MODULE SPECIFICATION TEMPLATE

Confirmation that this version of the module specification has been approved by the School Learning and Teaching Committee:

………19 November 2014………………………………………….(date)

**SECTION 1: MODULE SPECIFICATIONS**

1. Title of the module

BI602 Cell Signalling

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

Biosciences

1. Start date of the module

September 2003 latest revision November 2014 (revised version start date September 2015)

1. The number of students expected to take the module

40-80

1. Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal

None this is a revision of an existing module

1. The level of the module (e.g. Certificate [C], Intermediate [I], Honours [H] or Postgraduate [M])

H

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

15 credits (7.5 ECTS credits)

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

Autumn or Spring Term

1. Prerequisite and co-requisite modules

Compulsory Stage 2 Biosciences 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

11.1 Knowledge of the major classes of signalling molecules, their receptors and intracellular signalling pathways.

11.2 Acquisition of practical and data handling skills associated with monitoring intracellular signalling

1. The intended generic learning outcomes

12.1 Interpretation and retrieval of information

12.2 Analysis and evaluation of data

12.3 Written communication skills

13. A synopsis of the curriculum

The module begins by overviewing the diverse mechanisms used by cells to communicate, considering the main modes of cell-cell communication, the major classes of signalling molecules and the receptor types upon which they act. It then focuses on nuclear, G-protein coupled, and enzyme linked receptors covering in molecular detail these receptors and their associated signal transduction pathways.

**Introduction**

Principles of Cell Signalling

Cell Adhesion and Cell Communication (adhesion and gap junctions)

Signalling Molecules: hormones, neurotransmitters, growth factors

Receptor Types: Nuclear, G-protein coupled, Ion-channel linked, Enzyme-linked

**Nuclear Receptors**:

Cellular location and molecular organisation of receptors. Structure/function/activity relationships. Receptors as sequence-specific DNA binding proteins.

**G-Protein Coupled Receptors**:

Receptors coupled to heterotrimeric guanine nucleotide binding proteins (G proteins). Composition and classification of G-proteins, their activation and modulation by toxins and disease.

Second Messengers and Protein Phosphorylation (kinases and phosphatases).

Cyclic Nucleotide-Dependent Systems: G proteins in regulation of adenylyl cyclase-cAMP-protein kinase A (PKA) and guanylyl cyclase-cGMP pathways. Physiological roles e.g. in visual transduction and glycogen metabolism.

Inositol lipids in signal transduction: Regulation of phospholipase C. Inositol polyphosphates (e.g. IP3) and diacylglycerol (DAG) in regulation of Ca++-dependent kinases. Roles in specific cellular responses e.g. regulation of protein kinase C.

Interactions of Signalling Pathways: ‘Cross-Talk’ between different pathways and messenger molecules.

**Enzyme Linked Receptors:**

Receptor tyrosine kinases (RTKs), e.g. epidermal growth factor receptor (EGF) family and insulin receptor, and their varied roles in cellular metabolism, cell behaviour, development and disease.

Molecular organisation of receptors, autophosphorylation of intracellular domains

Intracellular signalling pathways: activation of monomeric G-protein Ras, leading to activation of the mitogen activated protein (MAP) kinase cascade.

Integration of signalling components: Role of adapter proteins (e.g. GRB2) and their protein-protein interaction domains (SH2, SH3 etc.) in linking ligand-receptor complexes to intracellular proteins.

Practical: Characterisation of G-protein coupled receptors using a cAMP-linked reporter gene assay.  
  
Workshop: Overview of the module in preparation for revision/exam.

14. Indicative Reading List

Recent editions of:

Lodish H et al. Molecular Cell Biology, Freeman &Co

Nelson, J, Structure and Function in Cell Signalling, John Wiley and Sons Ltd

Hancock JT, Cell Signalling, Oxford University Press

Lim W, Mayer B, Pawson T. Cell Signalling– Principles and Mechanisms, Garland Science

15. Learning and Teaching Methods, including the nature and number of contact hours and the total study hours which will be expected of students, and how these relate to achievement of the intended module learning outcomes

**Contact hours**:

Lectures: 24 x 1 hour (address learning outcomes 11.1, 12.1)

Practical/data analysis: 6 hours (addresses learning outcomes 11.1, 11.2, 12.2, 12.3)

Revision workshop: 1-2 hours (addresses learning outcome 11.1)

Self-study: 118 hours (addresses all learning outcomes)

The curriculum will be delivered through the lecture series and the practical class used to reinforce aspects of cell signalling. The associated practical report and data analysis will allow development of data handling and analytical skills.

16. Assessment methods and how these relate to testing achievement of the intended module learning outcomes

Summer exam, 2 hours, 60%: essay style (addresses all learning outcomes particularly 11.1, 12.1, 12.3)

Test, 1 hour, 20%: short answer/mini essay questions (addresses learning outcomes 11.1, 12.1, 12.3)

Practical report, 20% (addresses learning outcomes 11.1, 11.2, 12.1, 12.2, 12.3)

17. Implications for learning resources, including staff, library, IT and space

None this is a revision of an existing module

18. 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 support service, and specialist support will be provided where needed.

19. Campus(es) where module will be delivered:

Canterbury

**SECTION 2: MODULE IS PART OF A PROGRAMME OF STUDY IN A UNIVERSITY SCHOOL**

**Statement by the School Director of Learning and Teaching/School Director of Graduate Studies (as appropriate):** "I confirm I have been consulted on the above module proposal and have given advice on the correct procedures and required content of module proposals"

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| ................................................................  Director of Learning and Teaching/Director of Graduate Studies (delete as applicable)  …………………………………………………  Print Name | ..............................................  Date |

**Statement by the Head of School:** "I confirm that the School has approved the introduction of the module and, where the module is proposed by School staff, will be responsible for its resourcing"

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| .................................................................  Head of School  …………………………………………………….  Print Name | ..............................................  Date |

Module Specification Template  
Last updated February 2013