Institute for Education, Martin Luther King Road, Pembroke PBK 1990. Tel: +35625982001 | Email: ife@ilearn.edu.mt

# BBIO411 Genetics, Genomics and Biotechnology

ECTS Value: 5 ECTS

## Module Description

The importance of genetics education for biology teachers stems from the fact that genetics is central to life and to all sub disciplines of biology. Students often come with misconceptions regarding genetics and this module aims to cover fundamental principles and present day concepts in genetics. It will equip future biology teachers with a sound knowledge of genetics including applied techniques that are currently in use. The module unit content will include the following topics:

- Introduction to genetics including DNA and RNA structure, chromosomes, karyotypes and mutations.
- Mendelian inheritance genetics including case studies on types of single gene inheritance and the use of pedigrees · Dihybrid crosses in pea plants
- Extensions and exceptions of Mendelian laws with case studies for each type · Biotechnology and gene technology principles
- Gene technology techniques including gel electrophoresis, probes and marker genes

## Overall Objectives and Outcomes

By the end of this module, the learner will be able to:

## Competences

a. recognise the role of DNA as the genetic material;
b. analyse genetic data through case-studies;
c. communicate their findings in the appropriate formats;
d. extrapolate the relationship between DNA mutation, protein function and disease;
e. describe how genes interact with environmental factors to cause disease;
f. recognise the significance of Mendel's discoveries and how these give rise to modern genetics.
g. engage critically with literature.

## Knowledge

a. examine terminology used in genetics and biotechnology;
b. examine case studies dealing with different modes of inheritance in genetics;
c. explain biotechnology and gene technology principles;
d. Describe various modern day gene technology techniques in use;

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e. demonstrate understanding of the use of barcoding in biodiversity identification using local examples from published literature;
f. demonstrate understanding of the various applications of gene technology including genetic fingerprinting, the human genome project, forensics, GMOs and genetic engineering.

## Skills

a. use the basic vocabulary of genetics;
b. identify genetic and environmental factors that cause disease;
c. describe how genetic information is stored and transmitted from generation to generation;
d. interpret genetic linkages ;
e. construct a family pedigree with a minimum of 4 generations;
f. demonstrate knowledge of the current state of research in particular areas of the bio molecular sciences.

## Mode of Delivery

This module adopts a blended approach to teaching and learning. Information related to the structure and delivery of the module may be accessed through the IfE Portal. For further details, kindly refer to the Teaching, Learning and Assessment Policy and Procedures found on the Institute for Education's website.

## Assessment Methods

This module will be assessed through: Research Assignment and Online Tasks/Reflections.

## Suggested Readings

**Core Reading List**

1. Klug, W. (2017) Essentials of Genetics, Global Edition, 9th Edition or Later. Pearson Education, USA.

**Supplementary Reading List**

1. Vella, A., Vella, N., & Agius Darmanin, S. (2016). The first record of the African Sergeant, Abudefduf hoefleri (Perciformes: Pomacentridae), in the Mediterranean Sea. Marine Biodiversity Records, 9, 15. https://doi.org/10.1186/s41200-016-0008-7
2. Vella, A, Vella, N., & Agius Darmanin, S. (2015). Morphological and genetic analyses confirming the first Lutjanus fulviflamma (Forsskål, 1775) in the Mediterranean Sea. Journal of the Black Sea/Mediterranean Environmen21(3), 307–315.