Module Code	ME5B09
Module Name	Control Engineering 2
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Asst. Prof. Dermot Geraghty
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students should be able to: LO1 Design and simulate a continuous control compensator using Matlab and Simulink using either root locus or frequency response methods LO2 Design, simulate and evaluate a discrete compensator using the method of emulation LO3 Design a discrete compensator using a direct design method LO4 Select an 'off the shelf' PID controller for a given process and tune it LO5 Program a commercial robot to implement a pick and place operation **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Enhanced To develop continuously - Enhanced To communicate effectively - Enhanced
Module Content	This course focuses on design techniques for controllers and compensators. Continuous compensators are studied in detail and used as a basis for the design of discrete equivalents using the method of emulation. Direct design techniques for the design of digital compensators are introduced. Stability analysis for both continuous and discrete systems is introduced. Real time computer implementation of discrete controllers is studied. PID controllers and associated tuning techniques are studied. Design assignments are completed and simulated using Matlab and Simulink. This

[1] TEP Glossary

	module prepares students to fully implement a discrete control system for a given machine or process. The fundamentals of commercial robot programming are also covered with a laboratory exercise Robot Control.
Teaching and Learning Methods	This module uses Blackboard, podium lectures, a design assignment, a laboratory session and tutorials to help students achieve the required learning outcomes. In the current Covid-19 situation or in a new lockdown situation, the following changes to the normal teaching methods apply: 1. All lectures and tutorials will be delivered online. 2. Recorded lectures will be available on Blackboard 3. The end of semester exam will be online.

Assessment Details[2]
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due (provisional)
Written Examination	End of Semester examination	LO1-LO5	60%	Exam Period
Laboratory Exercise	Staggered throughout semester	LO5	10%	Staggered throughout Semester
Design Assignment	Weeks 3-9	LO1-LO4	30%	Week 9

Reassessment Requirements	Written Examination
Contact Hours and Indicative Student Workload[2]	**Contact hours: 46 (33 Lectures, 11 tutorials, 1 Lab)** **Independent Study (preparation for course and review of materials): 30** **Independent Study (preparation for assessment, incl. completion of assessment): 40**

[2] TEP Guidelines on Workload and Assessment

Recommended Reading List	Control Systems Engineering by Norman S. Nise, Wiley. E-book is available via the College Library
Module Pre-requisite	None
Module Co-requisite	None
Module Website	Blackboard
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No
Module Approval Date	
Approved by	
Academic Start Year	
Academic Year of Date	