UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title:	Electronics and Mechanics
Module Code:	ELE4013-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Biomedical and Electronics Engineering
Subject Area:	Electrical Engineering
FHEQ Level:	FHEQ Level 4
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	**Hours**
Lectures	22
Tutorials	8
Laboratory	42
Directed Study	128

Availability	
Occurrence	**Location / Period**
BDA	University of Bradford / Semester 1 (Sep - Jan)

Module Aims

1. To develop an understanding of basic electrical and electronic circuits, mechanical power transmission and the laws which govern their behaviours.

2. To provide the student with a clear and thorough understanding of the theory and applications of engineering mechanics for dynamical systems.

3. To consolidate the theoretical part of the module in a series of lab work.

Outline Syllabus

Electronics: 1. Basic electrical concepts: units, quantities, voltage, charge, current, energy and power, basic components and circuits, AC and DC sources. 2. Circuit variables and laws: Ohm's law, Kirchhoff's law. 3. Resistive circuits: series and parallel, combination. 4. Capacitors and RC circuits: charging/discharging. 5. Basic Magnetic principles: Flux, reluctance, magnetic circuits. 6. DC motors: power (torque & speed). 7. Semiconductor materials: diodes, LED, 8. Basic electronic sensors, 9. Bipolar junction transistor: Using the transistor as a switch. 10. Electrical safety and RoHS & WEEE legislation.

Mechanics: 1) Kinematics - Displacement, velocity, acceleration concept to solve various Dynamics Situations; 2) Newton Laws and their application to complex motion; 3) Force systems; 4) Spring force and friction; 5) Force and motion at linked bodies; 6) Angular motion; 7) Rotational solids; 8) Work, energy and power; 9) Non-conversed mechanical work and energy; 10) Momentum and impact.

Learning Outcomes

1	Describe basic mechanical, electrical and electronic components and laws.
2	Describe and familiarise the design of simple mechanisms and be able to set up and solve equations of motion for a system of particles.
3	Apply basic electrical theory by evaluating simple problems both theoretically and practically.
4	Solve particle dynamic problems. Use the graphical method and analytical method to develop and analyse simple/planer mechanisms.
5	Systematically/scientifically/creatively problem solve; communicate and interpret data.

Learning, Teaching and Assessment Strategy

Generally a 'Lectures, Tutorials and Laboratory' based teaching/learning.
All mechanics theory is covered in the interactive lecture sessions. In-class practical demonstration of motion mechanisms using a Simple Mechanisms Kit. Mechanical lab work to cover the practical mechanisms and simple machines. The electronics material will be mostly covered by laboratory work, with a small number of lectures to cover electrical safety and RoHS and WEEE legislation.
Formative assessment and oral feedback is given during the Tutorials and Laboratory/Lab-class sessions.

Three assessments (i.e. Exam, Lab-class in electrical and Lab-class in mechanical) examine the learning outcomes of the electronics part and the mechanics part expressed in the descriptor and student's ability to apply the principles and knowledge learnt.
Specifically the learning outcomes 1,2,3,4,5 will be assessed by the exam; and the learning outcomes1,2,3,5 will be assessed by the coursework/lab-class/reports.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G).
SM1b, SM2b, SM3b, EA1b, EA2, EA3b, EL5, P1, P2, P3, G1, EA3m.
Further details of these learning outcomes can be found at https://www.engc.org.uk/.

Mode of Assessment				
Type	**Method**	**Description**	**Length**	**Weighting**
Summative	Laboratory Report	Mechanics Lab Report 1	-1500 words	10%
Summative	Laboratory Report	Mechanics Lab Report 2	-1500 words	10%
Summative	Laboratory Report	Electronics Lab Report	0-1500 words	10%
Summative	Examination - practical/laboratory	Mark award based on quality of Practical lab work		10%
Summative	Examination - closed book	Examination of taught electronics and mechanics material	2.5 hours	60%
Referral	Examination - closed book	Supplementary examination of taught mechanics and electronics materials	2.5 hours	100%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html.

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.