Module Specification

Mathematics for Signals and Control

Version: 2021-22, v3.0, 17 Feb 2022

Contents

Part 1: Information

Module title: Mathematics for Signals and Control

Module code: UFMFL9-15-2

Level: Level 5

For implementation from: 2021-22

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), Gloucestershire College, Northshore College of Business and Technology, University Centre Somerset

Field: Engineering, Design and Mathematics

Module type: Standard

Pre-requisites: Engineering Mathematics 2021-22

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: See Learning Outcomes

Outline syllabus: Fourier Series: periodic functions and fundamental period, definition and computation of Fourier series, convergence of Fourier series, Fourier series of odd and even functions, half-range Fourier series, complex notation, amplitude and phase spectra.

Fourier Transforms: definition of the Fourier transform, spectra, properties of the Fourier transform, inverse Fourier transform, convolution.

Laplace Transforms: solution of linear differential equations, transfer functions, initial and final value theorems, convolution.

Z Transforms: definition of a z transform, sampling, properties of a z transform, inverse z transform, solving difference equations, z transfer function.

Systems of linear differential equations:, solution using eigenvalues and eigenvectors, system stability (definition and determination via eigenvalues); solution via Laplace transform, poles and system stability

Control theory: state-space models, transfer-function, matrix solution , poles and system stability.

Part 3: Teaching and learning methods

Teaching and learning methods: Contact time: 36 hours

Assimilation and development of knowledge: 75 hours

Assessment: 39 hours

TOTAL: 150 HOURS

The module is delivered by means of lectures and tutorials. To prepare for

assessment, students will be expected to undertake self directed learning in addition to the directed learning which supports taught classes.

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

> **MO1** Use mathematical concepts and language to describe problems arising in control theory and signal processing
>
> **MO2** Solve such problems using transform and state-space methods
>
> **MO3** Show an understanding of the strengths and limitations of such methods
>
> **MO4** Communicate mathematical ideas and concepts in written form

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/ufmfl9-15-2.html

Part 4: Assessment

Assessment strategy: The examination is summative and assesses students' understanding of concepts and techniques and their ability to apply them in relatively straightforward problems.

Coursework is both summative and formative, and consists of a series of eassessments using the Dewis system, designed to test student's ability to use concepts and techniques covered in lectures.

Feedback from coursework is intended to assist students to prepare for the end-of-

year examination.

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

Online Assignment - Component B (First Sit)
Description: E-assessments
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3

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

Online Assignment - Component B (Resit)
Description: E-assessments
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:

Electronic Engineering [Sep][SW][Frenchay][5yrs] MEng 2020-21

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

Robotics [Sep][SW][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

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

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

Electronic Engineering [Sep][SW][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

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

Mechatronics [Sep][PT][UCS][3yrs] FdSc 2020-21

Mechatronics {Apprenticeship-UCW} [Sep][FT][UCW][3yrs] FdSc 2020-21

Mechatronics [Sep][PT][GlosColl][3yrs] FdSc 2020-21

Electrical and Electronic Engineering [Sep][SW][Northshore][5yrs] MEng 2020-21

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

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

Electronic and Computer Engineering {Apprenticeship-GLOSCOLL} [Sep][FT][GlosColl][5yrs] BEng (Hons) 2019-20

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

Electronic Engineering [Sep][PT][Frenchay][6yrs] BEng (Hons) 2019-20

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

Electronic Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

Electronic Engineering {Apprenticeship-GLOSCOLL} [Sep][FT][GlosColl][5yrs] BEng (Hons) 2019-20

Robotics {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

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

Electronic and Computer Engineering [Sep][PT][GlosColl][5yrs] BEng (Hons) 2020-21

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