1. **Title of the module**

BIOS5490 (BI549)The Genome

1. **School or partner institution which will be responsible for management of the module**

School of Biosciences

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 5

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Spring

1. **Prerequisite and co-requisite modules**

BIOS3020 (BI302) Molecular & Cellular Biology

BIOS3240 (BI324) Genetics & Evolution

1. **The programmes of study to which the module contributes**

This will be an optional module for two different degree programmes

* BSc Biology and related programmes
* BSc Biochemistry and related programmes
1. **The intended subject specific learning outcomes.**

On successfully completing the module, students will be able to demonstrate:

* 1. An understanding of the composition and structure of complex eukaryotic genomes
	2. An understanding of how genes and genomes vary between individuals, the origins of this variation, and the modern molecular technologies used to measure genetic and genomic variation
	3. Technical skills in working with DNA and carrying out basic bioinformatics and genomic analysis of nucleotide sequences
	4. An understanding of the information that can be inferred from genomic sequence data, including identification of individuals, assessment of population structure (ethnic background) and phenotype prediction including medically-relevant information
	5. An understanding of the uses to which this information can be put, such as forensic analysis, medical diagnosis and historical research
	6. An understanding of methods of genome editing and the ethical issues surrounding it
1. **The intended generic learning outcomes.**

On successfully completing the module students will be able to:

* 1. Communicate information, arguments and analysis to specialist and non-specialist audiences
	2. Analyse and communicate experimental findings
	3. Understand the limits of their knowledge and how this influences their analyses and interpretations of data
1. **A synopsis of the curriculum**

This module will introduce students to the importance of genome-wide DNA sequence analysis in a range of different fields of study including forensic science, medical diagnosis and historical research. They will acquire a full grounding in the basic biology of how sequence data is acquired and analysed, and engage with up-to-date methods of DNA sequence analysis in the practical sessions. At the broad level, the module will be structured around the following 4 themes:

**What is a genome?** This addresses genome content and structure, including both functional and non-functional elements of the genome such as the simple “junk” DNA repeats used for forensic identification.

**Understanding genomic variation**. This addresses the molecular causes of genomic variation between individuals – i.e. what makes us all unique – and the technical methodologies used to detect genomic variation.

**What are the implications of being able to read DNA?** This covers the extent to which we can infer phenotype from genomic sequence – e.g. how much you can tell about a person once their genome has been sequenced. Specific examples may be drawn from forensic science, medical diagnosis and historical analysis.

**What are the implications of being able to write or edit DNA**? This addresses nascent and future technology for genome editing – what can it achieve, what are the risks, what are the ethical issues?

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Relevant chapters from core undergraduate biology textbooks, e.g. Campbell’s *Biology*

Dudley, J.T. and Karczewski, K.J. (2013) *Exploring Personal Genomics,* Oxford University Press. ISBN: 9780199644490

Lesk, A. (2017) *Introduction to Genomics* (3rd edition), Oxford University Press. ISBN: 9780198754831

Additionally selected peer-reviewed research and review papers will be recommended.

1. **Learning and teaching methods**

27 Contact hours
123 Hours of private study

Total hours for the module: 150 hours

1. **Assessment methods**
	1. **Main assessment methods**

Laboratory practical report (1500 words, 25%)

Computer analysis workshop report (1500 words, 25%)

Exam (2 hours, 50%)

**13.2 Reassessment methods**

Like for like

1. **Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *8.4* | *8.5* | *8.6* | *9.1* | *9.2* | *9.3* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |
| Private Study | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| *Lectures* | **X** | **X** |  | **X** | **X** | **X** | **X** |  |  |
| *Laboratory practical + setup* | **X** | **X** | **X** |  |  |  |  | **X** | **X** |
| *Computer workshop* |  |  |  | **X** | **X** |  |  | **X** | **X** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |
| *Lab practical report*  | **X** | **X** | **X** |  |  |  |  | **X** | **X** |
| *Computer analysis report*  |  |  |  | **X** | **X** |  |  | **X** | **X** |
| *Examination*  | **X** | **X** |  | **X** | **X** | **X** | **X** |  |  |

1. **Inclusive module design**

The School recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/ declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

Biosciences is an international discipline. This module presents subject-specific knowledge, research approaches and techniques, generated, developed and refined by scientists around the world. Mastery of the learning outcomes will equip students to apply the theories and techniques of the module in a wide range of international contexts. In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection has been identified to complement the delivery of the material. The School of Biosciences is an international community of students and staff. Group activities e.g. in practicals, tutorials, workshops and self-study will naturally draw on the international make-up of the student body; the module teaching team includes members with international experience of teaching and research collaboration.

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**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 20/01/20 | Minor | Sept 20 | 13 | No |
|  |  |  |  |  |