Module Specification

Module Summary Information

1	**Module Title**	Essential Skills for the Biosciences
2	**Module Credits**	20
3	**Module Level**	4
4	**Module Code**	BMS4001

5	Module Overview

Rationale:

This module will provide you with the fundamental scientific skills that will form the foundations for your success throughout your degree and into your career beyond. Many scientists are involved in the direct generation of data; be it physiological measurements of blood glucose levels pre- and post- exercise; the activity of an enzyme in a biochemical assay; or the rate of growth of a pathogenic bacterium on a particular food source. Therefore, understanding the basic principles of how to process this data is essential, and equally as important is knowing how to correctly use the scientific instruments available in the laboratory to generate the initial data.

In this module you will embark on a range of instructional and investigative laboratory practicals designed to introduce you to scientific instruments that are key components of any scientific laboratory. During the course of these experiments you will generate data, which you will be shown how to analyse appropriately. Of great importance when generating any kind of data, is to ensure that the results are reproducible, and that the methodologies and technologies used to generate the data are reliable and consistent. These elements will be embedded within the practical and online learning elements in this module, to ensure that your training begins with the principles that are recognised as being important by employers in a wide range of disciplines, not just for careers in science.

Alignment with Programme Philosophy and Aims:

In this module you will enhance your basic scientific numeracy and data handling skills, improve scientific and English writing skills, and develop your laboratory and investigatory skills. The knowledge and skills gained will feed forward, and be reinforced, in every other module in the biomedical sciences degree programme. The module will adopt a blend of theory and practice based learning, to introduce to you the principle requirements of quality and excellence in scientific data collection, which are key scientific attributes and transferable employability traits.

Learning and Teaching Strategy:

This module will use a blended approach to facilitate your learning. Through the module Moodle page there will be a number of scientific numeracy resources and quizzes, which are designed to ensure that you are fully equipped with the tools required to succeed in the laboratory. These will be supported by workshops and drop-in tutorial sessions, where you will be able to discuss areas of the material that you find problematic, and also receive feedback. In laboratory practicals and workshops, you will then put your skills to the test, using a range of scientific equipment to generate and analyse data. These sessions will be supplemented by lectures and online resources where you will be introduced to the technologies and theories underpinning the scientific methodologies. Throughout the practical manual, there are questions about the scientific instruments and exercises where you are required to input and

analyse the data that you generate. Completion of the laboratory manual will constitute the summative module assessment.

To achieve the required 20 credits for this module, you will need to dedicate at least 200 hours studying the module material. For this module, the time is broken down in an approximately 20:80 ratio (directed: self-directed). The scheduled learning activities will include interactive lectures, workshops and practical sessions; approximately 30% of this learning will take place in an online environment.

6	Indicative Content

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Session Topic/s
(incl. delivery style and indicative formative learning activities)

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Introductory lecture

Introduction and overview of the module. Description of the assessment and the alignment with the learning outcomes.

Introduction to the online learning content

Here you will be shown how to access the online learning material on scientific numeracy skills.

(1hr lecture)

Workshop: mathematics for biologists (3hr)

Practical 1. Microscopy

(3hrs)

Workshop: Mass, moles and volumes (3hrs)

Practical 2. Accuracy and quality control.

Here you will learn how to correctly and accurately use pipettes and weighing balances. You will then make a series of solutions and buffers. (3hrs)

Workshop: centrifugation (3hrs)

Practical 3. Separation by centrifugation.

Here you will separate biological samples using centrifugation (3hrs)

Workshop: Interpreting and presenting data (3hrs)

Practical 4. Spectroscopy

Here you will use spectrophotometers to measure and generate data (3hrs).

Workshop. Analysis of spectroscopy data (3hrs).

Practical 5. Consolidation

(3hrs)

Workshop: Research skills

Finding and citing scientific literature.

Practical 6 and 7: Separation of biological molecules

Practical 6: Chromatography (3hrs).
Practical 7. DNA and protein Gel electrophoresis. (2hrs + 3hrs)
Workshop. Analysis of data from practicals 6 and 7. (3hrs)
Submission of practical manual

7	Module Learning Outcomes On successful completion of the module, students will be able to:	
	1	Reflect on the importance of quality control and quality assurance principles during scientific experiments and data collection
	2	Demonstrate understanding of the basic and core experimental skills used in scientific laboratories
	3	Systematically obtain, evaluate and interpret data obtained from laboratory experiments.
	4	Produce a piece of scientific writing which demonstrates the correct way to reference material and shows an understanding of plagiarism.

8	Module Assessment		
Learning Outcome			
	Coursework	Exam	In-Person
1,2,3,4	X		

9	Breakdown Learning and Teaching Activities	
Learning Activities		**Hours**
Scheduled Learning (SL) includes lectures, practical classes and workshops, peer group learning, Graduate+, as specified in timetable		43
Directed Learning (DL) includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning, as directed on VLE		107
Private Study (PS) includes preparation for exams		50
Total Study Hours:		200