubleshooting methods used in assembly and repair of electronic equipment. Topics include terminating voice, video, and data cables and also design and fabrication of a single sided printed circuit board.

I. **PRE-REQUISITES/CO-REQUISITES:** “none”

J. **GOALS (STUDENT LEARNING OUTCOMES):**

   By the end of this course, the student will be able to:

   a. Define how to properly prepare to solder electronic circuits.
   b. Practice how to properly care for soldering equipment.
   c. Solder printed circuit boards and electronic components.
   d. Perform techniques and processes employed in developing printed circuits boards.
   e. Fabricate a printed circuit board.
   f. Fabricate voice, video, and data cable terminations.

   **Institutional Student Learning Objectives (SLO)**

   (1) Communication   (2) Critical Thinking   (3) Professional Competence   (4) Inter-Intrapersonal Skills

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<tr>
<th>Course Objectives</th>
<th>Institutional SLO</th>
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<tbody>
<tr>
<td>a. Define how to properly prepare to solder electronic circuits.</td>
<td>1. Communication</td>
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<tr>
<td>b. Practice how to properly care for soldering equipment.</td>
<td>3. Professional Competence</td>
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K. **TEXTBOOK:**

L. **REFERENCES:** Information sheets and specification sheets distributed in class.

M. **EQUIPMENT:** Hand tools -- Diagonal pliers, knife, needle nose pliers.

N. **GRADING METHOD:** A-F

O. **EVALUATION CRITERIA/METHODS:** Fabrication projects, Quizzes, Hourly Exams, Graded Laboratory Projects, and Practical Laboratory Experience.

P. **DETAILED OUTLINE - LECTURE**

I. Hand soldering techniques, stripping and tinning stranded wires, through hole component soldering and desoldering.
   
   A. Soldering Information and Techniques
   
   B. Preparing and soldering wires
   
   C. Printed circuit boards, through hole and surface mount components
   
   D. Desoldering THM and SMT, evaluations.

II. Telephone Wiring, Network Cabling, Video Cabling, Testing wiring and terminations.
   
   A. Introduction to Data, Voice and Video Cabling
   
   B. Video System Installations
C. Telephone Wiring and Network Cabling

D. Testing Data, Voice and Video wiring

III Circuit board prototyping and construction.

A. Printed Circuit Boards
   - coatings
   - Layers
   - Resists

B. Developers, Etchants, Resists
   - Positive resists
   - Negative resists
   - Direct etch

C. Drafting Aids
   - MultiSim
   - Ultiboard

D. Chemical Safety and Environmental concerns


**Q. DETAILED OUTLINE - LABORATORY**

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<tr>
<th>WEEK #</th>
<th>TOPIC</th>
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| 1      | **Introduction**  
Solder -- Kinds of Solder  
-- Flux, Kinds, Purpose/Of  
-- Fusion Diagram |
| 2      | **Soldering**  
-- Soldering Iron  
-- Techniques  
-- Tools and Soldering  
-- Aids |
| 3 - 4  | **Printed Circuit Board**  
-- Kinds, Purpose  
-- Development Techniques  
-- Photographic Process  
-- Etching |
| 5-6    | **Desoldering**  
-- Through hole  
-- Surface mount  
-- Single sided and double sided PC boards |
| 7      | **Technical Writing/Research Paper for an Electronic Fabrication Project** |
| 9 - 10 | **Telecommunications Voice and Data Systems Survey and Field Trip to an Operations Switch room** |
| 11 - 15| **Fabrication and Testing of an Electronic Design Project** |