

## MENT107 Electrical and Electronics Engineering Manufacturing

ECTS Value: 5 ECTS  
Self-Study Hours: 20

Contact Hours: 25  
Assessment Hours: 80

### Overall Objectives and Outcomes

This module encompasses the process of engineering manufacturing in electrical and electronics as well as the construction and testing of circuits as a final product. The module will start by looking at block diagrams, flow charts, exploded views, schematic diagrams and assembly diagrams. This module will then introduce the student to a basic understanding of different electronic boards and their parts such as breadboard; strip board; PCB and bus lines; terminal strips; copper tracks; insulation layer; photo resist layer. It will then continue with the instructions of how to construct a printed circuit board including soldering process from the artwork (with and/or without software); chemical development of PCB; etching of a PCB and populating the PCB with components. Finally, this module gives the skills and knowledge to understand electrical and electronic circuits for repairs and modifications, including fault-find electrical and electronic circuits from system to component level.

By the end of this module, the learner will be able to:

#### Competences:

- a. Engage with research to develop and critically assess pedagogical exercises which evaluate the process of interpreting and using engineering documentation to follow procedure.
- b. Develop and critically evaluate pedagogical exercises to identify the application of different circuit building components, master the process of constructing a printed circuit board, and construct, populate and test a PCB for an electrical and electronic circuit.
- c. Develop and evaluate pedagogical methods to identify tools and equipment used to construct circuits, label test bench equipment and settings, and understand the operation of electronic components within circuit and basic voltage, current and resistance tests from system to component levels.

#### Knowledge:

- a. Understand the concept, design and application of several engineering components from engineering documentation to real final applications.
- b. Describe the process of constructing a printed circuit board, interpret the schematic symbols and drawing requirements for PCB manufacturing and identify the advantages and disadvantages of electronic boards.
- c. Handle and use appropriate tools and equipment, understand the operation of test bench equipment and apply a systematic approach to fault finding and locate a range of faults to component level.

#### Skills:

- a. Design and develop a full product including housing of electronic circuit boards ready as prototype.

- b. Design, manufacture and test a PCB
- c. Fault-find a circuit and repair a malfunctioning circuit

## Assessment Methods

This module will be assessed through: Design and Practice Assignment.

## Suggested Readings

### Core Reading List:

1. Al Williams, (2004). Build your own printed Circuit Board. McGraw-Hill.
2. Tooley Mike, (2006). Electronic Circuits: Fundamentals and Applications, Third Edition. Routledge.

### Supplementary Reading List:

1. Kalpakjian Serope, Schmid Steven, (1992) Manufacturing Engineering and Technology. Addison Wesley
2. Singh Rajender, (2006). Introduction to Basic Manufacturing Processes and Workshop Technology. New Age International.
3. Groover Mikell P., (2012). Fundamentals of Modern Manufacturing. Materials, Processes and systems. Wiley.

### Websites:

1. PCB Design Tutorial - <http://alternatzone.com/electronics/pcbdesign.htm>
2. National Instruments Circuit Design Suite - <http://www.ni.com/multisim/P>
3. The Electronics Club - <http://electronicsclub.info/>