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Title: MOLECULAR BIOLOGY AND FUNCTIONAL GENOMICS  
 Status: Definitive  
 Code: **5105BCBMOL** (122491)  
 Version Start Date: 01-08-2021  
 Owing School/Faculty: Pharmacy & Biomolecular Sciences  
 Teaching School/Faculty: Pharmacy & Biomolecular Sciences

Team	Leader
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**Academic Level:** FHEQ5      **Credit Value:** 20      **Total Delivered Hours:** 58  
**Total Learning Hours:** 200      **Private Study:** 142

**Delivery Options**

Course typically offered: Semester 2

Component	Contact Hours
Lecture	40
Practical	6
Workshop	10

**Grading Basis:** 40 %

**Assessment Details**

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	NGS	analysis of NGS experiment: A pseudo-manuscript will be produced for the students to read and analyse	30	
Exam	SAQ	exam - short answer paper	70	2

**Aims**

*To provide a detailed understanding of the molecular mechanisms that are applicable to human disease states, development, genetic engineering, high-throughput technologies, and to introduce and develop bioinformatics practical skills.*

## **Learning Outcomes**

After completing the module the student should be able to:

- 1 Demonstrate familiarity with the mechanisms of DNA damage and repair and their contribution to human genetic disease.
- 2 Demonstrate an understanding of the genetic control of development.
- 3 Demonstrate an understanding of genetic engineering.
- 4 Understand some principles, challenges and applications for Next Generation Sequencing.

## **Learning Outcomes of Assessments**

The assessment item list is assessed via the learning outcomes listed:

Analysis of NGS experiment	4			
Examination	1	2	3	

## **Outline Syllabus**

*DNA damage and repair and its impact in human disease states (using a range of biochemical examples which may include: G6PD, Huntington's, Fragile -X, Xeroderma pigmentosum, etc.).*

*Translational control and gene silencing (introduce NMD, microRNA and RNAi).*

*Developmental biology and genetic programs (basic embryology and genetics).*

*Introduction to genetic engineering.*

*Next Generation Sequencing (NGS) and the challenges of 'Big Data'.*

*Experimental considerations for NGS experiments (feasibility, reproducibility, bias, error and limitations).*

*Introduction to bioinformatics.*

*Omics – (genomics, epigenome, transcriptome, microbiome, and proteomics).*

*Third-generation sequencing (TGS) technologies (like SMRT and FRET), digital PCR, GWAS and gene knock-outs.*

*Using data from obsolete platforms (microarrays, 454, etc.)*

## **Learning Activities**

Lectures

Practical

Workshops

## **Notes**

This module will empower students to demonstrate a critical understanding of genomic integrity and human disease. Transcriptional control, developmental biology, genetic engineering and bioinformatics will be introduced. Students will encounter experimental methods for the investigation of the relevant areas of biochemistry and molecular biology using data from high-throughput techniques.