

Advanced Bioinformatics

Module Code:	BIS7018-B
Academic Year:	2018-19
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	5
Practical classes and	20
Tutorials	2
Directed Study	173

Availability Periods

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.

Module Learning Outcomes

On successful completion of this module, students will be able to...

- 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	Final Assess'
Summative	Presentation	Oral presentation covering details of the bioinformatic	30 minutes	10%	Yes

		exercise. Particularly focused on motivation and solution.			
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%	No
Formative	Coursework	Outline of bioinformatic problem that will be addressed in the summative assessment.	0-500 words	%	No
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%	No
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	%	No

Legacy Code (if applicable)

Reading List

To view Reading List, please go to [rebus:list](#).