

# BMS5009: AGEING AND THE SCIENCE OF HUMAN LONGEVITY

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## Effective Term

Semester B 2024/25

## Part I Course Overview

### Course Title

Ageing and the Science of Human Longevity

### Subject Code

BMS - Biomedical Sciences

### Course Number

5009

### Academic Unit

Biomedical Sciences (BMS)

### College/School

College of Biomedicine (BD)

### Course Duration

One Semester

### Credit Units

3

### Level

P5, P6 - Postgraduate Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This is an introductory course on aging and the science of human longevity, a field of biomedicine that has emerged as a mainstream subject in recent years. It is an exciting and fast-moving area in which discoveries are still being made that are deepening our understanding of the causes of aging and how to develop interventions that can slow it down, or even reverse it. The course starts with the ecological role of aging. It then delves into the current evolutionary and mechanistic theories and associated pathways, accompanied by a review of the animal models used by scientists. It is followed by a review of the current science behind the causes of aging and the leading causes of death in humans. Next, the course looks at how human longevity is affected by medicine, genetics and lifestyle factors, such as sleep, diet, microbiota, supplements, and exercise. Finally, the course highlights some of the leading scientists and companies involved in human longevity.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 Students can critically discuss and compare the theories of aging, their strong and weak sides, and their usability to instruct research. They can describe the development of the science of longevity, how it has evolved over the years, and what the current ways of thinking are on this subject, along with its associated known pathways and causes.	50	x	x	
2 Students can describe the factors that have been shown to rejuvenate or slow down ageing based on related biomarkers. These include lifestyle factors such as sleep, diet, microbiota, exercise, supplements and medicines.	25	x	x	x
3 Students can describe who the current leading scientists are in the field of longevity. They can explain the strategies of companies and institutions that have been established with longevity focus and where the industry is heading over the next 5-10 years.	25		x	x

#### A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

#### A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

#### A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

### Learning and Teaching Activities (LTAs)

LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1 Lectures	Students are engaged in weekly lectures to gain knowledge about aging and longevity science	1, 2, 3	

2	Tutorial	Students are engaged in oral presentation, debates, and participation in journal discussions to gain skills and confidence for using the knowledge they acquired during the lecture	1, 2, 3	
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**Assessment Tasks / Activities (ATs)**

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)	
1	Oral Presentation	1, 2, 3	30	
2	Mid-term Examination	1, 2, 3	35	Mid-term exam covering weeks 1 to 6 of the course

**Continuous Assessment (%)**

65

**Examination (%)**

35

**Examination Duration (Hours)**

2

**Additional Information for ATs**

Final exam covering weeks 7 to 13 of the course

**Assessment Rubrics (AR)****Assessment Task**

Oral Presentation, Engagement in learning activities (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

Critically discuss, analyse, and evaluate the theoretical views on aging as well as achievements of the science of human longevity. Describe and classify the fundamental principles of aging and the science of human longevity. Describe and evaluate the directions pursued by different researchers and companies in the field of longevity science. Compare their strategies and evaluate their potential outcomes. Critically analyse the course material.

**Excellent**

(A+, A, A-) Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

**Good**

(B+, B, B-) Substantial performance on all CILOS. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

**Fair**

(C+, C, C-) Satisfactory performance on the majority of CILOS possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.

**Marginal**

(D) Barely satisfactory performance on a number of CILOS. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

### **Failure**

(F) Unsatisfactory performance on a number of CILOS. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.

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### **Assessment Task**

Mid-term Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

### **Criterion**

Describe and systematize theoretical and experimental achievements in the field of aging and longevity science.

### **Excellent**

(A+, A, A-) Outstanding performance on all CILOS. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

### **Good**

(B+, B, B-) Substantial performance on all CILOS. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

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### **Assessment Task**

Final Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

### **Criterion**

Describe and evaluate the directions pursued by different researchers and companies in the field of longevity science. Compare their strategies and evaluate their potential outcomes.

### **Excellent**

(A+, A, A-) Outstanding performance on all CILOS. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

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### **Assessment Task**

Oral Presentation, Engagement in learning activities (for students admitted from Semester A 2022/23 to Summer Term 2024)

### **Criterion**

Critically discuss, analyse, and evaluate the theoretical views on aging as well as achievements of the science of human longevity. Describe and classify the fundamental principles of aging and the science of human longevity. Describe and evaluate the directions pursued by different researchers and companies in the field of longevity science. Compare their strategies and evaluate their potential outcomes. Critically analyse the course material.

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### **Assessment Task**

Mid-term Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

### **Criterion**

Describe and systematize theoretical and experimental achievements in the field of aging and longevity science.

### **Excellent**

(A+, A, A-) Outstanding performance on all CILOS. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

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**Assessment Task**

Final Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

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**Part III Other Information****Keyword Syllabus**

Anti-ageing,  
Lifespan,  
Healthspan,  
Longevity,  
Biological age,  
Ageing biomarkers,  
Hallmarks of aging,  
Ageing pathways,  
Inflammaging,  
Immunosenescence,  
Cellular senescence,  
Supercentenarian,  
Medicine 3.0,  
Lifestyle factors

**Reading List****Compulsory Readings**

Title	
1	Nil

**Additional Readings**

Title	
1	Lifespan: Why We Age – and Why We Don't Have To by David Sinclair
2	Juvenescence: Investing in the Age of Longevity by Al Chalabi & Jim Mellon

3	The Telomere Effect by Elizabeth Blackburn
4	The Blue Zones Secrets for Living Longer: Lessons From the Healthiest Places on Earth by Dan Buettner