Subject Description Form

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>IC2105</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Title</td>
<td>Engineering Communication and Fundamentals</td>
</tr>
<tr>
<td>Credit Value</td>
<td>4 Training Credits</td>
</tr>
<tr>
<td>Level</td>
<td>2</td>
</tr>
<tr>
<td>Pre-requisite/ Co-requisite/ Exclusion</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Objectives
This subject offers a wide spectrum of fundamental engineering practice 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 with MATLAB that aims at providing fundamental and necessary technical skills to all year 1 students 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 with application in mechanical, industrial systems and electrical engineering;

b) Interpret basic occupational health and industrial safety requirements for engineering practice;

c) Explain common electronic product safety tests;

d) Design and implement simple mechatronic systems with programmable controller, software, actuation devices, sensing devices and mechanism; and

e) Apply scientific computing software for computing in science and engineering including visualization and programming;

Subject Synopsis/ Indicative Syllabus

<table>
<thead>
<tr>
<th>Syllabus:</th>
<th>1. (TM8059) Engineering Drawing and CAD</th>
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<tbody>
<tr>
<td>1.1.</td>
<td>Fundamentals of Engineering Drawing and CAD</td>
</tr>
<tr>
<td></td>
<td>Principles of orthographic projection; sectioning; dimensioning; sketching; general tolerances; conventional representation of screw threads and fasteners; types of drawings including part drawing and assembly drawing.</td>
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</tbody>
</table>

Introduction to CAD; features of 2D CAD system (layer; draw; modify; block & attributes; standard library); techniques for the creation of titleblock; setup of 2D plotting; 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 including dimensioning, tolerancing, and part list.

1.2. Electrical Drawing

Wiring diagram and wiring table for electronic and electrical installation, functional representation of circuit, system block diagram, electrical and electronic device symbols and layout, architectural wiring diagram with reference to the architectural symbols for electrical drawings in Hong Kong and international standards.

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, 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 signal sources;

3.2. Electronic product safety test method; High Voltage Isolation Test, Insulation Resistance Test, Continuity Test, Leakage Current Measurement, Electrostatic Discharge (ESD) Test.

4. (TM0510) Basic Mechatronic Practice

4.1. Definitions of mechatronics; design and operation of typical mechatronic systems; appreciation of measurement system, actuator
system, motor drives, mechanical drives, gear train and linkage, pneumatic and hydraulic systems, signal conditioning, and human-machine interfaces.

4.2. Integration of system components using appropriate controller hardware and software such as PLC, PAC, and Microcontroller system; use of simulation software packages for pneumatic and hydraulic circuit design.

5. (TM3014) Basic Scientific Computing with MATLAB

5.1. Overview to scientific computing; introduction to MATLAB; interactive calculations, random number generators, 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 graphical user interface.

Learning Methodology

The teaching and learning methods include lectures, workshop tutorials, and practical works. The lectures are aimed at providing students with an overall and concrete background knowledge required for understanding key issues in engineering communication, use of standard engineering components and systems, and importance of industrial safety. The workshop tutorials are aimed at enhancing students’ in-depth knowledge and ability in applying the knowledge 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

<table>
<thead>
<tr>
<th>Assessment Methods</th>
<th>Weighting (%)</th>
<th>Intended Learning Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment</td>
<td></td>
<td>a  b  c  d  e</td>
</tr>
<tr>
<td>1. Assignment / Project</td>
<td>Refer to individual Module Description Form</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>2. Test</td>
<td></td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>3. Report / Logbook</td>
<td></td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
</tr>
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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

<table>
<thead>
<tr>
<th>Class Contact</th>
<th>TM8059</th>
<th>TM2009</th>
<th>TM1116</th>
<th>TM0510</th>
<th>TM3014</th>
</tr>
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<tbody>
<tr>
<td>Mini-lecture</td>
<td>11 Hrs.</td>
<td>7 Hrs.</td>
<td>2 Hrs.</td>
<td>6 Hrs.</td>
<td>6 Hrs.</td>
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<tr>
<td>In-class Assignment/ Hands-on Practice</td>
<td>40 Hrs.</td>
<td>8 Hrs.</td>
<td>4 Hrs.</td>
<td>21 Hrs.</td>
<td>15 Hrs.</td>
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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.

**Reference Standards and Handbooks:**
8. IEC 61082 Preparation of Documents used in Electrotechnology.

**Reference Books:**
Training material, manual and articles published by Industrial Centre.