MSC (BIOINFORMATICS AND COMPUTATIONAL BIOLOGY)

Overview

NFQ Level 9, Major Award

The MSc (Bioinformatics and Computational Biology) may be taken full-time over 12 months or part-time over 24 months from the date of first registration for the programme. The MSc programme has four different streams: for Biology, Mathematics, Statistics and Computer Science graduates, respectively [for graduates of cognate disciplines, the assignment to a particular stream will be decided by the Programme Director].

Part-time students take between five and seven of their twelve taught modules in each academic year and undertake the project in the second academic year. The modules to be taken by the part-time students in each of their two academic years are specified by the course director.

Note: Students cannot choose a module already completed (for example, as part of their undergraduate degree), or with largely overlapping content to a module already completed. Evidence for this would be the production of a transcript showing all modules taken in their previous degree programme(s). The Programme Director will then assist with selecting a suitable replacement module.

Postgraduate Diploma in Bioinformatics and Computational Biology

Students who do not reach the average mark of 50% threshold required to progress to the research dissertation will be conferred with a Postgraduate Diploma in Bioinformatics and Computational Biology (https://ucc-ie-public.courseleaf.com/programmes/pdbcb/).

Similarly, students who pass the taught modules and do not wish to complete the research dissertation, may opt to be conferred with a Postgraduate Diploma in Bioinformatics and Computational Biology (https://ucc-ie-public.courseleaf.com/programmes/pdbcb/).

Programme Requirements

For information about modules, module choice, options and credit weightings, please go to Programme Requirements (p. 1).

Programme Requirements
Stream for Biological Science Graduates

Code	Title	Credits

Students take **90** credits as follows - all listed core modules (**85** credits) and **5** credits of elective modules:

Biological Science Taught Modules		
Core Modules		
AM6016	Dynamic Machine Learning with Applications	5
AM6020	Open Source Infrastructure for Modelling and Big Data	5
CS6405	Datamining	5
CS6501	Programming for Bioscientists I	5
CS6502	Programming for Bioscientists II	5
MB6300	Computational Systems Biology	5
MB6301	Genomic Data Analysis	5
MB6302	Computational Microbiome Analysis	5
ST3300	Data Analysis I	5
ST4400	Data Analysis II	5
ST5005	Introduction to Probability and Statistics	5
Elective Modules		
Students take modules to the value of **5** credits from the following:		5
MS6005	Discrete Mathematics (5)	
CS6503	Introduction to Relational Databases (5)	
Biological Science Research Modules		
Core Modules		
MB6303	Dissertation in Bioinformatics and Computational Biology	30
Total Credits		**90**

Stream for Computer Science Graduates

Code	Title	Credits

Students take **90** credits as follows - all listed core modules (**85** credits) and **5** credits of elective modules:

Computer Science Taught Modules		
Core Modules		
ST5005	Introduction to Probability and Statistics	5
BC6002	Molecular Biology	5
BC6003	Biomolecules	5
BL6023	Cells, Biomolecules, Genetics and Evolution	5
CS6405	Datamining	5
CS6502	Programming for Bioscientists II	5
MB6300	Computational Systems Biology	5
MB6301	Genomic Data Analysis	5
MB6302	Computational Microbiome Analysis	5
ST3300	Data Analysis I	5
ST4400	Data Analysis II	5
Elective Modules		
Students take modules to the value of **5** credits from the following:		5
MS6005	Discrete Mathematics (5)	
CS6501	Programming for Bioscientists I (5)	
Computer Science Research Modules		
Core Modules		
MB6303	Dissertation in Bioinformatics and Computational Biology	30
Total Credits		**90**

Stream for Mathematics Graduates

Code	Title	Credits

Students take **90** credits as follows - all listed core modules (**85** credits) and **5** credits of elective modules:

Mathematics Taught Modules		
Core Modules		
ST3300	Data Analysis I	5
or ST4400	Data Analysis II	
AM6016	Dynamic Machine Learning with Applications	5
BC6002	Molecular Biology	5
BC6003	Biomolecules	5
BL6023	Cells, Biomolecules, Genetics and Evolution	5

Code	Title	Credits
AM6020	Open Source Infrastructure for Modelling and Big Data	5
CS6405	Datamining	5
CS6502	Programming for Bioscientists II	5
MB6300	Computational Systems Biology	5
MB6301	Genomic Data Analysis	5
MB6302	Computational Microbiome Analysis	5
Elective Modules		
Students take modules to the value of **5** credits from the following:		5
CS6503	Introduction to Relational Databases (5)	
CS6501	Programming for Bioscientists I (5)	
Mathematics Research Modules		
Core Modules		
MB6303	Dissertation in Bioinformatics and Computational Biology	30
Total Credits		**90**

Stream for Statistics Graduates

Code	Title	Credits
Students take **90** credits as follows - all listed core modules (**85** credits) and **5** credits of elective modules:		
Statistics Taught Modules		
Core Modules		
AM6016	Dynamic Machine Learning with Applications	5
BC6002	Molecular Biology	5
BC6003	Biomolecules	5
BL6023	Cells, Biomolecules, Genetics and Evolution	5
AM6020	Open Source Infrastructure for Modelling and Big Data	5
CS6405	Datamining	5
CS6502	Programming for Bioscientists II	5
MB6300	Computational Systems Biology	5
MB6301	Genomic Data Analysis	5
MB6302	Computational Microbiome Analysis	5
MS6005	Discrete Mathematics	5
Elective Modules		
Students take modules to the value of **5** credits from the following:		5
CS6503	Introduction to Relational Databases (5)	
CS6501	Programming for Bioscientists I (5)	
Statistics Research Modules		
Core Modules		
MB6303	Dissertation in Bioinformatics and Computational Biology	30
Total Credits		**90**

Examinations

Full details and regulations governing Examinations for each programme will be contained in the *Marks and Standards Book* and for each module in the *Book of Modules*.

Programme Learning Outcomes

Programme Learning Outcomes for MSc (Bioinformatics and Computational Biology) (NFQ Level 9, Major Award)

On successful completion of this programme, students should be able to:

- Have a solid background in the theory behind bioinformatics methods and tools so that they can critically evaluate research in bioinformatics;
- Use existing bioinformatics methods and tools and rapidly learn to apply new methods and tools;
- Organise and analyse large data sets generated by genomics and systems biology approaches;
- Understand the role of modelling and simulation of biological systems;
- Have a deep knowledge of the aspect of bioinformatics in which they carried out their three-month research project. This experience will prepare them for a future research career in the bioinformatics field.