Liverpool John Moores University

Title:	DYNAMIC SYSTEMS MODELLING
Status:	Definitive
Code:	**6094ENG** (115909)
Version Start Date:	01-08-2018
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Christian Matthews	Y

Academic Level:	FHEQ6	**Credit Value:**	10	**Total Delivered Hours:**	51
Total Learning Hours:	100	**Private Study:**	49		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	21
Practical	6
Tutorial	21

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	3
Report	AS2	Coursework Lab & Assignment	15	
Report	AS3	Coursework Lab & Assignment	15	

Aims

To develop knowledge and experience of analytic and simulative methods applied to modeling of open and closed loop engineering systems with multi-physics dynamics.

Learning Outcomes

After completing the module the student should be able to:

1. Apply modeling methods to derive the dynamic equations governing mechanical systems, thermal systems and fluid systems.
2. Derive dynamic system models in State-Space or Transfer Function notation.
3. Use modern computer aided methods to simulate system dynamics
4. Design and implement open and closed loop control systems using frequency domain methods.

Learning Outcomes of Assessments

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

EXAM	1	2	4
Laboratory Assignment	3		
Modelling Assignment	4		

Outline Syllabus

Use classical modeling methods to:
Derive the differential equations for a mechanical system.
Derive the differential equations for a thermal system.
Derive the differential equations for a fluid system
Derive the differential equations for an electrical system.
Apply Laplace methods to convert the governing differential equations into their Frequency Domain representations.
Apply simulation methods to solve the dynamic systems differential governing equations in the time and frequency domains.
Demonstrate an understanding about the differences between open loop and closed loop dynamic systems strategies.
Discuss the conversion of the open loop systems into their respective closed loop system formalisms.
Validate using simulation methods how this leads to improve system dynamics.

Learning Activities

Lectures, tutorials, laboratory experiments and computer simulation exercises and debate

Notes

In this module the student develops knowledge and experience of analytic and simulative methods applied to modeling of open and closed loop engineering systems with multi-physics dynamics. The module exposes the student to modern object orientated simulation environments such as Dymola, Modellica.