CIRCUITS, CONTROL AND COMMUNICATIONS - 2024/5

Module code: EEE2033

Module Overview

Expected prior learning: Learning equivalent to Year 1 of EE Programmes.

Module purpose: This module is divided into two parts (Circuit & Control Systems and Communication Systems) each of which build on the concepts and tools introduced in Year 1.

Module provider

Computer Science and Electronic Eng

Module Leader

FOH Chuan (CS & EE)

Number of Credits: 15

ECTS Credits: 7.5

Framework: FHEQ Level 5

Module cap (Maximum number of students): N/A

Overall student workload

Independent Learning Hours: 98

Lecture Hours: 11

Tutorial Hours: 22

Guided Learning: 10

Captured Content: 9

Module Availability

Semester 1

Prerequisites / Co-requisites

None.

Module content

Indicative content includes the following.

Part A – Linear Systems (Prof David Carey)

- Complex frequency analysis: Poles and zeros, natural response, forced and complete response, Laplace transforms.
- Frequency response, transfer functions, filter circuits, filter response from poles and zeros, Bode plots.
- Laplace transforms: definition and application, periodic functions, Step function and Impulse function response.
- Introduction to control principles, 1st and 2nd order control response, Block diagram analysis.
- Simple methods of feedback design.
- Revision.

Part B - Communication Systems (Dr. Chuan Heng Foh)

- Revision of Fourier Transform and Probability Models.
- Analogue modulation including Amplitude Modulation, Frequency Modulation and Phase Modulation.
- Introduction to digital modulation, detection, channel capacity, and Additive White Gaussian Noise.
- Data link and various line coding schemes.
- Revision.

Assessment pattern

Assessment type	Unit of assessment	Weighting
Examination	INVIGILATED EXAM (2 hours)	100

Alternative Assessment

N/A

Assessment Strategy

The **assessment strategy** for this module is designed to provide students with the opportunity to demonstrate that they have achieved all the intended learning outcomes. The written exam will assess their understanding of analysis techniques for 1st and 2nd order circuits and systems. Additionally, the exam will assess their conceptual understanding and ability to give arguments in favour of specific design choices for the communication systems. This exam will also assess their abilities to design as well as analyse the control systems. The exam will include a combination of conceptual questions, numerical problems and design problems to assess the student understanding.

Thus, the **summative assessment** for this module consists of the following.

- Invigilated examination at the end of the module teaching during the examination week

Formative assessment and feedback

For the module, students will receive formative assessment/feedback in the following ways.

- During lectures, by question and answer sessions
- During tutorials/tutorial classes
- By means of unassessed tutorial problem sheets (with answers/model solutions)

Module aims

- The scientific and engineering aim of this signal and systems module are to explore the linear systems behaviour of the circuits and control systems introduced and to introduce students to signal modulation and communication.
- Aspects of the linear systems part of the module will be delivered within the MATLAB programming and numeric computing platform so students will have an opportunity to learn and apply MATLAB programming.
- The module also aims to provide opportunities for students to learn about the Surrey Pillars listed below.

Learning outcomes

Ref		Attributes Developed	
001	Model simple physical systems in the time and complex frequency domains.	KC	C1, C2
002	Use Laplace transforms, differential equations, transfer functions and block diagrams to analyse complex systems.	KC	C3
003	Apply analytical methods to the design of complex systems with feedback.	KC	C6
004	Develop a working knowledge of the properties of signals and modulation schemes.	KC	C2
005	Explain the basic concepts underlying the design and operation of the communication systems.	KC	C2

Attributes Developed

C - Cognitive/analytical

K - Subject knowledge

T - Transferable skills

P - Professional/Practical skills

Methods of Teaching / Learning

The learning and teaching strategy is designed to provide useful pointers for deeper learning of the topics listed in the module content. This is achieved through a series of lectures and other learning material like slide-sets, notes, online videos, tutorial sheets with model solutions, numerical and design problems with model solutions. Students are encouraged to do pre-session preparation and attempt the problem sheets on SurreyLearn. Class discussions are used to identify any difficulties faced by the learners and then provide more learning material using online resources at SurreyLearn system.

Learning and teaching methods include the following.

- Lectures: Mixture of live and pre-recorded lectures
- Captured content: mixture of videos additional notes
- Problem solving via tutorials with model solutions and other learning materials

Indicated Lecture Hours (which may also include seminars, tutorials, workshops and other contact time) are approximate and may include in-class tests where one or more of these are an assessment on the module. In-class tests are scheduled/organised separately to taught content and will be published on to student personal timetables, where they apply to taken modules, as soon as they are finalised by central administration. This will usually be after the initial publication of the teaching timetable for the relevant semester.

Reading list

https://readinglists.surrey.ac.uk
Upon accessing the reading list, please search for the module using the module code: EEE2033

Other information

Digital Capabilities - This module contains a set of interactive online components written in Python for students to visualise how system configuration affects system performance. The source code is provided such that students can also understand how to use digital means to model and analyse systems.

Employability - This module uses real-world problems from the industry as examples to illustrate how relevant theories can apply to solve the problems. This will create awareness of the engineering problem in the industry and thus improve the employability.

Resourcefulness and Resilience - This module provides a set of problems including problems related to engineering design where decision making is required based on theoretical analysis.

Programmes this module appears in

Programme	Semester	Classification	Qualifying conditions
Computer and Internet Engineering BEng (Hons)	1	Optional	A weighted aggregate mark of 40% is required to pass the module
Computer and Internet Engineering MEng	1	Optional	A weighted aggregate mark of 40% is required to pass the module
Electrical and Electronic Engineering BEng (Hons)	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Electrical and Electronic Engineering MEng	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Electronic Engineering BEng (Hons)	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Electronic Engineering MEng	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Electronic Engineering with Computer Systems BEng (Hons)	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Electronic Engineering with Computer Systems MEng	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Electronic Engineering with Nanotechnology BEng (Hons)	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Electronic Engineering with Nanotechnology MEng	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Electronic Engineering with Space Systems BEng (Hons)	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Electronic Engineering with Space Systems MEng	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module

Please note that the information detailed within this record is accurate at the time of publishing and may be subject to change. This record contains information for the most up to date version of the programme / module for the 2024/5 academic year.