Module Specification

Advanced Control and Dynamics

Version: 2023-24, v3.0, 12 Feb 2024

Contents

Part 1: Information

Module title: Advanced Control and Dynamics

Module code: UFME7F-15-M

Level: Level 7

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: In addition to the learning outcomes, the educational experience may explore, develop, and practise but not formally discretely assess the following:
Self-management skills.
Progression to independent learning and team work.

Outline syllabus: Enhanced classical control system analysis and design.

Control mathematics, such as matrix algebra, Laplace transform, z-transformer, differential equations, and difference equations, for control system modelling, analysis, and design.

Use of computational packages, such as Matlab, to analyse and design control systems.

Advanced control concepts such state-space representations, solution of state equations, controllability and observability; state-feedback, (pole placement) control design.

Modelling and analysis of multivariable control systems, to convert from the transfer function model to state space representation, and vice versa. Evaluation of dynamic plant performance in aspect of controllability and observability.

Design of multivariable state-feedback controllers, decoupling control systems, state observers.

Digital control system analysis and design with applications.

Part 3: Teaching and learning methods

Teaching and learning methods: The module will be delivered using a combination of lectures and tutorials/lab demonstrations involving example exercises.

Concepts and the scope of a topic will be introduced in lectures. These will be supported by directed reading and experimental simulation laboratory based work. The lab sessions will enhance the understanding of students of real-world applications of the material delivered in the module. The students will learn through applying a variety of analysis methods, mathematical and simulation tools to real system models. Matlab will be incorporated into the module as an integral part of

teaching and learning and two hours used to demonstrate the principles.

In the teaching-learning process, the students will have opportunities to exercise both team work and independent effort.

Contact: 36 hours
Assimilation and skill development: 70 hours
Undertaking Coursework: 40 hours
Exam preparation: 24 hours
Total: 150 hours

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Show an advanced professional level of knowledge and understanding of critical analysis and design techniques for both analogue and digital control systems

MO2 Demonstrate subject specific techniques with respect to operation and development of suitable computer based simulation software package

MO3 Demonstrate subject specific techniques with respect to the design and simulation of analogue and digital control systems

MO4 Show cognitive capacity with respect to advice and application of suitable techniques for the analysis and design of automatic control systems with regard to engineering processes

MO5 Demonstrate key transferable skills in problem formulation and decision making

MO6 Demonstrate key transferable skills in IT design and consultancy in context

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufme7f-15-m.html

Part 4: Assessment

Assessment strategy: There will be a final exam set at the end of the term and a total of 75% marks will be contributed from this assessment. The other 25% marks will be contributed from the coursework report . In the resit run both assessments will be the same as set in the first run. Assessment feedback will be given on coursework reports.

Assessment tasks:

Examination (First Sit)
Description: On Campus Exam
Weighting: 75 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO3, MO4, MO5, MO6

Report (First Sit)
Description: Coursework report (1000 words)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Examination (Resit)
Description: On Campus Exam
Weighting: 75 %
Final assessment: Yes
Group work: No

Learning outcomes tested:

Report (Resit)
Description: Coursework report (1000 words)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested:

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Robotics {Joint Award}[Frenchay] MSc 2023-24

Robotics and Autonomous Systems {Joint Award}[Frenchay] PhD 2023-24