Liverpool John Moores University

Title:	Control System Design and Analysis
Status:	Definitive
Code:	**5115MSE** (120721)
Version Start Date:	01-08-2018
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Electronics and Electrical Engineering

Team	Leader
Barry Gomm	Y
Dingli Yu	

Academic Level:	FHEQ5	**Credit Value:**	20	**Total Delivered Hours:**	50
Total Learning Hours:	200	**Private Study:**	150		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	28
Practical	12
Tutorial	8

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	70	2
Report	Report	PC Based Assignment	30	

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.

Learning Outcomes

After completing the module the student should be able to:

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

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Exam	1	2	3	4	5
Report	2	4			

Outline Syllabus

Introduction: control system structure including sensors, controllers, actuators and plants.
Matlab/Simulink
Modelling & 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 representation
Time 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.

Learning Activities

By a series of lectures, tutorials and computer simulations.

Notes

This level 5 module develops an understanding of the modelling, application, design

and analysis of control systems with Matlab/Simulink.