**Module Specification**

| Module Title | Genes and Bioinformatics | Module Code | BIO223 |
|---|---|---|---|

| Credit Value | 15 | Level | 5 | Mode of Delivery | On Campus | Semester B |
|---|---|---|---|---|---|---|

| Pre-requisite modules | Co-requisite modules | Overlapping modules |
|---|---|---|
| Heredity and Gene Action | | |

**1) Content Description**

Provide a description of the module, as it will appear in the Module Directory and on the Student Information System (approx. 70-80 words).

This module examines the precise molecular details of transcription and translation using bacteriophage, prokaryotic and eukaryotic organisms as illustrative examples. Gene structure is illustrated in the context of how a gene is transcribed to produce RNA, how the RNA is processed and translated to produce protein and how these processes are regulated through other DNA sequences and proteins. An introduction to bioinformatics will familiarise students with issues around data storage, access and analysis. Knowledge of second generation DNA sequencing technologies will underpin an exploration of sequence analysis, molecular phylogenetics and transcriptomics.

**2) Module Aims**

Specify the aims of the module, i.e. the broad educational purposes for offering this module.

The aim of this module is to provide the students with an understanding of the precise molecular details and regulation of transcription and translation using bacteriophage, prokaryotic and eukaryotic organisms as illustrative examples. In addition, students will develop an appreciation for the role of bioinformatics in molecular biology research.

**3) Learning Outcomes**

Identify the learning outcomes for this module, i.e. knowledge, skills and attributes to be developed through completion of this module. Outcomes should be referenced to the relevant QAA benchmark statements and the Framework for Higher Education Qualifications in England, Wales and Northern Ireland (2008). The SEEC Credit Level Descriptors for Further and Higher Education 2003 and Queen Mary Statement of Graduate Attributes should also be used as a guiding framework for curriculum design.

| Academic Content: | |
|---|---|
| A 1 | Understand the differences between eukaryotic and prokaryotic transcription. |
| A 2 | Understand transcriptional regulation in bacteriophage, prokaryotes and eukaryotes, understand the mechanisms of mRNA splicing & processing and understand the mechanisms of translation |
| A 3 | Understand the differences between eukaryotic and prokaryotic translation, extract basic information from web-based research resources and conduct basic bioinformatic analyses including BLAST |
| A 4 | Analyse experimental results and produce a critical appraisal of them in a scientific report. To demonstrate how cloning technology can be used to analyse genes and genomes |
| A5 | Understand the importance of data analysis and data sharing in molecular biology. |
| A6 | Understand how analysis of DNA and RNA sequences underpins research in molecular biology. |

| Disciplinary skills - able to: | |
|---|---|
| B1 | This module will enhance students' understanding of the basic principles that underlie regulation in all biological systems. They will also understand the different types of experimental approaches used in the study of inherited biological information |
| B2 | Students will gain an appreciation of the informatics skills needed to study biology in this post-genomic era. |

| Attributes: | |
|---|---|
| C1 | Grasp the principles and practices of the field of molecular biology, especially experimental design, laboratory techniques and data handling. |
| C2 | Produce analyses which are grounded in evidence. |
| C3 | Apply analytical skills to investigate unfamiliar problems. |
| C4 | Use technologies to access and interpret information effectively. |

**4) Reading List**

Provide an indicative reading list for the module. This should include key texts and/or journals but should not be an exhaustive list of materials.

Genes lectures are largely based on the following texts (note: other editions of these textbooks are also available and have almost identical material)

1. Lewin, B et al (2014) Lewin's Genes XI, Jones & Bartlett, QH430 KRE
2. Tropp, BE (2012) Molecular biology: genes to proteins, 4th edition, Jones & Bartlett, QH506 TRO

In addition, any general undergraduate molecular biology textbook will be suitable for this module (e.g. Molecular Cell Biology or Molecular Biology of the Cell).

The following textbooks are recommended for the bioinformatics lectures:

1. Lesk, AM (2014) Introduction to Bioinformatics, 4th edition, Oxford University Press, QH441.2

**5) Teaching and Learning Profile**

Provide details of the method of delivery (lectures, seminars, fieldwork, practical classes, etc.) used to enable the achievement of learning outcomes and an indicative number of hours for each activity to give an overall picture of the workload a student taking the module would be expected to undertake. This information will form the Key Information Set for each undergraduate programme and will be used to populate the KIS widget found on the QMUL programme information pages. More information can be found online about KIS. You may also wish to refer to the QAA guidance on contact hours when completing this section.

| Activity Type | KIS Category | Time Spent (in hours) |
|---|---|---|

| | | |
|---|---|---|
| Lectures | Scheduled | 22 |
| Workshops | Scheduled | 12 |
| | Total | 34 |

Specify the total module notional study hours. This should be a total of the hours given for each activity. The notional study hours for each academic credit point is 10. A 15 credit point module therefore represents 150 notional study hours.

| Activity Type | Total Time Spent (in hours) | Percentage of Time Spent |
|---|---|---|
| Scheduled learning and teaching | 34 | 22.7 |
| Placement | 0 | 0 |
| Independent Study | 116 | 77.3 |
| Total | 150 | 100 |

Use the information provided in the box above to specify the total time spent and the percentage time spent in each category of teaching and learning activity.

**6) Assessment Profile**

Provide details of the assessment methods used to assess the achievement of learning outcomes.

| Description of Assessment | Assessment Type | KIS Category | Duration/Length | Percentage Weighting | Final element of assessment | Qualifying Mark |
|---|---|---|---|---|---|---|
| Examination | Examination | Examination | 2.5 hours | 75% | Yes | N/A |
| Coursework | Written assignment, inc Essay | Coursework | | 25% | No | |

**Final element of assessment:** The assessment that takes place last. There should normally be only one element of assessment marked as final unless two assessment or submission dates occur on the same day.

**Qualifying mark**: A specified minimum mark that must be obtained in one or more elements of assessment in order to pass a module. This is in addition to, and distinct from, the requirement to achieve a pass in the module mark to pass the module.

**Reassessment**

Provide details of the reassessment methods used, specifying whether reassessment is either standard reassessment or synoptic reassessment.

○ Standard Reassessment ◉ Synoptic Reassessment

| Synoptic reassessment details (if you have indicated synoptic reassessment above, please give details) | | |
|---|---|---|
| Brief Description of Assessment | Assessment Type | Duration/Length of Examination/ Coursework |
| Resit Examination | Examination | 2 Hours and 30 Minutes |