

Module code: MOD002971	Version: 7 Date Amended: 07/Apr/2025
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1. Module Title
Molecular Genetics and Bioinformatics

2a. Module Leader
Hussein Al-Ali

2b. School
School of Life Sciences

2c. Faculty
Faculty of Science and Engineering

3a. Level
7

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:	MSc DNA Analysis MSc MSc Applied Bioscience		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

This module is designed to provide an understanding of molecular genetics and bioinformatic, in both prokaryotic and eukaryotic systems. You will learn in a combination of lectures, seminars/workshops and practical classes, exploring cutting-edge applications of molecular genetics and bioinformatics, while critically engaging in relevant primary literature. Key focus may include pharmacogenetics, rational drug design, the genetics of complex inherited disorders, epigenetic regulation of gene expression, and the genetics of antibiotic resistance. You will learn how to extract meaningful biological information from the vast amounts of raw experimental data generated by the increasingly sophisticated and automated genetics industry, and instructed in methods to present these data to a scientific audience. A range of computational tools will be employed and reviewed for extracting and comparing biological information from nucleotide sequences, in computer-based bioinformatic practical sessions. Analysis will be placed in the context of genetic and genomic variation and mutation, with consequent effects upon protein structure and cellular and organismal function.

6b. Outline Content

- Molecular Genetics
- DNA structure and function
- DNA damage, repair and recombination
- Chromosome structure
- Prokaryotic Genetics
- Eukaryotic Genetics
- Genetic Engineering
- Human Genomics
- Bioinformatics
- DNA Fragment assembly
- Genetic Database Searching
- Blast algorithm
- Pairwise and multiple sequence alignment methods
- Phylogenetic tree construction

6c. Key Texts/Literature

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

6d. Specialist Learning Resources

Students have access to a wide range of full text E-journals through the Anglia Ruskin University digital library. In addition to the main University Library and Student Resource Centre, where students have access to computer facilities. All students have their own email address and full internet and VLE access. Students will also make full use of the modern and well equipped molecular laboratories.

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	Have a core understanding and knowledge of molecular genetics
2	Knowledge and Understanding	Demonstrate a detailed knowledge of the computational tools and databases available and the principles that underline them.
3	Knowledge and Understanding	Critically and correctly choose and apply the appropriate computational tool to process raw biological data to provide a concise and detailed analysis.
4	Intellectual, practical, affective and transferrable skills	Use the fundamentals learned in the lectures to underpin current techniques, applications and laboratory methods in DNA analysis.
5	Intellectual, practical, affective and transferrable skills	Fully and expertly evaluate and provide reports on raw DNA data through the appropriate use of bioinformatics technology.
6	Intellectual, practical, affective and transferrable skills	Comprehensive and specific use of information technology skills in an applied setting to resolve complex scientific problems.

8a. Module Occurrence to which this MDF Refers				
Year	Occurrence	Period	Location	Mode of Delivery
2026/7	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	17	1-6	2 x 3 hrs + 5 x 2 hrs + 1 x 1 hr lecture/active learning
Other teacher managed learning	19	1-6	5 x 1 hr + 3 x 3 hrs + 1 x 2 hrs computer workshops + 3 hrs revision
Student managed learning	264	1-6	Background reading, online activities, preparation for lectures and practicals, and completion of assessments
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	2,3,5,6	40 (%)	Fine Grade	40 (%)
Analysis report 2000 words					
Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
011	Examination Cambridge	1-6	60 (%)	Fine Grade	40 (%)
Exam 2 hours					

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]