Control System Design and Analysis

Module Information

2022.01, Approved

Summary Information

Module Code	5504EDLBHG
Formal Module Title	Control System Design and Analysis
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
Beaconhouse Group

Learning Methods

Learning Method Type	Hours
Online	33
Practical	11

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

Aims	To develop an understanding of components and the principles of control systems, basic design and analysis techniques, and practice some control applications to industrial systems.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Demonstrate an understanding of the basic concepts of dynamic system response and closed loop control.
MLO2	2	Develop models for simple dynamic plant with appropriate software.
MLO3	3	Demonstrate ability to design controllers and analyse system stability.
MLO4	4	Simulate control systems with appropriate software and assess system performance.
MLO5	5	Demonstrate understanding of system components and controller realisation.

Module Content

Outline Syllabus	Introduction: control system structure including sensors, controllers, actuators and plants.Matlab/SimulinkModelling & Simulation: introduce transfer function models for different plants, how to use Matlab/Simulink to model a dynamic system, how to simulate a control system with Matlab/Simulink for system analysis and performance assessment.Integration algorithms, State Space representationTime response analysis: characteristics for first order and second order systems, response to step and ramp input.Controller design: design specification in time domain, functions of P, I and D control, empirical controller parameter setting method.Industrial control: implementation of PID controllers, proportional and derivative kicks, integral controller wind-up and anti-wind-up method.Control system hardware design.Block diagram analysis.Stability: concept of absolute and relative stability, stability analysis.Computer packages will be used to gain experience in applying and simulating techniques.
Module Overview	
Additional Information	This level 5 module develops an understanding of the modelling, application, design and analysis of control systems with Matlab/Simulink.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Exam	Exam	60	2	MLO1, MLO2, MLO3, MLO5
Report	Report	40	0	MLO2, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Russell English	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings