UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title:	Advanced Bioinformatics
Module Code:	BIS7018-B
Academic Year:	2019-20
Credit Rating:	20
School:	School of Chemistry and Biosciences
Subject Area:	Biomedical Science
FHEQ Level:	FHEQ Level 7 (Masters)
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	**Hours**
Lectures	7
Practical classes and workshops	24
Tutorials	6
Directed Study	163

Availability	
Occurrence	**Location / Period**
BDA	University of Bradford / Semester 2 (Feb - May)

Module Aims

To provide the students with a solid foundation in a principle coding language extensively used for bioinformatic analysis of big data, and to allow them to develop autonomy in producing fit-for-purpose bioinformatic pipelines which will allow them to successfully address common issues surrounding biomedical big data.

Outline Syllabus

R & Python syntax: particularly loops, list & dictionary comprehensions; common bioinformatic modules: particularly Biopython and Bioconductor; Big data standards and formats: handling and manipulation; Problem solving of frequently encountered bioinformatic problems: particularly

sequence extraction, quantitative analysis of variants, duplicate removal, fuzzy matching, generate basic diversity indices, quantitative analysis of genomic data; Test driven development; version control using git.

Learning Outcomes	
1	Understand, interpret and critically evaluate R & Python syntax
2	Logically plan, develop and troubleshoot R & Python code to address common bioinformatic problems
3	Develop a detailed knowledge and understanding of applied bioinformatic skills
4	Develop an understanding of the problems associated with large datasets, particularly relating to NGS sequencing data
5	Manipulate very large datasets in a controlled bioinformatic fashion
6	Explore problems and find novel bioinformatic/coding solutions to overcome them.
7	Understand the basics of test driven development, version control and reproducibility of data
8	Integrate existing bioinformatic tools into bespoke workflows/pipelines
9	Develop the ability to communicate bioinformatic methods and techniques

Learning, Teaching and Assessment Strategy

Lectures, computer-based workshops, individual and group problem-based coding exercises, group discussions and peer feedback. Additionally student input into the assessment criteria for the oral presentation will be discussed during the module, and changes implemented where appropriate (module staff will make the final decision).

Knowledge and understanding-based elements will be assessed using a written coursework test (module learning outcomes 1-8).

Learning outcome 9 will be assessed by oral presentation to an assessment panel and peer group.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Presentation	Oral presentation covering details of the bioinformatic exercise. Particularly focused on motivation and solution.	30 minutes	10%
Formative	Coursework	Outline of bioinformatic problem that will be addressed in the summative assessment.	0-500 words	%

Summative	Coursework	Written report on a bioinformatics exercise. Comprises piece of code (Python or R) addressing a specific bioinformatic problem, along with report detailing the problem and solution.	0-2000 words	60%
Formative	Computer-based assessment	Computer based assessment comprising 10 questions, based on producing or correcting Python or R code to accomplish basic bioinformatic tasks.	10 short questions	%
Summative	Computer-based assessment	Assessment comprising 10 questions, based on producing or correcting Python or R code to accomplish basic bioinformatic tasks.	2 hours	30%

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.