Module Definition Form (MDF)

Module code: MOD009721	**Version:** 1 **Date Amended:** 27/Feb/2024

1. Module Title
Introduction to Biology and Biomedical Engineering

2a. Module Leader
Muhammad Usman Bhutta

2b. School
School of Engineering and the Built Environment

2c. Faculty
Faculty of Science and Engineering

3a. Level
4

3b. Module Type
Standard (fine graded)

4a. Credits
30

4b. Study Hours
300

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:			

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

The module is designed to introduce you to Biomedical Engineering as a profession and to cover aspects of Biology which will be useful in your Anatomy & Physiology module.

You will first learn about Biology so that this material can be immediately useful in your Anatomy & Physiology module. You will learn about structures and functions of eukaryotic and prokaryotic cells, cell structure and functions, membranes and transport, and biological molecules. You will then be introduced to, and practice, common experimental methods used in Biology. The module then introduces Engineering in general, as well as how Biomedical Engineering fits with other Engineering disciplines. You will learn about the role of Engineering within society and possible career paths. A Guest Lecturer from outside academia will visit (Live Brief). You will then create your personal development plan (PDP). Various practical skills required throughout the course are also introduced and used. These skills include giving engaging oral presentations, asking effective questions in a guest lecture, and writing for a variety of audiences. You will also learn about teamwork, the various roles you can play within a team, effective management and leadership, and legal responsibilities and risks which might be encountered within Biomedical Engineering. You'll also be introduced to Study Skills Plus, an online resource which helps improve time management, organizational, and report writing skills. You will also learn and practice the fundamentals of computer aided design (CAD). Most teaching sessions begin with a lecture, followed by group-led discussions or workshops. The goal is to help you engage as much as possible with the module material, as well as to be comfortable working both individually and within groups with your classmates.

The module has two assessments: a mid-trimester In-Class Test to assess your understanding of Biology-related material and a Portfolio of Coursework, with due dates throughout the trimester. The Portfolio consists of Reports related to Biology labs, Reflections from the Guest Lecture, your PDP (Personal Development Plan), Evidence of Professional Memberships on LinkedIn and Professional Bodies (such as IMechE, IPEM, and/or BioMedSoc), and a Video Blog related to the past, present, and/or future of Biomedical Engineering which includes a CAD drawing. Time is scheduled for formative feedback on the various components of the Portfolio.

6b. Outline Content

Content Related to Biology

- Cellular structure and function – eukaryotic and prokaryotic cells, aggregation of cells
- Membranes – structure and methods of transport across
- Biological techniques – microscopy, cell disruption and centrifugation, chromatography and electrophoresis, enzyme immobilisation
- Biomolecules – Water, carbohydrates, proteins and lipids; DNA and RNA
- Protein synthesis, genetic engineering, DNA profiling
- Enzymes – properties and behaviour

Content Related to Biomedical Engineering

- Introducing profession of Biomedical Engineering and how it interrelates with other Engineering and Medical professions
- Past, present, and future of Biomedical Engineering
- Role of Engineers in Society
- Professional ethics, commercial considerations, Engineering standards, & legal aspects of pursuing a career in Engineering
- Guest Lecture from a professional Biomedical Engineer
- Fundamental CAD Skills

Transferable Skills

- Self- and peer-evaluation
- Formative feedback
- Study skills, in particular time management, organization, and planning
- Personal and Professional Development Plans
- Teamwork, management, and leadership
- Different types of writing for specialist and non-specialist audiences

6c. Key Texts/Literature

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources

Biology Lab Practicals

Guest Lecture from Biomedical Engineering Professional (Live Brief)

CAD Software

7. Learning Outcomes (threshold standards)		
No.	**Type**	**On successful completion of this module the student will be expected to be able to:**
1	Knowledge and Understanding	Demonstrate a comprehensive understanding of the hierarchical organisation of biological structures varying from cells, tissues, organ systems, and interrelationships and functions within organisms.
2	Knowledge and Understanding	Discuss inclusive approaches to engineering practice, ethical concerns, and relevant legal requirements governing engineering practice, such as personnel, health and safety, contracts, intellectual property rights, project safety and liability issues, and appropriate codes of practice and industry standards.
3	Intellectual, practical, affective and transferrable skills	Collect and analyse data from laboratory techniques commonly used within Biology.
4	Intellectual, practical, affective and transferrable skills	Evaluate, and suggest future improvements for, the success/effectiveness of key transferrable skills and intellectual skills such as effective teamwork, management, and leadership.
5	Intellectual, practical, affective and transferrable skills	Communicate, both orally and in writing, relevant historical, current and/or future developments and technologies within Biomedical Engineering to a variety of audiences.
6	Intellectual, practical, affective and transferrable skills	Assess current level, and plan future improvements, of a range of key transferrable skills, as well as intellectual skills, appropriate for life-long learning, professional and personal development and relevant to a wide-range of graduate employment opportunities.

8a. Module Occurrence to which this MDF Refers				
Year	**Occurrence**	**Period**	**Location**	**Mode of Delivery**
2025/6	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence			
Learning Activities	**Hours**	**Learning Outcomes**	**Details of Duration, frequency and other comments**
Lectures	36	1, 2, 5	3 hrs Lectures per week
Other teacher managed learning	36	2, 3, 4, 6	3 hrs Lab Sessions, Guest Lectures, Workshops per week
Student managed learning	228	1-6	Self-directed Learning
TOTAL:	300		

9. Assessment for the above Module Occurrence					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
010	Coursework	1	25 (%)	Fine Grade	30 (%)
1.5 hours in-class test on Biology (maps to C1)					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
011	Coursework	2-6	75 (%)	Fine Grade	30 (%)
Coursework (4000 words equivalent): LO 3,4 1500 words Biology Lab Report, LO 5 1500 words for Video Blog/Report, LO 2 500 words Guest Lecture Reflection, LO 6 500 words PDP and Professional Memberships					

Assessment components for Element 011				
Component No.	**Assessment Title**	**Submission Method**	**Weighting (%)**	**Components needed for Mark Calculation?**
011/1	Report and Reflection for Biology Lab Sessions (LO3,4, maps to C12, C13, C16)	Canvas	40 (%)	All
011/2	Video Blog and Report about Historical/Current/Future Aspect of Biomedical Eng inc a CAD drawing (LO5, maps C3, C17)	Canvas	40 (%)	
011/3	Reflection on Guest Lecture (LO2, maps to C5, C8, C11, C15)	Canvas	10 (%)	
011/4	Personal Development Plan (PDP) and Professional Memberships (LO6, maps to C18)	Canvas	10 (%)	

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:
(a) achieve the qualifying mark for each element of fine graded assessment as specified above
(b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]