Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: SYSTEM DYNAMICS AND CONTROL

Unit ID: ENGIN3404

Credit Points: 15.00

Prerequisite(s): (MATHS3001 for undergraduate Students only)

Co-requisite(s): Nil

Exclusion(s): (ENMEC3500 and ENMTX3040)

ASCED: 030101

Description of the Unit:

The unit provides students with solid foundation in control system engineering alongside study of the effect of non-linearity on the systems dynamic response. The students will be facilitated to use the theoretical knowledge in laboratory demonstrations, projects and assignments. This will enhance the students level of understanding of the subject as well as allow them to appreciate the application of the unit in a physical environment.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory						

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Intermediate						
Advanced			✔			

Learning Outcomes:

On successful completion of the unit the students are expected to be able to:

Knowledge:

K1. Demonstrate the principles of control system theory.
K2. Explain the principles of system stability and dynamic system.
K3. Describe the role of Masons rule, PID Control, Nyquist and Routh stability criterion.
K4. Interpret the behaviour of a control system when an input is applied.
K5. Explain different control terms and parameters to evaluate the system behaviour.
K6. Examine transient and frequency response analysis.
K7. Discuss feedback control mechanisms of dynamic systems.
K8. Analyse and synthesise a multivariable control system.

Skills:

S1. Generate mathematical models of dynamic control system by applying differential equations.
S2. Analyse and characterise the behaviour of a control system in terms of different system and performance parameters.
S3. Analyse and characterise the behaviour of a control system in terms of different system and performance parameters.
S4. Evaluate and analyse system performance using frequency and transient response analysis.
S5. Design and simulate control systems, using control software, to achieve required stability, performance and robustness.
S6. Critically analyse and outline the dynamic response of closed loop systems.

Application of knowledge and skills:

A1. Apply mathematical and theoretical knowledge to design control system for a practical dynamic mechatronic process to achieve desired robustness and stability.
A2. Apply systematic engineering methods in solving and analysing complex mechatronic control systems.

Unit Content:

Topics may include:

- Introduction and overview of control system.
- Modelling in frequency domain.
- Modelling in time domain.

- Time response.
- Reduction of multiple sub-systems.
- Stability.
- Root locus and frequency response techniques.
- Designing, modelling and real time realisation of different control systems using control software.

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
S1-S6, A1-A2	Experimental work and / or projects to verify students ability to apply knowledge and skills acquired in the unit.	Reports, demonstrations	10 - 30%
K1-K8, S1-S6	Relevant tasks and problems to enforce understanding of the students and help in gradual development of knowledge and skills throughout the unit.	Assignments, quizzes	10 - 30%
K1-K8	Questions and problems related to the unit contents.	Exams / Tests	40 - 60%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MICS Mapping has been undertaken for this Unit No

Date:

Adopted Reference Style:

Other (IEEE: Refer to the library website for more information)

Refer to the library website for more information

Fed Cite - referencing tool