CTRL H3503: Automatic Control 2

Module Title:	Automatic Control 2
Language of Instruction:	English

Credits:	5

NFQ Level:	7

Module Delivered In	1 programme(s)

Teaching & Learning Strategies:	Lectures will incorporate a mixture of presentations, example and student exercises/problem-solving, question and answer sessions, group discussions and online resources. Extensive use will be made of a practical Control laboratory programme to facilitate student engagement with real-world control scenarios. Students will also work collaboratively from time to time in the completion of exercises and development of solutions.

Module Aim:	The aim of this module is to introduce multi-variable control systems, control valve applications and to enable students to develop the knowledge and skills necessary to optimize PID control system parameters.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Apply appropriate control strategies to a range of multi-variable process systems.
LO2	Specify suitable control valves, and ancillary associated equipment, for a range of different process applications.
LO3	Determine correct equipment configuration and controller settings for safe and stable control.
LO4	Optimise “as found” PID controller tuning.

Pre-requisite learning		
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*		
8352	CTRL H3502	Automatic Control 1
8358	MEUS H3505	Process Measurements 1
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*		
No incompatible modules listed		
Co-requisite Modules		
No Co-requisite modules listed		
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*		
No requirements listed		

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Module Content & Assessment

Indicative Content
Single Variable Control Common Characteristics and Requirements of Pressure, Flow, Level and Temperature Control Systems - design implications on response, critical measurement considerations, limitations of manipulated variable.
Multi-Variable Control Cascade Control - principle of operation, hardware configurations, Master/Slave requirements, tuning methods. Level/Flow and Temperature/Flow applications. Ratio Control - principle of operation, hardware configurations, Wild/Controlled variable requirements, tuning methods. Combustion optimization and mixing applications. Feed-forward Control Applications.
Control Valves Control Valve Types - globe, ball, butterfly, gate and diaphragm valves. Control Valve Characteristics, Valve Selection and Sizing. Valve Actuators - pneumatic, electric and hydraulic applications. Fail-safe Modes and plant shutdown, Ancillary Equipment - Positioners, Boosters etc. Split-ranging Applications.
Controller Tuning Control Mode Selection, Zeigler-Nichols Open- and Closed-loop Tuning Methods. Quarter-decay Tuning, Optimization of "as-found" PID controller settings individually and collaboratively.

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	30.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Short Answer Questions	Online/Classroom based written test	1,2	5.00	Week 5
Short Answer Questions	Online/Classroom based written test	2	5.00	Week 10

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Problem-based configuration and tuning exercise	3,4	30.00	Week 14

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	Written Exam	1,2,3,4	60.00	End-of-Semester

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Short Answer Questions	Online/Classroom based written test.	1,3	5.00	Week 5
Short Answer Questions	Online/Classroom based written test.	2	5.00	Week 10

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Problem-based configuration and tuning exercise.	3,4	30.00	Week 14

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	Written Exam	1,2,3,4	60.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lab/Lecture	Every Week	3.00
Independent Learning Time	Every Week	6.00
	Total Hours	9.00

Workload: Part Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lab/Lecture	Every Week	3.00
Independent Learning	Every Week	6.00
	Total Hours	9.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EMIMC_D	Batchelor of Science in Industrial Measurement and Control	2	Mandatory