

Module Details	
Module Title	Molecular Biology
Module Code	BIS5020-B
Academic Year	2024/5
Credits	20
School	School of Chemistry and Biosciences
FHEQ Level	FHEQ Level 5

Contact Hours	
Type	Hours
Directed Study	167
Laboratories	6
Lectures	9
Tutorials	18

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2

Module Aims
<p>Molecular Biology is a branch of biology that studies how molecules interact with one another in living organisms to perform functions of life. In the context of the programme, molecular biologists investigate human genetics and the molecular basis of disease using advanced laboratory techniques which will be covered in this module.</p> <p>This module supports the programme by developing learners' knowledge and critical understanding of the well-established principles of Biomedical Science (BMS PLO6). It also enables learners to evaluate and discuss the genetics laboratory speciality (BMS PLO7, HCS PLO6).</p> <p>This module aims to promote knowledge and application of the basic principles of Molecular Biology. To appreciate recombinant RNA, DNA, proteins and their functions. To describe the application of gene expression systems and cloning. To describe techniques relating to DNA isolation, purification and quantitation (including PCR). To understand the principles of genetic sequencing (Sanger, Illumina, Short- and Long-read technology), genetic testing, screening and pharmacogenetics (personalised medicine). To explain methods relating to genetic manipulation and its ethical issues (RNAi, CRISPR/Cas9).</p> <p>This module will support those students seeking knowledge to assist their employment in medicine and medical research. It emphasises the importance of the use of molecular biology techniques in scientific and applied research.</p>

Outline Syllabus

Academic content

Recombinant RNA, DNA, proteins and their functions.

Methods relating to genetic manipulation and its ethical issues (RNAi, CRISPR/Cas9).

Application of gene expression systems and cloning.

Techniques relating to DNA isolation, purification and quantitation (including PCR and the principles of assessing nucleic acid purity)..

Comparison of automated and manual nucleic acid purification strategies.

Principles and analysis of Sanger sequencing, using example case studies eg mutation surveyor BRCA1/2.

Introduction to next generation sequencing (NGS).

Applications of sequencing including JAK 2 testing (sanger/NGS) and next generation sequencing of BRCA1/2.

Applications of short and long read sequencing.

Use of next generation sequencing to identify antimicrobial resistance in microbiology laboratories.

Employability and Enterprise Skills

Biomedical knowledge and critical understanding

Laboratory skills

Communication skills

Data analysis

Critical thinking

Team work

Learning Outcomes

Outcome Number	Description
01	Discuss the fundamental principles and techniques of recombinant DNA technology in prokaryotic and eukaryotic systems and explain their applications.
02	Discuss the structure of prokaryotic and eukaryotic genomes and the regulation of prokaryotic and eukaryotic gene expression (HCPC standard 13).
03	Demonstrate an understanding of common approaches in molecular biology, and their applications for personalised medicine.
04	Interpret data, plan experimental work and work to deadlines (HCPC standard 8, 9).

Learning, Teaching and Assessment Strategy

The LTA strategy encompasses education for employability and equal opportunities for learners. Concepts, principles and knowledge will be explored in lectures and tutorials using active learning concepts in a Team-Based Learning (TBL) setting. This theoretical knowledge will be supported by hands-on learning in laboratory practical classes and tutorials.

The practicals will cover key molecular biology techniques, for example, DNA extraction, enzyme restriction and gel electrophoresis.

TBL sessions will be supported by the use of technology and the programme InteDashboard. This mix of methodologies will be accessible to different learning styles and will develop communication skills, critical thinking and interpretative skills through team-based work.

Private study will be facilitated and supported via the use of the virtual learning environment (VLE), which will provide coursework advice and feedback, and revision support.

Knowledge and skills will be assessed in a variety of ways throughout the module. The TBL component will be continuously assessed throughout the semester.

The laboratory sessions require students to demonstrate appropriate skills in undertaking key molecular biology techniques and will be assessed through the duration of the module.

Formative MCQ tests will be made available via the VLE at the end of each teaching block as well as at the end of the semester. This provides immediate feedback for learners to self-assess their understanding and progress. A formative synoptic essay will be set via the VLE and feedback will be given to learners.

A formative TBL evaluation test is included during the continuous TBL assessment.

It is a requirement of the IBMS that ALL assessments in this module MUST be passed with a minimum mark of 40%.

Mode of Assessment

Type	Method	Description	Weighting
Summative	Team-Based Learning Assessment	Team Based Learning: end of unit assmnts (suppl assmnt will be an individual application exercise on Canvas) (MUST PASS	50%
Summative	Coursework - Written	Synoptic Essay (MUST PASS AT 40%) (2000 words)	50%
Formative	Classroom test	Team Based Learning: formative evaluation	N/A

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.