LIVERPOOL JOHN MOORES UNIVERSITY

Control Engineering

Module Information

2022.01, Approved

Summary Information

Module Code	7402ELE
Formal Module Title	Control Engineering
Owning School	Engineering
Career	Postgraduate Taught
Credits	20
Academic level	FHEQ Level 7
Grading Schema	50

Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

Learning Methods

Learning Method Type	Hours
Lecture	22
Tutorial	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	This module aims to let students learn state space control method for dynamic system modelling, control, analysis and simulation.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Construct a state space model for a dynamic system based on its ODEs
MLO2	2	Analyse system characteristics and design state feedback control systems
MLO3	3	Design state observers and observer based state feedback control systems
MLO4	4	Evaluate the control systems using Matlab/Simulink

Module Content

Outline Syllabus	System Modelling: State space modelling for electrical and electronic systems, mechanical systems, process systems, etc. Transformation from state space model to transfer function model, Transformation between continuous and discrete state space models, state space model standard form.System Characteristics: State transition matrix, solution of state equations, controllability, observability, stability,State Feedback Control: Pole placement method in both continuous and discrete forms, observer design in both continuous and discrete forms, observed state feedback control.Optimal Control: Quadratic performance index, Lyapunov equation, quadratic optimal control with Riccati equation.
Module Overview	
Additional Information	This level 7 module extends a prospective student's experience of classical control techniques to modern state space control techniques for linear systems. The emphasis is on the understanding of design techniques for control system design for both single-input single-output and multi-input multi-output dynamic systems. Students will learn to apply the techniques both theoretically and practically to industrial systems by simulation.UNESCO Sustainable Development Goals1. Quality Education2. Gender Equality3. Affordable and Clean Energy4. Industry, Innovation and Infrastructure5. Partnerships for the GoalsUK SPEC AHEP 4UNESCO Sustainable Development GoalsQuality EducationGender EqualityIndustry, Innovation and InfrastructurePartnerships for the GoalsUK SPEC AHEP 4CEng. M3 Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed.M6 Apply an integrated or systems approach to the solution of complex problems.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Centralised Exam	Exam	70	2	MLO1, MLO2, MLO3
Report	System design Matlab/Simulink	30	0	MLO1, MLO2, MLO3, MLO4

Module Contacts