UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title:	Genomic Coding & Genetic Engineering
Module Code:	MHT7011-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Biomedical and Electronics Engineering
Subject Area:	Medical and Healthcare Technology
FHEQ Level:	FHEQ Level 7 (Masters)
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	**Hours**
Lectures	48
Tutorials	24
Directed Study	128

Availability	
Occurrence	**Location / Period**
BDA	University of Bradford / Semester 1 (Sep - Jan)

Module Aims

To engender specialist knowledge and understanding of the principles of bioinformatics and how information technology can be applied to problems in computational biology and clinical medicine. To develop mathematical skills in relation to bioinformatics and an understanding of the role of information technology in the genomic revolution.

Outline Syllabus

What is bioinformatics?
The role of information technology in biology and medicine.
Elementary information theory.
Elementary coding theory.

Nature of information. Information encoding, storage and transmission.
Error-correcting codes.
Elementary statistics.
Expected distributions.
Genomic alphabet.
Proteomic alphabet.
Genomic information coding.
Sequence analysis.
Sequence alignment.
Pattern matching.
Pattern discovery.
Applications to taxonomy and phylogeny.
Identify genome codes
Gene-Protein and amino acids
3D Structure of Gene-Protein
Motif discovery.
Codons, scriptons, cistrons and replicons.
Regulatory sequences.
Spectral analysis and the periodogram.
Automated discovery of ORFs.
Making a Mammoth (Nature study paper)
Implications for understanding of evolution.

Learning Outcomes	
1	Understand the nature of the information contained within genomic code;
2	Locate and analyse bioinformatics data published on the internet;
3	Describe the principles and techniques underlying the analysis;
4	Critically evaluate and analyse genomic data for medical use;
5	Critically evaluate the performance of different bioinformatics techniques.
6	Use a range of bioinformatics techniques to analyse genomic data;
7	write simple programs in a computer language of their choice to manipulate biological information into different forms for various uses.

Learning, Teaching and Assessment Strategy

Concepts are introduced using formal lectures, tutorials, matlab and BLAST laboratory sessions. Deeper/better understanding is developed during tutorials by solving several genome codes problems. Oral feedback is given during tutorial and laboratory sessions.

The factual basis, concepts and principles of the subject will be introduced through interactive lectures in which routine analysis will be demonstrated. The material is reinforced through whole-group seminars. Tutorial exercises, recommended texts and lecture notes provided enable students to consolidate what they have learned. In the remaining time, students have the opportunity to reflect on, explore and extend their knowledge and understanding and to prepare for the formal written examination that assesses their knowledge and understanding of the subject.

LO1: SM1b, SM2b, EA1b, EA2, EA3b, D3b, D4, P4, P8, G1

LO2: SM2b, EA1b, EA2, EA3b, D3b, D4, D6, P8, G1

Mode of Assessment				
Type	**Method**	**Description**	**Length**	**Weighting**
Summative	Coursework	Coursework portfolio of experimental modelling work, results and analysis	0-5000 words	100%

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.