

Subject Description Form

Subject Code	AP20012
Subject Title	Computer-based Automation
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To develop students' ability to design interfaces between microcomputers and instruments for automation and/or control of scientific measurement systems.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ul style="list-style-type: none"> (a) describe the technical details of both the hardware and software in a computer interfacing system; (b) apply knowledge in Lab View and instrumentation to the development of laboratory automation; (c) design simple interfacing systems; (d) make use of foundation knowledge in instrumentation for life-long professional development in science/engineering; and (e) be able to communicate clearly in English and by other means, such as block diagrams and flow charts.
Subject Synopsis/ Indicative Syllabus	<p>LabVIEW: graphical programming, virtual instrumentation, data acquisition, instrument control.</p> <p>Interfacing techniques for engineering/physics applications: input and output devices and their interfacing.</p> <p>Process control and sensor/transducer application: voltage-to-frequency converters, analog-to-digital and digital-to-analog converters, peak detector.</p> <p>Signal processing: signal and noise characteristics and signal enhancement/noise reduction methods.</p>
Teaching/Learning Methodology	<p>Lecture: Background knowledge behind all experiments will be systematically introduced in lectures. Class work and assignments related to the content of lectures will be used to enhance students learning. Students are requested to give brief presentations on the topics related to the contents of experiments.</p> <p>Laboratory session: Students will use computer controlled instruments to conduct electrical and optical measurements as well as practice using of various sensors and transducers.</p>

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			a	b	c	d	e
	(1) Continuous Assessment	40	✓	✓	✓	✓	✓
	(2) Practical Examination	20		✓	✓	✓	
	(3) Written Test	40	✓		✓		✓
	Total	100					
<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Continuous assessment includes assignments and laboratory reports. Assignments will strengthen the students' basic knowledge and the analytical skills to solve the problems related to this subject. Practical Examination is useful to assess students' experimental skills and knowledge learned from the lectures and laboratory works, which is mainly the design and control of interfaces between computer and scientific instruments. Written Test will review their understanding of the course and assess their ability to solve problems, in particular using graphical programming. Hence, the proposed assessment methods are necessary to assess the intended learning outcomes.</p>							
Student Study Effort Expected	Class contact:						
	• Lecture		22 h				
	• Laboratory		24 h				
	Other student study effort:						
	• Self study		74 h				
	Total student study effort		120 h				
Reading List and References	<ol style="list-style-type: none"> 1. "The LabVIEW Style Book" by Peter A. Blume. (Prentice Hall, 2007). 2. "LabView for Everyone: Graphical Programming Made Easy and Fun" by Jeffrey Travis and Jim Kring (Prentice Hall, 2006). 						