

## Module Specification

### Module Summary Information

<b>1</b>	<b>Module Title</b>	Genetics
<b>2</b>	<b>Module Credits</b>	20
<b>3</b>	<b>Module Level</b>	4
<b>4</b>	<b>Module Code</b>	BMS4003

<b>5</b>	<b>Module Overview</b>
<p><b>Rationale:</b></p> <p>This module will provide you with an introduction to the field of Genetics. An understanding of genetics is fundamental to understanding biological processes, and the role of genes in health and disease. This module will discuss modes of inheritance, how information is encoded in DNA, how this information is translated, and the impacts of mutations on genetic conditions, The last three decades have seen the identification of the causative gene in hundreds of human genetics conditions, and the availability of the human genome sequence has accelerated the process of discovery. It is now apparent that gene expression and thus protein production is regulated at several levels, which add to the complexity of biological systems.</p> <p>In this module, you will be introduced to the different modes of inheritance, how information is encoded in genes, organised in the form of chromosomes and how the genetic code determines the sequence of a protein following the processes of transcription (to produce mRNA) and translation (to produce peptides).</p> <p>You will also cover the range of mutations found in human genetic conditions, and the tools that are now used for detecting and screening for such mutations in the clinical setting. Genetic modification of organisms (GMO) is relatively straightforward now, particularly of crops, although this is still a contentious issue. In the laboratory, you will assess chosen foodstuffs for the presence of GMOs, and engage in discussion in a workshop of the wider context over the development and use of GMOs, including discussion of globalisation, safety and ethics. The advent of high-throughput sequencing, particularly of genomes, has generated a vast amount of DNA sequence data, which has led to the development of tools to analyse such data. You will therefore be introduced to methods for interrogating the databases, and the tools for sequence comparison through a lecture and a practical workshop.</p> <p><b>Alignment with Programme Philosophy and Aims:</b></p> <p>In this module, you will develop your basic laboratory and investigatory skills by applying your scholarly and practical learning to role of the information encoded in genes, and in the genome. These basic laboratory skills are applicable to a range of experimental scientific careers, and will feed into, and be enhanced, during teaching modules, work placements and research projects as you progress through the degree programme. The use of GMOs is a global activity, with safety and political aspects, and the discussion of the issues in this module will allow for an awareness of scientific activity on the world stage. This module will provide the genetic knowledge that will be enhanced in the Infectious</p>	

Diseases and Blood Science modules at level 5, and the New Technologies in Biomedicine and Molecular Basis of Disease modules at level 6.

**Learning and Teaching Strategy:**

This module will use a blended approach to facilitate your learning. In lectures you will learn about how information is encoded within DNA and transmitted, and how DNA is analysed, which will be underpinned by a range of online resources, textbooks, websites and scientific articles. Lectures will contain a mix of information delivery, interactive elements using response-ware polling software and peer-to-peer learning sessions. Your knowledge will be applied during practical sessions.

The module will be supported by a Moodle page, where a range of pre- and post-session resources will be available to facilitate your learning. You will have the opportunity to participate in diagnostic quizzes, to assess your learning, and to design questions to test your fellow students in peer-to-peer learning sessions. The padlet online tool ([www.padlet.com](http://www.padlet.com)) will be used both as a mechanism for group work, and as an information collator as part of the preparation for the assessment. The use of padlet for generating community learning resources will be encouraged as part of the learning activity on the module.

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 25:75 ratio (directed: self-directed). The scheduled learning activities will include interactive lectures, workshops and practical sessions; approximately 20% of this learning will take place in an online environment.

**Assessment Strategy:**

Summative assessment will be via a GMO laboratory report consisting of a set of structured questions and a written report on a human gene with associated genetic condition. As part of the collection of information for the human gene report, there will be a formative, midway assessment of a padlet generated by each student, in the form of an oral presentation of the padlet. Feedback and guidance provided will facilitate the production of the final report.

<b>6</b>	<b>Indicative Content</b>
Modes of inheritance, genetic code, chromosomes, transcription and translation, prokaryotic genetics, eukaryotic genetics, chromatin, mRNA processing, genes and genomes, human genetic conditions, cancer genetics, regulation of transcription, genetically modified organisms, gene therapy, bioinformatics, DNA and RNA analysis	

<b>7</b>	<b>Module Learning Outcomes</b>
<b>On successful completion of the module, students will be able to:</b>	
	<b>1</b> Describe how the information in DNA is encoded, transmitted, and inherited.
	<b>2</b> Demonstrate understanding of the role of mutations in human genetic conditions, and identification of these mutations
	<b>3</b> Evaluate and interpret data and information obtained from online resources and computer based experiments.

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

9 Breakdown Learning and Teaching Activities	
Learning Activities	Hours
<b>Scheduled Learning (SL)</b> includes lectures, practical classes and workshops, peer group learning, Graduate+, as specified in timetable	66
<b>Directed Learning (DL)</b> includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning, as directed on VLE	50
<b>Private Study (PS)</b> includes preparation for exams	84
<b>Total Study Hours:</b>	200