

Electronics and Mechanics

Module Code:	ELE4013-B
Academic Year:	2018-19
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	48
Tutorials	9
Laboratory	15
Directed Study	128

Availability Periods

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

Module Aims

Outline Syllabus

Mechatronics (s1): 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. Fundamentals of conventional power plants and renewable and

non-renewable distributed generators.

Mechanism/Dynamics (s2):1) Kinematics of a particle: rectilinear and curvilinear motion; relative motion analysis; 2) Kinetics of a particle: Newton`s law of motion; equation of motion; system of particles; cylindrical co-ordinates; general force motion. 3) Work and energy: work of a force; principle of work and energy; power and efficiency; potential & kinetic energy; conservation of energy. 4) Impulse and momentum: conservation of linear momentum and impact. 5) Typical mechanism and machine components: friction and motion on inclined plane. 6) Introduction to planar mechanism analysis using graphical method. General and Mechanical Engineering applications and context will be explored at every opportunity.

Module Learning Outcomes

On successful completion of this module, students will be able to...

- 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 Application of 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 Systematic/scientific/creative problem solving; creating problem solving; communication; teamwork interpreting data and report writing.

Learning, Teaching and Assessment Strategy

Generally a 'Lectures, Tutorials and Laboratory' based teaching/learning.

All electronics and mechanics theory are 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. Substantial electronics laboratory work to cover the practical electronics.

Formative assessment and oral feedback is given during the Tutorials and Laboratory/Lab-class sessions.

Four assessments (i.e. Closed book exam, MCQ 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 1,2,4 will be assessed by the final closed book exam; the learning outcomes 1,3 will be assessed by the MCQ exam; and the learning outcomes 1,2,3,5 will be assessed by the coursework/lab-class and reports

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Laboratory Report	Laboratory portfolio report containing electronics lab work		15%	No
Formative	Laboratory Report	Lab portfolio report containing electronic lab work		%	No
Summative	Examination - MCQ	MCQ of taught electronics material	1.5 hours	35%	Yes
Referral	Examination - closed book	Supplementary exam to cover electronics/mechanics theories and materials related to the lab work	3 hours	100%	Yes
Summative	Examination - closed book	Examination of taught mechanics material	1.5 hours	35%	No
Summative	Coursework	Individual Report based on the 3 mechanics lab class work and related theories	1500-words	15%	No
Formative	Coursework	Individual report based on the 3 mechanics lab class work and related theories		%	No

Legacy Code (if applicable)

Reading List

To view Reading List, please go to [rebus:list](#).