Module Specification

Control Systems Design

Version: 2025-26, v6.0, Approved

Contents

Part 1: Information

Module title: Control Systems Design

Module code: UFMFW7-15-3

Level: Level 6

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: Mathematics for Electrical Engineers 2025-26

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module develops students' ability to design and analyse complex and modern dynamic system modelling and control plus MATLAB/Simulink enhance simulation demonstrations. It involves the understanding and using of analytical techniques, interpretation of tasks between customers and designers, and computational experiments as applied to classical and modern dynamic system models.

Features: Not applicable

Educational aims: Students will develop a robust knowledge and understanding in classical, modern, and digital control system analysis and design as expected of an electronics engineer. Students will use industry standard software to develop and evaluate conceptual and analytical models.

Outline syllabus: Typically the syllabus includes:

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/Simulink, 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, and observer design.

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

Design of PID controllers, state-feedback controllers, state observers, which are expandable to multivariable control systems.

Digital control system analysis and design, ADC and DAC selections 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 experimentally simulated 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/Simulink 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 teamwork and independent effort.

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

MO1 Design, simulate, and analyse analogue and digital control systems with the use of suitable computer-based simulation software package

MO2 Evaluate, select and apply suitable techniques for the analysis and design of automatic control systems about engineering processes

MO3 Apply criterion-based evidence to formulate problems and make design decisions related to control systems

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/4CD57734-30B6-DC80-1D72-6D99462D32FE.html?lang=en-GB

Part 4: Assessment

Assessment strategy: There will be a final laboratory exam set at the end of the term contributing to 75% of module marks. The laboratory examination will assess analytical knowledge and the ability to solve numerical problems and systems configurations and their applications to control systems.

The coursework is a consultancy style report and will contribute 25% marks to the final marks of the module. This will involve the design and a representation of the computer-based experimentation (e.g. MATLAB and Simulink).

In the resit run the strategy will be the same as set in the first run. The requirements, learning material and guidance to complete this task will be available for students to independently complete the project.

The GCET delivery of this exam is a 2 hour face-to-face/invigilated exam. It was agreed that GCET can deliver the exam in a different way to UWE for in-country reasons.

Assessment tasks:

Examination (First Sit)
Description: Laboratory Exam (2 hours)
Weighting: 75 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Report (First Sit)
Description: Report (8-10 pages)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3

Examination (Resit)
Description: Laboratory Exam (2 hours)
Weighting: 75 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Report (Resit)
Description: Report (8-10 pages)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electrical and Electronic Engineering [Frenchay] BEng (Hons) 2023-24

Electronic Engineering [Frenchay] WITHDRAWN BEng (Hons) 2023-24

Electronic and Computer Engineering [Frenchay] BEng (Hons) 2023-24

Electronic Engineering {Apprenticeship-UCW} {Top-Up} [Frenchay] BEng (Hons) 2024-25

Electronic and Computer Engineering [Frenchay] BEng (Hons) 2023-24

Electrical and Electronic Engineering [Frenchay] BEng (Hons) 2023-24

Electronic Engineering {Apprenticeship-UCW} {Top-Up} [Frenchay] BEng (Hons) 2024-25

Electronic and Computer Engineering [SHAPE] WITHDRAWN BEng (Hons) 2024-25

Electronic Engineering (Nuclear) {Apprenticeship-UCW} {Top-Up} [MOD] BEng (Hons) 2025-26

Electrical and Electronic Engineering [AustonSingapore] WITHDRAWN BEng (Hons) 2025-26

Electrical and Electronic Engineering [BIET] BEng (Hons) 2025-26

Electronic Engineering [Sep][PT][Frenchay][6yrs] BEng (Hons) 2020-21

Electronic Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2021-22

Electronic and Computer Engineering {Apprenticeship-GLOSCOLL} [Sep][FT][GlosColl][5yrs] BEng (Hons) 2021-22

Electronic and Computer Engineering [Sep][PT][GlosColl][5yrs] BEng (Hons) 2021-22

Electronic Engineering [Sep][PT][Frenchay][6yrs] - Withdrawn BEng (Hons) 2020-21

Electronic Engineering {Foundation} [Frenchay] BEng (Hons) 2022-23

Electronic Engineering [Frenchay] BEng (Hons) 2022-23

Electronic and Computer Engineering [Frenchay] BEng (Hons) 2022-23