Course Title: Basic Training

Course Code: EE4094

Units: 0

Level: B4

Course Aims & Objectives:

Aim
This course aims to provide practical training at a level such that upon graduation, it would be sufficient for what a professional engineer needs. In particular, the training materials will be relevant to the electronics industry in Hong Kong and the Pearl River Delta Region.

Objectives for Part I: In-House Training on Practical Skills
The objective of this part is to impart on students some of the necessary skills required for electronic engineering design work. In particular practical use of computer aided design from a circuit diagram to printed circuit board assembly. Workshop practices and its safety and the appreciation of surface mount technology.

Objectives for Part II-A: Industrial Attachment
To enable students to gain practical experience from a real industrial environment, all students are required to join the Industrial Attachment Scheme (IAS). However, students may be approved or recommended to take the in-house training in lieu of the IAS under exceptional circumstances.

1. Enhance students’ awareness of the latest technologies in the mass-production of electronics products.
2. Enable students to learn new techniques in a genuine working condition.
3. Familiarize students with the operation of a manufacturing plant, including its organization structure, management style, sources of raw materials, inventory control, marketing channels, and other logistic supports.
4. Provide students a real-life environment to pick up the spirit of professionalism, and to develop professional ethics.

Objectives for Part II-B: 4-week in-house Training
The objective of this course is to immerse the students in a simulated industrial environment so that they can experience the practical side of manufacturing an electronic product. Through this immersion, students will be subjected to the same constraints in the manufacture of an electronic product as they would have if they were in industry.

Intended Learning Outcomes:
Basic Training I
On completion, students will be able to,
1. Manufacture a working electronic circuit on a PCB
2. Demonstrate bench fitting skills
3. Manufacture a board using surface mount technology

Basic Training II
On completion, students will be able to,
4. Identify the practical constraints behind the manufacture of an electronic product.
5. Manufacture an electronic product under the constraint of volume production.
6. Procure the documentation necessary for the volume production of an electronic product.

Syllabus:

Part I: 2-week in-house training on practical skills

One Week Training on Electronics and CAD
Work will be based around a simple electronic circuit that the student can take home and find useful such as an audio amplifier; electrical and electronic symbols, electrical and electronic schematic using EDA, PCB layout using CAD, component overlay, bill of material, wiring diagram, wiring harness, PCB fabrication, PCB assembly and wiring, testing and debugging.

Half Week on Workshop Training
Work will be based around a simple box type structure; safety in workshop, safety in use of tools, safety in use of machines, safety in use of electrical machines, measurement using micrometers or vernier calipers, marking of sheet metals, cutting of sheet metal, bending of sheet metal, drilling, tapping, fixings and bench fitting.

Half Week on the Appreciation of SMT
Work will based around the manufacture of a PCB based on surface mount technology; chip components, screen printing, chip mounting, pick and place, reflow soldering.

Part II-A Industrial Attachment

Structure and content
Students are required to take eight to nine weeks of training starting from June in an electronics company. The training of each student is subject to the available engineering training programme of individual company. Student may be exposed to work in product design, production, and quality assurance.

Supervision and Assignment
An engineer of the Company will be assigned to be the mentor who is responsible for giving guidance and advice to the student and assessing the student’s performance during the training. An academic staff from the Department of Electronic Engineering, City University of Hong Kong, will be appointed to co-supervise and monitor the progress of the student. Students are required to report their work in a log-book every day. The assessment is based on the log-book and the performance of their work taken in the company. Students may be required to give a presentation on their work at the end of the attachment.

Insurance
Student will be employed as temporary staff under the terms and conditions of the company in Hong Kong. Some may be sent to the company’s factory in the Pearl River Delta region for training. As such, students will be covered by the employee insurance scheme for temporary staff of individual companies. The Department will also devise a separate insurance scheme, in particular for hospitalization, taking into consideration the coverage of the company’s scheme and the University’s Group Personal Accident Insurance scheme. In this respect, the Business Operations Office will be consulted.

Part II-B: 4-week in-house training
The prototype design for this project is carried out in the Electronic Product Design course. The manufacturing part of the project for this course is a continuation of the prototype design work. The manufacturing projects are all of a "read" work kind either to meet an existing demand or to meet an expected demand.

The project work is split into definite phases, brief descriptions of which are shown below:

a. **Part A - Detailing, Drawing and Planning**
   Detailed drawings of the component parts, assembly drawings, circuit layout diagrams and related documents have to be prepared. The project team will also prepare an analysis of the manufacturing operations required, make cost estimates and prepare a flow chart for the complete manufacturing process which also includes the production floor plan.

b. **Part B - Manufacturing, Assembly Testing and Evaluation**
   Teams will procure then manufacture the parts and sub-assemblies, followed by the assembly and the testing of the prototype. Teams will then evaluate the prototype with a view to quantity production, and make any necessary recommendations regarding the improvement of design, manufacturing procedure, assembly, and testing of the product.

c. **Part C – Documentation**
   Documentation should include a brief but comprehensive written report as well as manuals detailed enough to manufacture the product in quantity. The manuals should include the design, production and quality assurance and should be sufficiently detailed to allow its manufacture without the need to consult the original design engineer.

Project teams will be small in size with each team working on one project presented in the form of a general circuit diagram and description of the prototype requirements. The staff concerned will discuss with teams the general design and working principles of the project followed by which the teams are required to work in accordance with Part A, B and C above.

Each project will be sub-divided into a number of stages or phases. In each stage, a leader will be appointed within the team. Each member in the team will take turn to act as a leader in order to ensure that supervisory and leadership experiences are gained. The duty of a leader is to monitor the progress of work and to take note of milestones that are met and if not to take remedial action. In case of problems, the leader should alert the team and consult the staff concerned in order to overcome these difficulties.

The projects assigned require sustained efforts if they are to be completed within the four scheduled weeks. It is expected, and indeed will be necessary, that team members are not confined by a "worker" concept of "standard" working days or working hours. The meeting of target dates is considered an important part of this industrial type project.

A major value of this manufacturing project is that it is in all respects industrial with respect to the work, the environment, the pattern of attendance, and the procedures to be followed.

**Laboratory Experiment:**
Part I - 2x5 full days
Part II - 4x5 full days

**Teaching pattern:**
This course is carried out in 2 parts:
Part I: 2 week in-house training

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Part II-A: 8-9 week of industrial attachment
or
Part II-B: 4-week in-house training

**Assessment pattern:**
The assessment is purely on a pass/fail basis. Students are required to pass this course in order to graduate. The weighting of this course is zero.

**Pre-requisites:** *(please quote course code & title)*
EE3002 Electronic Product Design for Part II-A and B, or
EE3003 Electronic Product Design for Part II-A and B

**Pre-cursor:** *(please quote course code & title)*
Nil

**Exclusive Course:** *(please quote course code & title)*
Nil

**Equivalent Courses:** *(please quote course code & title)*
Nil

**Equivalent to the Old Course Code and Title:**
EE40494 Basic Training

**Textbook:**
Nil

**Reference Book:**
Nil