1. **Title of the module**

BI628 Microbial Physiology and Genetics II

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

Biosciences

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

Level 6

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)**

Autumn and Spring

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

BI548 Microbial Physiology and Genetics I

1. **The programmes of study to which the module contribute**s

Biology and related programmes (compulsory) and Biochemistry and related programmes (optional)

1. **The intended subject specific learning outcomes.**
**On successfully completing the module students will be able to demonstrate an understanding of:**

8.1 The structural and metabolic diversity of microorganisms

8.2 Genetic and physiological regulation in microorganisms

8.3 Experimental approaches used to investigate physiological and genetic control in microorganisms

1. **The intended generic learning outcomes.**
**On successfully completing the module students will have developed skills in:**

9.1 Written communication

9.2 The ability to generate, analyse and report experimental data

9.3 The ability to work collectively to analyse and present orally data reported in the scientific literature

1. **A synopsis of the** **curriculum**

**Lectures:**

 **Introduction:** Outline of how physiological homeostasis and adaptation is achieved in the bacterial cell.

**Experimental approaches used to study microbial physiology and genetics**: “Classical” and “reverse” genetics as applied to the study of bacteria. The use of reporter fusions. Transcriptomic and proteomic analysis of gene expression. Deep sequencing and metagenomics. Protein-nucleic acid interactions.

**Transcriptional and post-transcriptional regulation of gene expression in bacteria**: Transcription and translation in bacteria and the diverse mechanisms by which they are controlled. Phase variation and quorum sensing as modes of gene regulation.

**Complex signalling and physiological control**: Selected examples of physiological control in microorganisms, including the Sigma E envelope stress response pathway, regulation in response to nitrogen availability and nitric oxide stress, sensing, and detoxification mechanisms.

**Microbial biodiversity at the physiological and biochemical level:** Diversity of respiratory adaptations. Light harvesting: purple bacteria & cyanobacteria. Photosynthetic electron transport in purple bacteria & cyanobacteria.

**Practical**:Practical on *E. coli*  demonstrating how the envelope stress response factor Sigma E and it’s sRNA-controlled target regulate gene expression at the post-transcriptional level using *lacZ* reporter fusions.

**Symposium:** Group presentation of a research paper relating to topic areas in “Complex signalling and physiological control” or “Microbial biodiversity at the physiological and biochemical level”

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

Slonczewski J. and Foster J. *Microbiology An Evolving Science*. Third Edition. W.W. Norton & Co

1. **Learning and Teaching methods**

The subject specific knowledge will be delivered in lectures supported by reference to the core text and the scientific literature.

The practical class will support development of an understanding of how gene fusions and genetic analysis is used to study gene regulation in bacteria. The associated report will develop skills in data analysis and interpretation.

The symposium will develop the students understanding of specific advanced topics in microbial physiology and genetics.

**Contact Hours: 33 hr**

Lectures: 24 hrs (12 x 2 hr lectures)

Practical: 6 hrs

Symposium: 3 hr

**Self-study: 117 hrs**

1. **Assessment methods**

Assessment is by coursework, 40% and examination, 60%

Lac-fusions practical (20%)

Symposium, presentation of a research topic analysed and prepared in a group but presented individually; the preparatory group component is an integral element reflected in the individual mark (20%)

Examination, 2 hr, essay based (60%)

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 | 9.1 | 9.2 | 9.3 |  |  |  |  |  |  |
| **Learning/ teaching method** | **Hours allocated** |  |  |  |  |  |  |  |  |  |  |  |  |
| Lectures | 24 | X | X | X |  |  |  |  |  |  |  |  |  |
| Laboratory | 6 |  |  | X |  | X | X |  |  |  |  |  |  |
| Symposium | 3 |  |  |  |  | X | X |  |  |  |  |  |  |
| Private Study |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Practical report* | 23 |  |  | X | X | X |  |  |  |  |  |  |  |
| *Symposium preparation* | 23 |  |  |  |  | X | X |  |  |  |  |  |  |
| *Exam revision* | 71 | X | X | X |  |  |  |  |  |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Practical |  |  |  | X | X | X |  |  |  |  |  |  |  |
| Presentation |  |  |  |  |  | X | X |  |  |  |  |  |  |
| Examination | 2 | X | X | X | X |  |  |  |  |  |  |  |  |

1. **The School recognises and has embedded the expectations of current disability equality legislation, and supports students with a declared disability or special educational need in its teaching. Within this module we will make reasonable adjustments wherever necessary, including additional or substitute materials, teaching modes or assessment methods for students who have declared and discussed their learning support needs. Arrangements for students with declared disabilities will be made on an individual basis, in consultation with the University’s disability/dyslexia student support service, and specialist support will be provided where needed.**
2. **Campus(es) or Centre(s) where module will be delivered:**

Canterbury

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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.**

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| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 07/12/15 | Minor | September 2015 | 11 | No |
|  |  |  |  |  |