Module Definition Form (MDF)

Module code: MOD009631	**Version:** 3 **Date Amended:** 04/Sep/2025

1. Module Title
Principles of Genetics

2a. Module Leader
Krithika Sundararaman

2b. School
School of Life Sciences

2c. Faculty
Faculty of Science and Engineering

3a. Level
5

3b. Module Type
Standard (fine graded)

4a. Credits
15

4b. Study Hours
150

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:	School of Life Sciences courses		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

We live in the age of genetics and genomics, with breakthroughs in our understanding of genetic diseases and potential cures regularly featured in the news. The pace of discovery in this field makes this an exciting time to be learning genetics. You will gain knowledge and understanding of the fundamental principles of genetics and how we can answer questions such as: How are genetic diseases inherited? How do scientists find out about complex diseases which are affected by both genes and environmental factors? How can you find out how common a genetic disease is in a population?

You will discover how the study of genes offers a biologically-based explanation for morphological, physiological, and behavioural traits of an organism. You will gain insights into how genetics provides a mechanism for the generation and maintenance of variation; the raw material for evolution. We firstly consider the classical patterns of inheritance, building on concepts you will have covered in level 4. You will develop an understanding of the relationship between genotype and phenotype through an integration of concepts at the organismal, cellular and molecular levels. You will investigate gross structural chromosome mutations and the phenotypic consequences of these mutation, and will learn how classical and modern techniques are used for establishing the physical locations of genes. You will gain insights into gene function and the genetic basis of many diseases, and go on to look at how traits may be determined by many genes and how genes interact with environmental factors. You will learn to use mathematical methods to analyse genetic variation found in populations. You will learn how gene expression is regulated in the development genetics, and look the genetics of cancer.

Modern tools of genetic research and analysis are incorporated throughout the module. Your understanding of genetic processes will be developed through a variety of problems, case studies, simple breeding experiments and other practicals.

As well as gaining specific subject knowledge, this module helps you to develop a number of transferable skills includin practical laboratory techniques and skills relevant to general employment including data collection, handling and presentation and report writing. You will have an opportunity to hear guest speakers talking about their careers in the field of genetics. The content of the module is an essential part of your training towards a career in biomedical science.

6b. Outline Content

- Structure and function of DNA, RNA and proteins with regard to structure and function of genes and principles of inheritance
    - Mendelian genetics including single gene, multigene and extranuclear inheritance, epistasis and pleiotropy
    - Human pedigrees
    - Gene mapping
- Population genetics
- Quantitative genetics
- Principles of genomic, transcriptomic and proteomic methods used to study human chromosomes and DNA
- Developmental genetics
- Genetic disorders with biomedical significance
    - Chromosomal mutations
    - Cancer genetics

6c. Key Texts/Literature

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

6d. Specialist Learning Resources
General Biology Laboratory Technical Support

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	Explain the nature of genes and chromosomes, the principles of inheritance, and the biological consequences of mutations
2	Knowledge and Understanding	Explain polygenic and multifactorial traits within an individual, and genetic variation within populations, and how this relates to biodiversity.
3	Knowledge and Understanding	Perform and critique techniques used to map genes to their chromosomal positions, including genes associated with development, normal function and disease.
4	Intellectual, practical, affective and transferrable skills	Work collaboratively with others to collect and analyse data from genetic experiments

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	25	1-3	7 x 3 hours + 4 x 1 hour lectures/active learning
Other teacher managed learning	11	1-4	3 x 2 hours practicals + 1 x 2 hours genetics problems + 3 hrs revision
Student managed learning	114	1-3	Background reading, online activities, preparation for lectures and practicals, and completion of assessments
TOTAL:	150		

9. Assessment for the above Module Occurrence					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
010	Coursework	3-4	50 (%)	Fine Grade	30 (%)
Lab report (1000 word equivalent)					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
011	Coursework	1-2	50 (%)	Fine Grade	30 (%)
In class test 1000 word equivalent					

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]