1. **Title of the module**

BI644 The Biology of Ageing

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

School of 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 credits)

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

Spring

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

Pre-requisite: Compulsory Stage 1 and 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.  
   On successfully completing the module students will have acquired:**
   1. Knowledge of the major processes underlying the ageing process.

8.2 Practical and data handling skills associated with analysing lifespan and age-related decline data sets*.*

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

9.1 Interpretation and retrieval of information

9.2 Analysis and evaluation of data

9.3 Written communication

1. **A synopsis of the curriculum**

The module overviews the importance of studying ageing, the organisms and methods used to do so. It considers how organisms age, together with providing a detailed understanding of the processes and molecular mechanisms that govern ageing.

***Introduction***

Importance and principles of ageing research

Why do organisms age and theories of ageing: e.g. Damage theory, telomeres, genetics and trade off theories.

How ageing and lifespan is measured.

Overview of processes and pathways controlling ageing.

**Methods in ageing research**

Model Organisms: Benefits and problems associated with studying ageing in model organisms, including: yeast, worms, flies, mice, primates.

Systems approaches to studying ageing: e.g. high throughput DNA/RNA sequencing, high throughput proteomics and, metabolomics. Pros and cons of these methods, what we have learned from them?

**Signalling pathways that control ageing**

Insulin signalling pathway and Target of Rapamycin (ToR) pathway.

Organisation of pathways and the molecules involved, how they were discovered to be implicated in lifespan and ageing, ways of modelling and studying their molecular detail in animals e.g. genetic/ epistasis analysis.

The processes downstream of these pathways that allow them to control lifespan/ageing e.g. stress resistance, autophagy, reduced translation, enhanced immunity etc.

Cross-talk between pathways.

Dietary restriction, lifespan and ageing.

How dietary restriction works in different organisms, what signalling pathways and processes it affects.

**Diseases of ageing**

What these are e.g. Alzheimer’s, Huntington’s.

Overview of ‘normal ageing’ associated processes e.g. muscle weakening.

How they can be studied in model organisms and the importance of ageing research for treating these disorders.

**Ethics of ageing research**

Pros and cons of studying ageing with a goal of extending human lifespan e.g. insurance, health system, social, psychological implications.

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

Austad, S.N. Why We Age (1997) (Wiley).

Ricklefs, R.E., C.E. Aging: A Natural History (1995) (Scientific American Library) (W H Freeman & Co).

The rest of the suggested reading fill consists of review articles and primary research publications. The emphasis of this module will be to read and interpret the literature first hand.

1. **Learning and Teaching methods**

The curriculum will be delivered through the lectures and the workshops used to reinforce aspects of studying ageing biology in the lab. The associated essay and data analysis will allow development of data handling and analytical skills.

Total Contact Hours: 26

Independent Study and Assessment Hours: 124

Total Study Hours: 150

Lectures: 20 hrs

Workshops: 6 hrs

1. Group discussion of key ageing research paper(s) (small groups)

2. Data analysis session (whole class or smaller groups)

3. Overview of the module in preparation for revision/exam (whole class)

Self-study: 124 hours

1. **Assessment methods.**This module will be assessed by 60% exam and 40% coursework consisting of an essay (20%) and data handling exercise (20%).
2. ***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* | *9.3* |  |  |  |  |  |  |  |
| **Learning/ teaching method** | **Hours allocated** |  |  |  |  |  |  |  |  |  |  |  |  |
| *Private Study* | *124* | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |  |  |
| *Lectures* | *20* | **x** |  | **x** |  |  |  |  |  |  |  |  |  |
| *Workshop (group discussion)* | *2* | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |  |  |
| *Workshop (data handling)* | *2* | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |  |  |
| *Revision Workshop* | *2* | **x** |  |  |  |  |  |  |  |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Essay (based on discussion workshop)* |  | **x** |  | **x** | **x** | **x** |  |  |  |  |  |  |  |
| *Data handling exercise* |  | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |  |  |
| *Examination* |  | **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) |
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