1. **Title of the module**

BI503 Cell Biology

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

The School of Biosciences

1. **The level of the module (e.g. 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 (7.5 ECTS)

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

Autumn

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

Core Stage 1 modules

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

Biochemistry and related programmes

Biomedical Science and related programmes  
Biology and related programmes

1. **The intended subject specific learning outcomes.  
   On successfully completing the module students will be able to:**
   1. An understanding of key areas of cell biology
   2. An understanding of modern microscopic methods for identifying cellular components
2. **The intended generic learning outcomes.  
   On successfully completing the module students will be able to:**
   1. Development of abilities to handle scientific literature
   2. Development of skills in presenting a concise digest of a research area both orally and in written form
3. **A synopsis of the curriculum**

The cell is the fundamental structural unit in living organisms. Eukaryotic cells are compartmentalized structures that like prokaryotic cells, must perform several vital functions such as energy production, cell division and DNA replication and also must respond to extracellular environmental cues. In multicellular organisms, certain cells have developed modified structures, allowing them to fulfil highly specialised roles. This module reviews the experimental approaches that have been taken to investigate the biology of the cell and highlights the similarities and differences between cells of complex multicellular organisms and microbial cells. Initially the functions of the cytoskeleton and certain cellular compartments, particularly the nucleus, are considered. Later in the unit, the mechanisms by which newly synthesised proteins are secreted or shuttled to their appropriate cellular compartments are examined.

**Lectures:**

**Cell motility and the cytoskeleton.** - types of cell movements. Actin-based mechanisms - actin/myosin systems in muscle and other cells in higher eukaryotes and the discovery of corresponding microbial systems. - microtubules and their role in intracellular transport: dynein and kinesin. Microtubules in cilia and flagella. ATP and GTP driven processes - the family of intermediate-sized filaments; their structure, cellular role. Concepts of the evolution of intermediate filaments between microbes and man.

**Regulation of the mitotic cell cycle and the dynamic structure of the nucleus.**  – the

interphase nucleus - chromatin structure (histones, nucleosomes, higher order folding;

telomeres; kinetochore etc), nucleolus, nuclear envelope structure, biogenesis of ribosomes,

genetic approaches to analysis of regulation of mitosis, definition of yeast cdc genes;

comparison with biochemical approaches, regulation of progression from G1 → S → G2 → M.

Cycle exit to G0 and return. Growth factor, signalling and apoptosis. Chromatin structure and

its regulation through the cycle, Dynamics of the nuclear envelope and chromosome/chromatid

separation.

**Overview of membrane traffic in eukaryotic cells.** - relationship of endocytotic and

exocytotic pathways, compartments and sorting.

**Biogenesis of proteins destined for organelles or for secretion.-** experimental approaches –

yeast and bacterial sec genes vs biochemical dissection of mammalian secretory tissue, signal

sequences targeting proteins to different organelles, folding and post-translational modification

of proteins in the secretory pathway, eukaryotic and prokaryotic secretory pathway –

biochemical and genetic dissection of compartments, transport mechanisms and targeting.

**Practicals:** Actomyosin contraction in myofibrils using phase microscopy .

**Supervisions:** Reading and précis of a scientific paper in cell and molecular biology. Presentation of its chief findings and impact

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

Core texts:   
Lodish HF, Berk A, Kaiser CA, Krieger M, Molecular cell biology, 6th Edition, W.H. Freeman, 2007

Optional texts:   
Alberts B, Molecular Biology of the Cell, 3rd Edition, Garland Science Pub., 2008   
Alberts B, Essential Cell Biology, 3rd Edition, Garland Science Pub., 2009   
Much of the module material is covered at some (usually more introductory) level in Biology and Biochemistry textbooks, as recommended in other modules - examples include Campbell’s Biology and Nelson & Cox’s (Lehninger’s) Principles of Biochemistry.

1. **Learning and Teaching methods**

Module material will be delivered through lectures and a practical class and both will address learning outcomes 8.1 and 8.2.

The supervision and presentation underpin the development of skills in analysing the research literature and presentation of research work in a concise and accessible form, this addresses learning outcomes 9.1 and 9.2 in addition to 8.1

**Contact hours:**

24h lectures

1h supervision

3h practical

2h presentation

**Self Study:** 120 hours

Practical report 24 hours

Supervision and presentation 18 hours

Reading and preparation for examination 78 hours

1. **Assessment methods.**

1. Practical. 20% This will address learning outcomes 8.1 and 8.2

2. Reading the scientific literature. Group and individual work aimed at (1) using Web of Science/PubMed plus printed and online sources to identify literature on a subject (2) reading, understanding and criticising papers (3) presenting scientific subjects as abstracts, and orally.

15% This will address learning outcomes 8.1, 9.1 and 9.2

3. Final examination. 65% this will address learning outcomes 8.1, 8.2 and 9.1

1. ***Map of Module Learning Outcomes (sections 8 & 9) to Learning and Teaching Methods (section12) and methods of Assessment (section 13)***

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| --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** |  | *8.1* | *8.2* |  | *9.1* | *9.2* |
| **Learning/ teaching method** | **Hours allocated** |  |  |  |  |  |
| **Private Study** |  | **✓** | **✓** |  | **✓** | **✓** |
| **Lectures** |  | **✓** | **✓** |  |  |  |
| **Supervision** |  | **✓** |  |  | **✓** | **✓** |
| **Practical** |  | **✓** | **✓** |  |  |  |
| **Presentation** |  | **✓** |  |  | **✓** | **✓** |
| **Assessment method** |  |  |  |  |  |  |
| **Practical** |  | **✓** | **✓** |  |  |  |
| **Literature** |  | **✓** |  |  | **✓** | **✓** |
| **Examination** |  | **✓** | **✓** |  | **✓** |  |

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) |
| 04/07/16 | Minor | September 2016 | 12 | No |
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