1. **Title of the module**

BIOS8510 (BI851) - Advanced Molecular Processing for Biotechnologists and Bioengineers

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

Biosciences

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

Level 7

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

30 credits (15 ECTS)

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

Spring

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

None

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

MSc Biotechnology and Bioengineering (compulsory)

MSc Biomedicine (optional)

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

Have:

1. An overview of knowledge and understanding of key drivers and principles in drug design, systems biology, synthetic biology, bioenergy, cell engineering, bionanomaterials and protein/vaccine based drugs and their application to industrial biotechnology and bioengineering.

2. Practical experience of modern cell engineering and synthetic biology approaches.

3. Experimental design within a biotechnological and bioengineering research context.

1. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**

Have:

1. Communication: ability to organise information clearly, present information in oral and written form, adapt presentation for different audiences including academic and industrial.

2. Analytical skills: interpretation of data, marshalling of information from published sources, critical evaluation of own research and that of others.

3. Team work: the ability to work both independently and as part of a research group using peer support, diplomacy and collective responsibility.

4. Self-motivation and independence: time and workload management in order to meet personal targets and imposed deadlines.

5. Information technology: use of appropriate technology to retrieve, analyse and present scientific information.

6. Scientific writing: ability to interpret and critique the findings of others and collectively develop an opinion in an area, communicating this via the presentation of theories and ideas in a review format.

1. **A synopsis of the curriculum**

This module will consider key areas of biotechnology and bioengineering including an introduction to drug discovery and design, systems biology and synthetic biology, gene expression and the engineering of cells to modulate cellular processes, the mechanics of cells from an engineering perspective, industrial biotechnology (specifically biofuels and small molecule systems biology), protein and vaccine based drugs, regenerative medicine and bionanomaterials. This will be delivered through workshops and seminars by specialists within the CMP and involve a number of course work assignments that will consider the most current research and thinking in these areas. This will be complemented by two three day practicals, one on mammalian cell engineering and the other on synthetic biology.

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

The reading list will largely be the latest review and primary research articles in this area, which will be used to drive a case-study based approach to learning. Students will be provided with their own copies of this reading material, but in some cases they will be set tasks for receiving appropriate journal articles to which we already have access. Two key Journals will be Nature Biotechnology and Biotechnology and Bioengineering. Many basic biochemistry text books within the Library also cover much of the material which will be delivered.

1. **Learning and teaching methods**

Total contact hours: 62

Private study hours: 238

Total study hours: 300

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

Poster Assignment (20%)

Laboratory Practical Assignment (10%)

Journal Club Presentation (20%)

Mini Review Assignment, 3000 words maximum (40%)

Laboratory Practical Assignment (10%)

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* | *9.1* | *9.2* | *9.3* | *9.4* | *9.5* | *9.6* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |
| **Private Study** | **x** |  | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Workshops* | **x** |  | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Practicals* | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Site visits* | **x** |  |  | **x** | **x** |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |
| *Poster Assessment* | **x** |  | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Laboratory Practical 1* | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Laboratory Practical 2* | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Journal Club* | **x** |  | **x** | **x** | **x** |  | **x** | **x** | **x** |
| *Mini Review* | **x** |  | **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. Academics involved in international research projects will also use examples of such research in their research led teaching sessions.

**FACULTIES SUPPORT OFFICE USE ONLY**

**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) |
| 09/01/2019 | Minor | September 2019 | 7 |  |
|  |  |  |  |  |

Revised FSO Jan 2018