

General Information

Module Code

BIO-6031A

Academic Year

2024/5

Module Title

BIOLOGY OF AGEING: EVOLUTION, ECOLOGY AND HUMAN HEALTH

Module type

CW

Semester / Term

SEM1

Level

6

Credit Value

20

Scheme

UG

Related Modules:

Pre-requisite**Co-requisite****Forbidden**

Timetable slot

B2

Is this module suitable for inbound study abroad students?

Y

Additional costs**Maximum number of students**

74

Module Organiser

Professor Alexei Maklakov

Module Description

What is this module about?

The purpose of this module is to introduce students to the fundamentals of the biology of ageing, as well as to the latest discoveries in evolutionary and applied biogerontology. The students will learn about the ultimate evolutionary causes of ageing, the genetics of ageing, and the role of the environment in shaping differences in ageing between populations, sexes, and individuals. The module material will cover ageing in wild populations of animals and plants, in laboratory model organisms, and in historical and contemporary human populations. Special attention will be given to ageing as a global challenge facing modern societies and to the research advances aimed at extending healthy lifespan in humans.

The module will use *Mechanisms of Life-History Evolution* (2011) (Oxford University Press, eds. Flatt and Heyland) and *The Evolution of Senescence in the Tree of Life* (2017) (Cambridge University Press, eds. Shefferson, Jones and Salguero-Gomez) as the items of core reading and will refer back to some of the chapters in these books.

Learning objectives and Outcomes

What are the Learning objectives?

The subject specific learning objectives of this module are to:

- Understand why ageing evolves (i.e. why ageing is a pervasive feature of living organisms);
- Understand the differences between and gauge the level of support for classic population genetic theories of ageing (antagonistic pleiotropy and mutation accumulation);
- Understand the importance of the environment (including early-life environment) in ageing;
- Use appropriate terminology linked to the biology ageing, such as mutation-selection balance, age-specific gene function, extrinsic vs intrinsic mortality, disposable soma, telomeres, etc.
- Recognise major biological processes (e.g. nutrient-sensing signalling, autophagy, mitochondrial function) involved in governing cellular senescence and organismal longevity
- Understand the difference between energy-based trade-off and functional trade-offs in the evolution and expression of ageing;
- Understand the biological causes of sex differences in ageing and lifespan;
- Critically evaluate the promise of modern technologies aimed at extending healthy lifespan in humans

What are the Learning Outcomes?

Name	Details
1	Ageing and evolution To be able to offer informed perspective on the ultimate evolutionary causes of ageing
2	Ageing and biomedicine To be able to offer an informed perspective on biogerontology (eg diet and phamarceuticals as anti-ageing strategies)

3

Sex differences in ageing

To be able to offer an informed perspective on ultimate (evolutionary) and proximate (mechanistic) reasons as to why males and females have different lifespans

4

Ageing in humans

To be able to offer an informed perspective on most promising anti-ageing strategies to date and on social consequences of increased longevity

Learning activities and Effort hours

Learning activity	Total effort hours	Indicative effort hours per week
1. Class sessions (Lectures, workshops, lab sessions, seminars etc.)	40	4
2. Pre-class preparation and follow up study	160	4
3. Work-based or Placement Hours		
4. Formative assessments/ activities	1	1
5. Feedback/ Feed forward sessions		
6. Summative assessments (essays, dissertations, oral presentations, worksheets, lab reports etc.)		
7. Background reading	20	
8. Exams/ OSCEs	1	
9. Course Tests		
10. Tutorials (Individual or small groups)		
Total Hours =	222.00	9.00

Learning Support Materials

Should this module be exempt from requiring an online reading list?

N

Link to Talis (<https://uea.rl.talis.com/index.html>)

Formative Assessments

Sequence	Assessment Type	Title	Deadline
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Summative Assessments

Sequence	Assessment Type	Title	Deadline	Weighting	Method of submission	Method of return	Return date	Format and purpose of feedback
001	Written Assignment	Essay (1000 words)		30 / 100	Bb file submission point	VIA BLACKBOARD		

Further Details

002	Written Assignment	Main coursework (3000 words)		70 / 100	Bb file submission point	VIA BLACKBOARD		
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Further Details

Attribute Development

On this module students will develop knowledge, insights and attributes that are readily transferable into future or current work settings. The attributes are articulated below to help understand how the module will help students to thrive on their course and prepare them for the world of work. These attributes are also articulated within the UEA Award.

Academic excellence

- In-depth and extensive knowledge, understanding and skills in chosen discipline(s)
- The ability to collect, collate, analyse and critically engage with a wide range of information sources, and evidence
- The ability to analyse and critically engage with a wide range of concepts and ideas

Critical thinking & problem solving

- A capacity for independent, conceptual and creative thinking
- A capacity for informed argument and logical reasoning

- A capacity for problem identification and problem-solving

Learning & personal development

- A commitment to developing professional values, self-insight and capabilities
- The ability to respond positively to constructive criticism and feedback from peers, tutors and colleagues
- Self-confidence and an ability to exercise own 'voice'

Digital literacy and IT

- Confidently employ a range of digital technologies for academic and professional/ career development purposes
- Use appropriate digital technologies and resources to locate diverse types of information for both academic and non-academic purposes
- The ability to critically evaluate and engage with the information obtained

Self-management & professionalism

- A capacity for taking responsibilities and ownership of actions
- An ability to manage time effectively, including setting priorities, juggling competing demands and meeting deadlines
- An understanding of work cultures and practices, including work place professionalism

Team working and leadership

- An ability to co-operate and collaborate with others, including working to shared aims
- An ability to take other viewpoints, have empathy for other people's position and give constructive feedback
- An ability to motivate and lead others, including taking the initiative and delegating when required

Communication

- An ability to communicate in written form for different purposes, audiences and contexts
- An ability to communicate in person for different purposes, audiences and contexts
- An ability to network effectively with others for specific purposes

Applied numeracy and Technical proficiency

- An ability to perform routine calculations in daily tasks and in applied contexts
- An ability to analyse and interpret data and evidence
- Proficiency in skilled techniques used for academic and professional purposes

Career management

- A capacity to reflect on and articulate qualities, strengths and attributes
- The ability to research specific job and career areas
- An ability to present your experience and attributes positively to graduate employers

Commercial awareness

- A knowledge of the link between academic subjects and their commercial applications
- An understanding of business priorities and the needs of graduate employers

- The ability to understand and prioritise customer needs

Innovation and enterprise

- The confidence to introduce and establish something new
- The potential to take an idea through to its practical application
- The potential to apply an enterprising mind-set to situations

Citizenship and stewardship

- An understanding of your place within local and global communities
- An awareness of the need to manage shared and finite resources, including an appreciation of moral and ethical dimensions
- An ability to improve the lives of others and lobby for positive change through community and/or political engagement