

**Semester: 5th**

**Teaching Unit: Methodology Teaching Unit (MTU 3.1)**

**Course: Pre-Project Works**

**Semester Credits Hours (SCH: 37h30) (Lec. : 1h30, Lab.: 1h00)**

**Credits: 3**

**Coefficient : 2**

### **Teaching Objectives:**

- To be able to design simple electronic circuits (analysis, operating principles, component calculations, and implementation)
- To enable students to apply the knowledge they have acquired during their courses by realizing analog or digital electronic functions on Printed Circuit Boards (PCB).

### **Recommended Pre-requisite Knowledge:**

Electronic Components Technology 1, Electrical and Electronic Measurements.

### **Course Content**

#### **Lecture part :**

#### **Chapter 1. Electronics Drawing Techniques**

**(3 Weeks)**

Recalls on passive and active components: principles and properties, technological characteristics, and domains of application. Introduction to electronic drawing, block diagram, detailed diagram and equivalent diagram, layout drawings, wiring plan, definition drawing and components list.

#### **Chapter 2. Electronic Schematic Design Technology**

**(3 Weeks)**

International grid, preliminary mock-ups (or prototype), components arrangement (active components, passive components, integrated circuits, heatsinks, transformers, power components).

#### **Chapter 3. Electronic Circuit Wiring Technique**

**(3 Weeks)**

Printed Circuit Boards, constituents and properties, layout of the electrical circuit drawing, creating the negative (methodology and software), transferring to copper via photogravure, copper etching, post-etching treatment, circuit verification and machining, circuit modification and repair, SMC circuits, theoretical approach, and examples.

#### **Chapter 4. Fundamental Principles of Electronic Circuit Troubleshooting**

**(3 Weeks)**

Component failures, causes of failures (operating and environmental constraints), measuring instruments, testing methods.

#### **Lab. Part (Practical Work):**

**(3 Weeks)**

Presentation of electronic components, introduction to the use of measuring instruments, soldering techniques, soldering of components, familiarization of the student with practical issues, criteria for choosing mini-projects, use of computer software for creating negatives.

As a reference, below is a non-exhaustive list of projects that may be suggested to students for implementation. Of course, both the lecturer and the students are free to propose the implementation of other circuits or projects.

The work on the mini-project can be started at the beginning of the semester to provide the student with sufficient time for topic selection, literature research, understanding of the electronic circuit, searching for and calculating component values and, above all, the realization of the knowledge gained in this course through practical experiments.

Finally, this work should ultimately be concluded with a report and an oral presentation or a poster presentation in front of the course lecturer alone or in front of a group of teachers.

**Mini project n°1:** Study and Implementation of a Standard 12 V DC, 5A Power Supply.

**Mini project n°2:** Study and Implementation of an Integrated Circuit Audio Amplifier.

**Mini project n°3:** Study and Implementation of a Timer and Ramp Generator with NE555.

**Mini project n°4 :** Study and Implementation of a Sequencer with Logic Circuits.

**Mini project n°5 :** Study and Implementation of a Triac Dimmer.

**Mini project n°6 :** Study and Implementation of a Sound Activated Switch.

**Mini project n°7 :** Study and Implementation of a Logic Circuit Tester.

**Mini project n°8 :** Study and Implementation of a Passive Component Curve Tracer.

**Mini project n°9 :** Etude Study and Implementation of a Multi-Stage Amplifier.

#### **Evaluation or "Assessment" Method:**

Continuous Assessment or "Evaluation" : 40%; Exam : 60%.

#### **Bibliographic References**

1. P. Gueule ; Circuits imprimés et PC ; Dunod, 2004.
2. J. Alary ; Circuits imprimés en pratique : Méthodes de fabrication de circuits imprimés, détaillées et économiques ; Dunod, 1999.
3. P. Dunand ; Tracés des circuits imprimés, compatibilité électromagnétiques.
4. H. Mostefai ; Le dépannage des circuits électroniques ; Editions Lamine.
5. R. Besson ; Technologie des composants électroniques ; Editions Radio.
6. E. Lowenber ; Electronique : Principes et applications ; Mc Graw Hill, 1978.
7. M. Fray ; Schémas d'électronique : Principes et méthodes ; Masson & Cie, 1967.