

MECH1990 Industrial Training – For BEng(MECH), BEng(AE) and MEGBM Students

Course Objectives:

- The industrial training program provides different modules of practical training for Mechanical Engineering students to give them a broad and structured understanding of engineering practice, and help them satisfy training requirements of the Hong Kong Institution of Engineers (HKIE) and the UK's Engineering Council for certification/registration purposes.
- An important aspect of the program is the integration of the workshop experience with the knowledge acquired in classrooms and laboratories so that students' understanding and appreciation of the knowledge acquired from the academic courses is enhanced.

Course Outcomes:

- On successful completion of this course, students are expected to be able to:
- Apply mathematical, scientific, and engineering principles, tools and techniques to solve practical mechanical engineering problems.
- Design a mechanical prototype system to given set of requirements within realistic constraints of health and safety, manufacturability and sustainability.
- Use the techniques, skills, and modern engineering tools necessary for engineering practice to build a prototype.
- Use the computer/IT tools relevant to mechanical engineering in practice.
- Identify the key professional practices and ethical responsibilities of an engineer.

Exemption from Industrial Training

Students should complete the prescribed industrial training program by attending all the industrial training modules, submit and pass the Practical Training Report required of each module, and submit and pass the overall Logbook. **For details of exemption, please refer to the following description which is extracted from Section E 'Exemption from Industrial Training' on Industrial Training Center website: <http://egitc.ust.hk/>**

Students who are required by their degree programs to complete industrial training can apply for exemption if they have completed equivalent training elsewhere, or they have completed internships approved by their major Departments. Students should apply directly to their major Department for exemption from industrial training by using the ITC Exemption Application Form [ITC Exemption by taking Equivalent Training Elsewhere](#) or [ITC Exemption by Internship](#)

Application for exemption will be considered by the major Department on a case basis. For exemption based on internship, factors like duration of the internship, relevance to the degree program, company or organization that the students have worked with, etc. will all be considered. Students are also required to submit a brief report and supervisor feedback form upon completion of their internship for the Department's consideration.

Industrial Training Program

Module Code & Location	Module Title	Session	Duration
ICU328 @ HKPUIC	Practical Appreciation of Electro-Mechanical Automation Systems	Yr-2 Winter / Summer	5 weeks
ICU320 @ HKPUIC	Appreciation of 3D CAD	Yr-2 Winter / Summer	1 week
USTSMEB @ HKUST	Safety Training: - Construction Safety (0.5 days) - Chemical Safety (1 day)	Yr-2 Winter	1.5 days
		Total:	around 6.5 weeks

Industrial Training Module Description:

IC Module Code: ICU328
Module Name: Practical Appreciation of Electron-Mechanical Automation Systems
Duration: 20 days
<p>Brief Module Description: The subject aims to give students opportunity to design and build automatic electro-mechanical products. The subject will be divided into four modules.</p> <p><u>1) Manufacturing processes</u></p> <ul style="list-style-type: none"> ▪ Machining: turning, milling, CNC machining, EDM and Wire-cutting. ▪ Sheet Metal fabrication: blanking, folding, joining, and welding. ▪ Metal Casting: sand casting, investment casting and rapid casting. ▪ Surface finishing: electroplating and anodizing. ▪ Bench fitting: filing, drilling, tapping, assembly. ▪ Measurement and Inspection: dimensions and tolerance, surface roughness. <p><u>2) Automation systems</u></p> <ul style="list-style-type: none"> ▪ Input devices: switches, sensors, encoders/transducers. ▪ Controllers and programming: Programmable Logic Controller (PLC), Programmable Automation Controller (PAC). ▪ User interfaces devices: touch panels, HMI design. ▪ Controller Networking: TCP/IP, Wireless network, Open loop & close loop control methodologies and the concept of centralize and distributed control. ▪ Motion Control: motor and driver, position and speed control, Fluid Power - Pneumatic valves and cylinders. <p><u>3) Power systems</u></p> <ul style="list-style-type: none"> ▪ Batteries and charging system, Charging process control, BMS and Balancer application, Super capacitors, integrated energy system. ▪ Electric motor traction system design, traction system control, power system optimization and regeneration control. ▪ Auxiliary power unit use and control, hybrid system fundamentals.

4) Vehicular systems

- Vehicle construction: chassis, transmission, steering, suspension.
- Vehicle dynamics: layout, weight-transfer, pitching and rolling, under and over-steering.
- Driving control: Display instruments, Control instruments, hydraulic and electric control circuits, Mobility related safety issues.

UST Module Code: ICU320

Module Name: Appreciation of 3D CAD

Duration: 4 days

Brief Module Description:

- This subject aims at giving students the necessary fundamental engineering practice includes Engineering drawing and 3D computer-aided design (CAD).
- Principles of orthographic projection (1st angle and 3rd angle projection systems)
- Dimensioning
- Types of drawings including part drawing and assembly drawing
- Introduction to CAD
- General concepts on 3D computer modeling
- Parametric feature based solid modeling; construction and detailing of solid features
- Solid model modification and its limitations
- Concepts of assembly modeling including bottom up and top down approaches for the generation of parts, subassemblies, and final assembly
- Virtual validation and simulation, generation of 2D drawings from 3D parts and assemblies
- Drawing annotation

UST Module Code: USTSMEB

Module Name: Safety Training

Duration: 1.5 days

Brief Module Description:

- Construction Safety (0.5 days)
- Chemical Safety (1 day)