Module Specification

Control Systems Design

Version: 2022-23, v3.0, 17 Feb 2022

Contents

Part 1: Information

Module title: Control Systems Design

Module code: UFMFW7-15-3

Level: Level 6

For implementation from: 2022-23

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Delivery locations: Frenchay Campus, Global College of Engineering and Technology (GCET), Northshore College of Business and Technology

Field: Engineering, Design and Mathematics

Module type: Standard

Pre-requisites: Signal Processing and Circuits 2022-23

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, 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.

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

MO1 Analyse and design both analogue and digital control systems

MO2 Design and simulate analogue and digital control systems with the use of suitable computer based simulation software package

MO3 Evaluate, select and apply suitable techniques for the analysis and design of automatic control systems with regard to engineering processes

MO4 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 = 12 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/ufmfw7-15-3.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 component A. The written examination will assess analytical knowledge and the ability to solve numerical problems and systems configurations

The coursework (component B) is a consultancy style report. Component B 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 components A B will be the same as set in the first run. The requirements, learning material and guidance in order 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 for 2021/22 and 2022/23 providing there is no change to the UWE assessment during this time.

Assessment components:

Examination - Component A (First Sit)
Description: Written examination (2 hours)
Weighting: 75 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Report - Component B (First Sit)
Description: Consultancy style coursework report summarizing laboratory work and computer simulations (8 pages)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Examination - Component A (Resit)
Description: Written examination (2 hours)
Weighting: 75 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Report - Component B (Resit)
Description: Consultancy style coursework report summarizing laboratory work and computer simulations (8 pages)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electronic Engineering (Nuclear) {Apprenticeship-UCW} {Top-Up} [Sep][FT][MOD][2yrs] BEng (Hons) 2022-23

Electronic Engineering {Apprenticeship-UCW} {Top-Up} [Sep][FT][Frenchay][2yrs] BEng (Hons) 2022-23

Electronic Engineering (Nuclear) {Top-Up} [Sep][PT][MOD][2yrs] - Not Running BEng (Hons) 2022-23

Electrical and Electronic Engineering [Feb][FT][AustonSingapore][1yr] BEng (Hons) 2022-23

Electrical and Electronic Engineering [May][FT][AustonSriLanka][12months] BEng (Hons) 2022-23

Electrical and Electronic Engineering [May][FT][AustonSingapore][1yr] BEng (Hons) 2022-23

Electrical and Electronic Engineering [Oct][FT][[AustonSingapore][1yr] BEng (Hons) 2022-23

Electrical and Electronic Engineering [Oct][FT][AustonSriLanka][1yr] BEng (Hons) 2022-23

Electrical and Electronic Engineering [Feb][FT][AustonSriLanka][1yr] BEng (Hons) 2022-23

Electrical and Electronic Engineering [May][PT][AustonSriLanka][16months] BEng (Hons) 2021-22

Electrical and Electronic Engineering [Oct][PT][AustonSriLanka][16months] BEng (Hons) 2021-22

Electrical and Electronic Engineering [Feb][PT][AustonSingapore][16months] BEng (Hons) 2021-22

Electrical and Electronic Engineering [May][PT][AustonSingapore][16months] BEng (Hons) 2021-22

Electrical and Electronic Engineering [Oct][PT][AustonSingapore][16months] BEng (Hons) 2021-22

Electrical and Electronic Engineering [Feb][PT][AustonSriLanka][16months] BEng (Hons) 2021-22

Electronic and Computer Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2020-21

Electronic Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2020-21

Electronic Engineering [Sep][FT][Frenchay][4yrs] MEng 2020-21

Electronic Engineering [Sep][FT][Frenchay][3yrs] - Not Running BEng (Hons) 2020-21

Electronic Engineering [Sep][SW][Frenchay][5yrs] MEng 2019-20

Electronic Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2019-20

Electronic Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2019-20

Instrumentation and Control Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2019-20

Instrumentation and Control Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2019-20

Electrical and Electronic Engineering [Sep][SW][Northshore][5yrs] MEng 2019-20

Electronic and Computer Engineering [Sep][PT][GlosColl][5yrs] BEng (Hons) 2018-19

Electronic Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Electronic and Computer Engineering {Apprenticeship-GLOSCOLL} [Sep][FT][GlosColl][5yrs] BEng (Hons) 2018-19

Electronic and Computer Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2020-21

Electronics and Telecommunication Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2019-20

Electronics and Telecommunication Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2019-20