STLT202/03-04

MODULE SPECIFICATION

1 The title of the module

Physiology of micro-organisms, animals & plants

2 The Department which will be responsible for management of the module

Department of Biosciences

3 The Start Date of the Module

September 2006

4 The number of students expected to take the module

25 per year

5 Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Departments and Faculties regarding the withdrawal

BI625

6 The level of the module (eg Certificate [C], Intermediate [I], Honours [H] or Postgraduate [M])

H

7 The number of credits which the module represents

15

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

The module will be taught in Term 1.

9 Prerequisite and co-requisite modules

BI513 Physiology, BI3xx plant and animal form and function. There are no co-requisites

10 The programmes of study to which the module contributes

Biology BSc (Hons)

11 The intended subject specific learning outcomes and, as appropriate, their relationship to programme learning outcomes

1. To describe specialized physiological functions of microbes, plants and animals
2. To provide insight into the approaches used to study physiological processes
3. To describe how physiological systems adapt to specific environmental conditions

12 The intended generic learning outcomes and, as appropriate, their relationship to programme learning outcomes

1. An understanding of specific physiological functions in microbes, plants and animals.
2. An understanding of how physiological systems adapt to the environment Knowledge of experimental approaches in physiology

Relationship to programme:

1. Interpreting a complex data set.
2. Develop problem solving skills.
3. Working in a small team to plan and complete a practical assignment.

13 A synopsis of the curriculum

The theme of the course is how physiological systems have evolved and adapted to meet the needs of the organism. It introduces common principles of homeostatic control and diverse mechanisms of adaptation to lifestyle, environment and associated stress factors.

Microbe physiology:

Physiological adaptation in response to environmental signals in microbial cells: Tools used to study differential gene expression including "classical" and "reverse" genetics, reporter fusions (*lac*, *phoA* and *gfp*), gene arrays and proteomics. Principles of signal recognition/physiological response with iron (Fur) and sigma factors (Stationary phase) as examples of mediators of regulatory cascades. "Two component" regulators (e.g. NtrC) and quorum sensing. Phase variation as an alternative mechanism of adaptation at the population level. The biochemical and genetic mechanisms and responses that lead to physiological adaptation to ammonia starvation. The biochemical and genetic mechanisms leading to the control of growth and cell division in bacterial and fungal cells. Nuclear behaviour and sex in the fungi.

Animal physiology:

- Sensory systems: a comparative look at specific senses (e.g. vision, olfaction, gustation) across the animal kingdom; adaptation to environment and lifestyle.

- Locomotion, orientation and navigation: modes of locomotion; strategies for orientating and navigating.

- Circadian Rhythms: adaptation to environment; neural basis; molecular mechanisms.

- Communication and Language: animal communication (e.g. birdsong, honey bee dance, human speech); evolution of human speech and language; language disorders.

- Feeding and digestion: feeding mechanisms (absorption, filter-feeding etc); evolution of alimentary systems.

- Osmoregulation and excretion: renal and extra-renal osmoregulatory organs; adaptation to environment.

Plant physiology:

- Photosynthesis in C3, C4 and CAM plants – comparison of physiological and anatomical adaptations of the photosynthetic systems.

- Phytohormones – regulation of growth and metabolism.

- Plant defense and secondary metabolites – production of a diverse range of compounds in secondary metabolite pathways, alkaloid biosynthesis.

- Use of nutrients – physiological and anatomical adaptation to facilitate a diverse range of nutrients.

- Plant-microbe interaction – how plants interact with specific microbes, symbiosis, commensalisms, parasitism, mycorrhiza.

- Adaptation to environment – reactions to changes in the environment, physiological and anatomical adaptation, stress factors.

Practicals:

1. Mapping a *cis*-active regulatory element by characterising the effect of deletion mutations on expression of *lac* operon fusions.
2. Locomotion in C.elegans using different mutations

Supervisions:

1. Problem based on the biochemical and physiological control mechanisms that operate upon amino acid starvation (stringent response)
   Problem based on the biochemical and physiological control mechanisms that operate upon light response in plants

14 Indicative Reading List

Brock, Biology of Microorganisms, Tenth Edition, Prentice Hall.
Graham, Plant Biology
Campbell, Biology

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 learning outcomes

This module will be delivered via a series of lectures, practicals and problem solving supervisions as part of a programme of 150 learning hours for the

module. The remaining time will be spent as directed study in the completion of a series of activities and exercises that will assist the students in the completion of the 'mini'-project. Students will be expected to undertake wider reading in order to contribute to the learning processes.

Supervisions 2 x 1hr:	2hr
Lectures 12 x 2hr:	24hr
Practicals 2 x 2hr:	4hr

The combination of teaching techniques (lectures, supervisions, practicals and independent study) have been selected to enable the students to most efficiently attain the learning outcomes required.

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

The course will be evaluated using a practical report and associated questions (10%) plus the results of the problem solving supervisions (25%). There will be a 1.5 hour long end of module examination (65%).

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

Staff time for the hours indicated above. Library resources sufficient for up to 12 students at any one time as indicated in indicative reading; no particular IT requirements; practical facilities for up to 25 students at any one time.

18 A statement confirming that, as far as can be reasonably anticipated, the curriculum, learning and teaching methods and forms of assessment do not present any non-justifiable disadvantage to students with disabilities

This is confirmed.

Statement by the Director of Learning and Teaching: "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

....17.03.04............
Date

Statement by the Head of Department: "I confirm that the Department has approved the introduction of the module and will be responsible for its resourcing"

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Head of Department

....17/3/04............
Date

Revised August 2002; Revision 2 in 2003.