



Electrical and Electronics Workshop Syllabus



Syllabus

Course Title: Electrical and Electronics Workshop

Course Code: N/A

Course Followers:

Students of Mechatronics Department in 2st semester of 2nd year

Course Meeting Times

Lab workshop: 1 session / week, 4 hours / session

Course Credits: 1

Course Introduction

A PCB allows large number of electronic components to be connected to each other easily and reliably. Understanding how to prepare the necessary equipment and components, and then assemble a PCB, is important skill for anyone wanting to become involved in manufacturing an enormous range of products. In this workshop, students will prepare the necessary information, components and equipment required to assemble PCBs. students will carry out the soldering and assembly processes required to make a PCB, and check the quality of their work. students will investigate the techniques and equipment used in industry to manufacture PCBs in large numbers.

As well as hands-on practical skills, this workshop will also develop students ability to work independently using written instructions, drawing and diagrams to carry out practical tasks. These skills are highly valued by employers and this workshop will help prepare you for progression to employment as a manufacturing operative in industry. Industrial field and manufacturing system

include and rely on electrical systems but few people understand how these systems function or how they should be tested and serviced safely.

In this workshop, students will gain the skills necessary to carry out routine servicing and maintenance activities on electrical components and systems. students will learn how components come together to make simple electrical systems function and operate. students will explore the ways in which systems can be tested and serviced safely.

Course Objectives

After successfully studying this course, students will be able to:

1. Set up and carry out the assembly of electronic circuits using printed circuit boards (PCBs).
2. Investigate industrial electronic circuit manufacturing processes.
3. Study the function and operation of the electrical components that they are likely to encounter when fault-finding.
4. Carrying out maintenance on electrical circuits.
5. Will be able to deal with PCB Components and Soldering and Electrical Components and Wiring.

Learning Outcomes

By the end of this unit students will be able to:

1. Prepare for and perform safely the assembly of through-hole PCBs
2. Explore ways in which PCBs are manufactured on an industrial scale.
3. Undertake routine operations on an electrical system using information sources
4. Wire and terminate electrical components

Prerequisites / Reference Courses

Physics.

Electric circuits.



Textbooks

The course textbooks are:

1. Electronic Devices and Circuits Second Edition by Jimmie J. Cathey.
2. Electronic Devices Conventional current version Ninth Edition by Floyd.
3. Make: Electronics Second Edition by Charles Platt.
4. Electronic Principles Eighth Edition by Albert Malvino | David Bates.
5. Electronics Workshop Companion by Stan Gibilisco

Homework

- Homework will be issued in workshop and collected a week later in recitation.
- Corrected homework with solutions will be returned in labs the week after it is collected. You are welcome and encouraged to discuss the homework among your colleagues. However, the final formulation and write up of your homework answers must be your own.
- Submitting homework copied from someone else is a breach of ethics, and will be handled by the Committee on Discipline. More importantly, although homework counts for only 10 percent of the grade, they are critical to learning the material and to doing well on the midterm and final exam. **One homework problem will appear in each of the tests**, and homework performance will be taken into account during grade assignment for cases that are on letter-grade boundaries.
- **Late homework will not be accepted for grading.** However, total homework grades will be based on the best nine out of eleven individual homework grades. Thus, with one exception, two homework assignments may be missed without a grading penalty.
- All homework will be graded on a coarse scale of 0 to 3 points. 3 points if all or nearly all problems are correct, 2 points if homework is approximately half correct, 1 point if mostly incorrect, and 0 points if late or not submitted.

Labs (or Tutorials/Exercise, Workshop)

- Labs will be conducted during the weeks shown in the schedule. Each lab assignment involves one or more accomplishments which must be checked off by an instructor in the lab. The instructor will be available for help and lab check-off during those weeks in which a lab is in progress.
- No written work will be due for the last lab.
- You are welcome and encouraged to discuss the labs among your colleagues. You are also welcome to team up in pairs to execute a lab. However, the write up of your lab must be done on your own. Skipping the lab and submitting work copied from someone else is a serious breach of ethics and will be handled by the Committee on Discipline.
- Lab assignments will be graded on a scale of 0 to 3 (3: lab complete, works, good job on pre- and post-lab; 2: lab mostly complete, reasonable job on pre and post lab; 1: lab partially done, marginal to poor job on pre- and post-lab; 0: lab not done, poor job on pre- and post-lab).

