

Title:	Industrial Control	APPROVED
Long Title:	Industrial Control	
Module Code:	ELEC6023	
Credits:	5	
NFQ Level:	Fundamental	
Field of Study:	Electrical Engineering	
Valid From:	Semester 1 - 2014/15 ( September 2014 )	
Module Delivered in	<a href="#">3 programme(s)</a>	
Module Coordinator:	JOSEPH CONNELL	
Module Author:		
Module Description:	Develop control engineering concepts from first principles using time domain analysis of open and closed loop systems.	
Learning Outcomes		
On successful completion of this module the learner will be able to:		
LO1	Implement the concepts of input, output, plant, process, system, stability, inherent regulation.	
LO2	Interpret control processes in open and closed loop mode with block diagrams, for analogue type systems.	
LO3	Implement the operation of prime control devices such as operational amplifiers, and final control elements such as thyristor and triac, position controlled valve, motorised valve.	
LO4	Explain the principles of operation of various types of sensors and their application in control in terms of accuracy, response time, etc	
LO5	Evaluate continuous type plant responses in the time domain. Evaluate continuous type plant steady state gain in open loop and closed loop mode. Calculate closed loop steady state error. Use software to formulate basic models.	
LO6	Use circuit simulation software to simulate circuits operation.	
Pre-requisite learning		
Module Recommendations		
<i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i>		
No recommendations listed		
Incompatible Modules		
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.</i>		
No incompatible modules listed		
Co-requisite Modules		
No Co-requisite modules listed		
Requirements		
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.</i>		
Industrial Automation for Electrical Engineering(L6)		
Co-requisites		

No Co Requisites listed

**Module Content & Assessment**

**Indicative Content**

**Control Building Blocks**

Concept of reference, feedback and error signals. Block diagrams of analogue control systems.

**Analog Controller Hardware**

Operational amplifier configurations such as summing, difference, multiplying, integrating, and differentiating.

**Control Model Development**

Developing basic models from plant data. Block diagrams of digital control systems with microprocessor based controllers. Application of closed loop control in industrial situations such as temperature, level and speed.

**Sensors and Actuators**

PID Stand Alone Controller, Electronic transducers - sensor and actuator concept. Response Characteristics - sensitivity, linearity error, accuracy error, precision, stability and noise, response time, temperature coefficient and hysteresis. Position Encoders - potentiometer, digital rotary and linear encoders, relative and absolute position. Temperature Sensors - Wheatstone bridge circuit. Thermistor: bridge circuit arrangement, time constant, bridge sensitivity optimization, pressure and differential pressure methods. pH measurement, Flowmeters.

**Final Control Elements**

Introduction to the thyristor and triac. Phase control and integral cycling. The thyristor in dc circuits. Three phase rectification. Controlled rectification. Electrically controlled valves.

Assessment Breakdown	%
Course Work	30.00%
End of Module Formal Examination	70.00%

**Course Work**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Lab performance and Evaluation	1,2,3,4,5,6	20.0	Sem End
Other	Assessment	1,2,3	10.0	Week 6

**End of Module Formal Examination**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	End-of-Semester Final Examination	1,2,3,4,5	70.0	End-of-Semester

**Reassessment Requirement**

**Repeat examination**

Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

The institute reserves the right to alter the nature and timings of assessment

**Module Workload**

<b>Workload: Full Time</b>				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Weekly Lecture	2.0	Every Week	2.00
Lab	Laboratory/Practical Sessions	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Self Study	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

**This module has no Part Time workload.**

Module Resources
<i>Recommended Book Resources</i>
<ul style="list-style-type: none"> <li>• Curtis Johnson 2006, <i>Process Control Instrumentation Technology</i>, 8th Ed., 12, Pearson Education UK [ISBN: 0131976699]</li> </ul>
<i>This module does not have any article/paper resources</i>
<i>This module does not have any other resources</i>

Module Delivered in			
Programme Code	Programme	Semester	Delivery
CR_EEPSY_8	<a href="#"><u>Bachelor of Engineering (Honours) in Electrical Engineering</u></a>	4	Mandatory
CR_EELEC_7	<a href="#"><u>Bachelor of Engineering in Electrical Engineering</u></a>	4	Mandatory
CR_EELEC_6	<a href="#"><u>Higher Certificate in Engineering in Electrical Engineering</u></a>	4	Mandatory