Subject Description Form

<table>
<tr><td>Subject Code</td><td>EE4024 / EE4011A / EE4011B</td></tr>
<tr><td>Subject Title</td><td>Industrial Computer Applications</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>4</td></tr>
<tr><td>Pre-requisite/
Co-requisite/
Exclusion</td><td>Nil</td></tr>
<tr><td>Objectives</td><td>Introduce the applications of advanced computing techniques in solving industrial problems. The topics include: embedded system; applications of computer vision; Internet of Things (IoT) applications and introduction to Big Data.</td></tr>
<tr><td>Subject Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. Apply advanced computing techniques to solve industrial problems
b. Understand the importance of computing systems in industrial applications.
c. Think logically and be able to analyze data as well as present results in writing.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>1. Embedded Computer control: Modelling of the computer process control system, practical approaches to digital control implementation, microprocessor based control systems.
2. Big Data: Big Data fundamentals, the Hadoop frame work, web scraping.
3. Computer vision: Digital image fundamentals, image representation, image enhancement, image segmentation, application of image processing in industrial automation.
4. IoT and Mobile applications: IoT design and implementation. Introduction to server-side and client-side applications and MQTT platform.
Mini-project:
Apply one of the above computing topics to solve an engineering problem.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures and tutorials are the primary means of conveying the basic concepts and theories. Experiences on design and practical applications are given through mini-project, in which the students are expected to solve design problems with real-life constraints and to attain pragmatic solutions with critical and analytical thinking.
<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="3">Outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>Lectures</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Tutorials</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Mini-project</td><td>✓</td><td>✓</td><td>✓</td></tr>
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Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Examination	60%	✓	✓	✓
2. In-class Test	15%	✓	✓	✓
3. Mini-project	18%	✓	✓	✓
4. Exercise	7%	✓	✓	
Total	100%			

One end-of-semester written examination; one mid-semester test; a mini-project on an industrial computing based application with a study report covering the investigation of the intriguing computing application for feasibility lookout, failure explanation, rooms for future enhancement and improvements.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	33 Hrs.
▪ Laboratory (mini-project)	6 Hrs.
Other student study effort:	
▪ Mini-project report and preparation	20 Hrs.
▪ Self-study	46 Hrs.
Total student study effort	105 Hrs.

Reading List and References

Reference books and online materials:

1. T. Cox, et al., Getting Started with Python for the Internet of Things, Maker Media, Inc, 2019.
2. U. Meyer-Baese, Embedded microprocessor system design using FPGAs, Springer, 2021.
3. E. White, Making Embedded Systems: Design Patterns for Great Software, O'Reilly, 2011.
4. M. Beyeler, Machine Learning for OpencCV: Intelligent image processing with Python, Packt Publishing, 2017.
5. Y. L. Prasad, Big Data Analytics Made Easy, Notion Press, 2016
6. T. White, Hadoop: The Definitive Guide, 3rd Ed, O'Reilly, 2012