Lab Books

- Students must obtain the contents of a few pages for every lab (from Lab #1 to lab #13) for recording measurements, observations and graphs of data taken during the in-lab exercises.
- Written pre-lab and post-lab exercises are also to be completed in their own papers.

Midterm Exam

- The exam will take place few days after Lab #7 for a four-hour duration.
- Students will make different circuits on Test board.
- There will be no lab on the day. **Student may bring one two-sided sheet of notes written by your own hands to the exam.** Student may also bring a calculator, eraser, pencil or ball pens.

Final Exam

- A four-hour final exam will be given during the end-of-term exam week. Timing and room assignments will be announced later.
- Students will make different circuits on Test board.
- **Students may bring three two-sided sheets of notes written by their own hands to the exam.**

Calendar

The calendar provides information on the course's, lab (Lab #), and exam (E) sessions.

| SES # | TOPICS | KEY DATES |
|-----------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Lab #1 | -Introduction to Electrical and Electronic workshop - Using Manual kits. | Lab report #1 in |
| Lab #2 | - Solder different components such as resistor, capacitor, diodes and transistors on a PCB. | Lab report #1 out Lab report #2 in |
| Lab #3 | - Practice to remove components /wires from PCB (Desoldering). | Lab report #2 out Lab report #3 in |
| Lab #4 | - Testing electronic components (resistors, capacitors, diodes, transistors, transformers, relays). | Lab report #3 out Lab report #4 in |
| Lab #5 | - Semiconductor Diodes. Setup DC Power Supply Circuit (9V or 12V or 15V). | Lab report #4 out Lab report #5 in |
| Lab #6 | - Bridge Diodes and Regulators. - Setup Variable DC Power Supply Circuit (-5V,+5V, -12V and +12V) by using Regulators. | Lab report #5 out Lab report #6 in |
| Lab #7 | - Bipolar Junction Transistors. - Set up Light Circuit (Fleisher circuit). | Lab report #6 out Lab report #7 in |
| Lab #8 | - Field-Effect Transistor (FET). - Metal Oxide Semiconductor Field Effect Transistor (MOSFET) | Lab report #7 out Lab report #8 in |
| E1 | Midterm Exam | |
| Lab #9 | - Integrated Circuits - Operation Amplifier - Set up the Monostable Multivibrator Circuit by NEC555 Integrated Circuit. | Lab report #8 out Lab report #9 in |
| Lab #10 | - Set up the Astable Multivibrator Circuit by NEC555 Integrated Circuit on PCB. | Lab report #9 out Lab report #10 in |
| Lab #11 | - Set up the Amplification Circuit by LM386 Integrated Circuit on PCB. | Lab report #10 out Lab report #11 in |



| SES # | TOPICS | KEY DATES |
|-----------|------------------------------------------------------------------------|-----------------------------------------|
| Lab #12 | - Set up the Counter Circuit on PCB. | Lab report #11 out Lab report #12 in |
| Lab #13 | - Basics of Electrical Installations. - Simple Electrical Circuits. | Lab report #12 out Lab report #13 in |
| E2 | Final Exam | |

Grading (or Assessment) Policy

Initial grading will be based on the following weighting:

| ACTIVITIES | PERCENTAGES |
|------------------------------|-------------|
| Homework | 10% |
| Labs (performance & reports) | 40% |
| Midterm | 20% |
| Final exam | 30% |

- Lab assignments will be graded on a scale of 0 to 3
 - i) 3: lab complete, works, good job on pre- and post-lab;
 - ii) 2: lab mostly complete, reasonable job on pre and post lab;
 - iii) 1: lab partially done, marginal to poor job on pre- and post-lab;
 - iv) 0: lab not done, poor job on pre- and post-lab.

- All homework will be graded on a coarse scale of 0 to 3 points,
 - i) 3 points if all or nearly all problems are correct,
 - ii) 2 points if homework is approximately half correct,
 - iii) 1 point if mostly incorrect, and
 - iv) 0 points if late or not submitted.

• This will be followed by considerable discussion among the entire teaching staff to factor in your diligence on the homework and labs, and your participation in labs. This discussion can affect your letter grade for the course, particularly if your initial grade is on a letter-grade boundary.

• Furthermore, failure to complete the labs in this subject will result in an overall grade that is one letter grade lower (not an Incomplete).

• This subject has been designed so that homework and labs are integral and essential parts of the learning process. Although there is no specific reward for participation, there is a clearly defined penalty for not participating. Students who consistently miss homework and labs will not be included in the grading discussions.