

Module Details	
Module Title	Electronics and Mechanics (Biomedical Engineering)
Module Code	MHT4007-B
Academic Year	2024/5
Credits	20
School	School of Engineering
FHEQ Level	FHEQ Level 4

Contact Hours	
Type	Hours
Lectures	28
Tutorials	18
Laboratories	26
Directed Study	128

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Academic Year
BDB	University of Bradford / Academic Year

Module Aims
<p>Electronics and mechanics are both crucial components in the field of engineering. There exists a significant correlation between technical challenges and our everyday existence.</p> <ul style="list-style-type: none"> - To learn the fundamentals of electrical and electronic circuits, energies, and dynamics, as well as the rules that control these areas. - To furnish the student with a comprehensive understanding of the theory and practical implementations of engineering mechanics in the context of Biomedical Engineering and Clinical Technology. -To strengthen their comprehension and abilities while solidifying the module's theoretical content through a series of laboratory exercises.

Outline Syllabus

Electronics:

1. Basic electrical concepts: units, quantities, voltage, charge, current, energy and power, basic components and electronic 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. Basic analysis of AC circuits
7. Semiconductor materials: diodes, LED
8. half and full rectifier
9. Bipolar junction transistor: Using the transistor as a switch for robot circuit
10. Electrical safety and RoHS & WEEE legislation

Mechanics:

1. Kinematics - Displacement, velocity, acceleration concepts using graphical and analytical methods
2. 2D projectile motion and analysis
3. Newton Laws and their application
4. Force systems
5. Conserved work, Energy and power
6. Basics of DC motors
7. Electro-mechanical simulations
8. Mechanical system modelling and simulations using MATLAB

Learning Outcomes

Outcome Number	Description
01	Describe the fundamentals of mechanical, electrical, and electronic principles and laws.
02	Explain and get to know how simple processes work, and be able to write down and solve equations of motion for a group of particles.
03	Explore the practical and theoretical application of fundamental electrical theory through the evaluation of simple situations
04	Make use of both the analytical and graphical methods to design and evaluate simpler methods .
05	Engage in systematic, scientific, and creative problem-solving, effective communication, and data interpretation.

Learning, Teaching and Assessment Strategy

All Electronics and Mechanics theory are covered in the lecture sessions. The practical demonstration will be fully supported with Electronic and Mechanical labs including with a series of tutorial session over the two semesters. The lectures also cover the electrical safety and RoHS and WEEE legislation.

Formative assessment and oral feedback are given during the Tutorials and Laboratory/Lab-class sessions. An assessment (i.e. Exam) examine the learning outcomes of the electronics (50%) and the mechanics (30%) parts expressed in the module descriptor and student's ability to apply the principles and knowledge learnt. Also, there will be compulsory questions in the exam based on laboratory parts (Electronics and Mechanics parts). Specifically, the learning outcomes 1,2,3,4,5 will be assessed by the exam. In addition, the students will carry a course work within the Mechanical part of 20% of the total mark.

It is a requirement of the Institution of Engineering and Technology (IET) that students MUST achieve a mark of at least 30% in assessment components weighted above 30% IN ADDITION to achieving a mark of at least 40% in the module overall. This requirement applies ONLY to students on IET accredited programmes, which is the BDA occurrence/version of the module.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Fourth Edition (AHEP4) as published by the Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify five key areas of learning which partially (C) or fully (M) meet the academic requirement for CEng registration: Science and Mathematics (1), Engineering Analysis (2-4), Design and Innovation (5-6), The Engineer and Society (7-11), and Engineering Practice (12-18). Further details of these learning outcomes can be found at <https://www.engc.org.uk/ahep/>

C1, M2, C2, C4, M12, C12, M13, C13, C16,

Mode of Assessment

Type	Method	Description	Weighting
Summative	Coursework - Written	Electromechanical Modelling and Simulation.	20%
Summative	Examination - Closed Book	Exam Closed Book 1 (3 hours)	30%
Summative	Examination - Closed Book	Exam Closed Book 2 (Must Pass at 30%) (3 Hours)	50%

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.