Module Specification

Advanced Control and Dynamics

Version: 2025-26, v3.0, Approved

Contents

Part 1: Information

Module title: Advanced Control and Dynamics

Module code: UFME7F-15-M

Level: Level 7

For implementation from: 2025-26

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, differential equations, Lyapunov functions for control system modelling, analysis, and design.

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

Advanced control concepts and techniques such state-space representations, solution of state equations, controllability and observability; state-feedback, (pole placement) control design, Lyapunov stability analysis, sliding mode control, and linear quadratic regulation.

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, and nonlinear control systems.

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 Gain an advanced professional level of knowledge and understanding of critical analysis and design techniques for both linear and nonlinear dynamic systems

MO2 Gain computational experimental capacity and skill to implement the designed control system validation with appropriate control/simulation software/languages

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/955CC880-E667-8578-B642-485B90418A15.html?lang=en-GB

Part 4: Assessment

Assessment strategy: This will be once off individual Course Work (CW) report for the module assessment submitted at the end of the study term. The resit will take the same CW specification, because there is no unique solution to the technical

development. The assessment feedback plus section marks will be given on the coursework reports.

Assessment tasks:

Report (First Sit)
Description: Coursework report (2000 words)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Report (Resit)
Description: Coursework report (2000 words)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electronics and Telecommunication Engineering [GCET] MSc 2025-26

Robotics {Joint Award}[Frenchay] MSc 2025-26

Robotics and Autonomous Systems {Joint Award}[Frenchay] PhD 2025-26

Robotics and Autonomous Systems {Joint Award}[Frenchay] PhD 2025-26