Subject Description Form

Subject Code	EE2101C / IC2105
Subject Title	Engineering Communication and Fundamentals
Credit Value	4 Training Credits
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject offers a wide spectrum of fundamental engineering practices that are essential for a professional engineer. This subject includes Engineering Drawing and CAD, Industrial Safety and Electronic Product Safety Test and Practice, Basic Mechatronic Practice and Basic Scientific Computing that aims at providing fundamental and necessary technical skills to all year 1 student interested in engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Describe the principles and conventional representation of engineering drawings according to engineering standards and be able to use it as a medium in technical communication and documentation with CAD application, modelling and practice in engineering applications; b. Interpret basic occupational health and industrial safety requirements for engineering practice; c. Explain common electronic product safety tests; d. Develop a simple mechatronic system to solve an engineering problem; and e. Apply scientific computing software for basic computation, data visualisation and programming in science and engineering;
Subject Synopsis/ Indicative Syllabus	1. (TM8059) Engineering Drawing and CAD 1.1 Fundamentals of Engineering Drawing: Principles of engineering drawing, dimensioning and tolerances; types of drawings, such as part drawing and assembly drawing; conventional representation of common machine elements and parts; wiring diagram and wiring table for electrical installation; system block diagram for the electrical system; architectural wiring diagram. 1.2 Introduction to CAD Features of the 2D CAD system; 2D drawings techniques, such as basic object construction, annotation, dimensioning; setup of 2D plotting; general concepts on 3D computer modelling; parametric feature-based solid modelling; construction and detailing of solid features; concepts of assembly modelling; virtual validation and simulation, generation of 2D drawings from 3D parts and assemblies; data exchange; techniques for export files for different processes (e.g. 3D printing, laser machining, VR) 2. (TM2009) Industrial Safety 2.1. Safety Management: Overview, essential elements of safety management, safety training, accident management, and emergency procedures. 2.2. Safety Law: F&IU Ordinance and principal regulations, OSH Ordinance and principal regulations. 2.3. Occupational Hygiene and Environmental Safety: Noise hazard and control; dust hazard and control; ergonomics of manual handling.

	2.4. Safety Technology: Mechanical lifting, fire prevention, dangerous substances and chemical safety, machinery hazards and guarding, electrical safety, first aid, job safety analysis, fault tree analysis, and personal protective equipment. 3. (TM1116) Electronic Product Safety Test and Practice 3.1 Use of basic electronic test instruments, current and voltage measurements, waveform measurement, power supply and signalsources; 3.2 Electronic product safety standards; electronic product test methods, such as high voltage isolation test, insulation resistance test, continuity test, leakagecurrent measurement, electrostatic discharge (ESD) Test etc. 4. (TM0510) Basic Mechatronic Practice 4.1. Definitions of mechatronics; mechatronic system design approach; key elements of a mechatronic system, such as sensor and actuator, mechanical drives, digital control, signal conditioning,and human-machine interfaces. 4.2. Introduction of design and operation of typical mechatronic systems, such as robotic arms, elevator systems, mobile robots, manufacturing and logistic system; 4.3. Design of mechatronic system using programmable controllers and development software such as PLC and Microcontroller system; use of simulation software packages to support system prototyping. **One of the following as decided by hosting programme** 5. (TM3014) Basic Scientific Computing with MATLAB 5.1. Overview of the scientific computing with MATLAB; interactive calculations, variables, vectors, matrices and string; mathematical operations, polynomial operation, data analysis and curve fitting; file I/O functions; basic 2D and 3D plots. 5.2. M-file programming & debugging; scripts, functions, logic operations, flow control; introduction to the graphical user interface. 6. (TM3300) Basic Scientific Computing with Python 6.1. Overview of the scientific computer with Python. Basic data structures and data operations; script programming and debugging; logic operations, flow control and graphical userinterfaces. 6.2. Use of functions and common Python packages for data manipulation and processing. 6.3. Data visualization by using graphics packages;
Teaching/ Learning Methodology	The teaching and learning methods include lectures, workshop tutorials, andpractical works. The lectures are aimed at providing students with an overall and concrete background knowledge required for understanding key issues in engineering communication, the use of standard engineering components and systems, and the importance of industrial safety. The workshop tutorials are aimed at enhancing students' in-depth knowledge and ability in applying theknowledge and skills to complete specific tasks. The practical works aim at facilitating students to review the diverse topics covered in this course and perform active learning with research, practice, questioning, and problem-solving in a unified activity.

Assessment Methods in Alignment with Intended Learning Outcomes

Assessment Methods	% weighting	Intended Learning Outcomes Assessed				
		a	b	c	d	e
Continuous Assessment						
1. Assignments/ Project	Refer to individual Module Description Form	✓	✓	✓	✓	✓
2. Test			✓		✓	✓
3. Report/ Logbook				✓	✓	
Total	100%					

Assessment Methods	Remarks
1. Assignment / Project	The project is designed to facilitate students to reflect and apply the knowledge periodically throughout the training.
2. Test	Test is designed to facilitate students to review the breadth and depth of their understanding on specific topics.
3. Report / Logbook	Report / Logbook is designed to facilitate students to acquire deep understanding on the topics of the training and to present those concepts clearly.

Student Study Effort Expected

Class Contact	**TM8059**	**TM2009**	**TM1116**	**TM0510**	**TM3014 or TM3300**
• Mini-lecture	11 Hrs.	7 Hrs.	2 Hrs.	6 Hrs.	6 Hrs.
• In-class Assignment/ Hands-on Practice	40 Hrs.	8 Hrs.	4 Hrs.	21 Hrs.	15 Hrs.
Other Study Effort					
Nil					
Total Study Effort			**120 Hrs.**		

Reading List and References

Reference Software List:

1. AutoCAD from Autodesk Inc.
2. SolidWorks from Dassault Systèmes Solidworks Corp.
3. MATLAB from The Mathworks Inc.
4. Python from Python Software Foundation

Reference Standards and Handbooks:

1. BS EN ISO 128 – Technical product documentation. General principles of

	representation 2. Cecil H. Jensen, et al, Engineering Drawing and Design, McGraw-Hill,2008. 3. IEEE Standard 315 / ANSI Y32.2 / CSA Z99 Graphic Symbols forElectrical and Electronics Diagrams. 4. IEC 61082 Preparation of Documents used in Electrotechnology. **Reference Books:** Training material, manual and articles published by Industrial Centre.