ELECTRONIC CIRCUITS AND DEVICES - 2024/5

Module code: ENG1105

Module Overview

This is an introductory module in electronics for non-electronic/electrical engineering students. It builds a basic understanding of electrical concepts, circuits and instruments relevant to later modules in the course.

Module provider

Mechanical Engineering Sciences

Module Leader

HARTAVI KARCI Ahu Ece (Mech Eng Sci)

Number of Credits: 15

ECTS Credits: 7.5

Framework: FHEQ Level 4

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

Overall student workload

Independent Learning Hours: 74

Lecture Hours: 22

Tutorial Hours: 11

Laboratory Hours: 11

Guided Learning: 10

Captured Content: 22

Module Availability

Semester 2

Prerequisites / Co-requisites

N/A

Module content

Indicative content includes:
Passive devices
Resistors, Ohm's Law, potentiometers, power, Kirchhoff¿s Laws and their applications in circuits analysis, resistor networks, Wheatstone Bridge, Capacitors, static characteristics, charge, energy storage, time constant, transient response, RC circuits, impedance
Electromagnetic devices
Inductors, static characteristics, energy storage, time constant, transient response, RL circuits
Interaction of electric and magnetic fields, transformers
Introduction to DC motors
Meters
Ammeter, voltmeter, wattmeter, ohmmeter, AC response, peak, RMS, phasors, Oscilloscope
Dynamic characteristics, power, phase

Sensors and transducers
Basic signal characteristics (noise, error, hysteresis, accuracy, repeatability)
Principles of transduction
Basic resistive, capacitive and inductive sensors
Application of sensors to measure key measureands such as temperature, speed, pressure displacement, etc.
Bridge circuits to evaluate sensors
Filter Circuits and Analysis
Simple RC/ (low-pass, high-pass, band-pass, band-stop), time constant, analysis of filter circuits, Bode plots,
Discrete semiconductors
Diodes, basic semiconductor physics
Diodes as rectifiers (half wave and full wave bridge)
Use of LEDs and photodiodes
Bipolar junction transistors

Assessment pattern

Assessment type	Unit of assessment	Weighting
Online Scheduled Summative Class Test	Test (1 hr duration)	20
Examination	Exam (2 hrs duration)	80

Alternative Assessment

N/A

Assessment Strategy

The assessment strategy is designed to provide students with the opportunity to demonstrate understanding of scientific principles, methodologies and mathematics methods as well as the ability to analyse electronic circuits and describe electronic systems in the final examination. The in-class test allows students to demonstrate their knowledge and understanding of basic electronic principles.
Thus, the summative assessment for this module consists of:
In-class test [Learning outcomes 1, 2, 3]
Examination [Learning outcomes 1, 2, 3, 4, 5, 6]
Formative assessment and feedback
Formative verbal feedback is given in tutorials

Module aims

- an introduction to the basic principles and methodologies applied to electrical and electronic circuits
- an understanding of the basic electrical concepts and fundamental circuit laws
- an understanding of the principles of passive components
- basic knowledge for the study of simple dc and ac circuits such as filters
- an understanding of sensing elements and different measurement instruments based on electrical/electronic properties

Learning outcomes

		Attributes Developed
001	Define and analyse basic electronic concepts, parameters and components	CK
002	Understand the fundamental circuit laws and how to use them for the analysis of AC and DC circuits;	K
003	Understand how basic measurement instruments (voltmeters, current meters and oscilloscopes) work, and their practical limitations	KP
004	Select and correctly apply the appropriate methods to review relevant problems	CK
005	Collect, simulate, analyse, evaluate, and report the relevant experimental data using relevant computer software;	CKPT
006	Apply the electronic principles above to the use of various electronic sensors and transducers and interpret the resulting signals.	CK

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:
Introduce basic electronic principles through theory with worked examples. This is delivered principally through lectures and tutorial classes, where a software tool for the analysis of circuits will be used

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: ENG1105

Other information

The School of Mechanical Engineering Sciences is committed to developing graduates with strengths in Employability, Digital Capabilities, Global and Cultural Capabilities, Sustainability, and Resourcefulness and Resilience. This module is designed to allow students to develop knowledge, skills, and capabilities in the following areas: Digital capabilities - Software tools are used within this module and stundets will gain skills that are transferrable using these tools to solve engineering problems

Programmes this module appears in

Programme	Semester	Classification	Qualifying conditions
Aerospace Engineering BEng (Hons)	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Aerospace Engineering MEng	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biomedical Engineering BEng (Hons)	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biomedical Engineering MEng	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Mechanical Engineering BEng (Hons)	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Mechanical Engineering MEng	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module