

Course Unit	Biology of Aging	Field of study	Biology and Biochemistry
Bachelor in	Gerontology	School	School of Health
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	2
Level	1-1	ECTS credits	5.0
Code	9833-346-1202-00-23		
Workload (hours)	135	Contact hours	T - , TP 28 , PL - , TC 12 , S - , E - , OT 16 , O -

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Sílvia Filipa Alves Beato Salvador Salvador

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. - Describe the biological models that explain the aging process;
2. - Describe the main structural and functional changes associated with age;
3. - Describe possible implications in quality of life in the elderly related with biological changes;
4. - Identify functional assessment tools in the elderly;
5. - Point out health and well-being protective strategies mainly directed to successful aging.

### Prerequisites

Not applicable

### Course contents

1 - Biological aging: definitions and theories; 2 - Cellular and molecular aging: main biochemical and molecular mechanisms related with cellular aging; 3 - Aging of the main systems in the human organism; 4 - Aging and biological rhythms; 5 - Aging biomarkers; 6 - Biological fundamentals of neurocognitive aging;

### Course contents (extended version)

1. Biological Aging:
  - Basic terms definition and characterization of the senescence process;
  - Biological theories of aging.
2. Cellular and molecular aging:
  - Cellular division, mitotic cycle regulation;
  - Oxidative stress;
  - Genetic aspects of the aging process.
3. Aging of the main systems in the human organism;
  - Cardiovascular system;
  - Respiratory system;
  - Locomotor system;
  - Connective tissues, collagen, elastin, fibronectin, . . .
  - Immune system;
  - Digestive and urinary system;
  - Endocrine system.
4. Aging and biological rhythms;
5. Aging biomarkers;
6. Biological fundamentals of neurocognitive aging;
7. Biological Theories of Aging / Theoretical Models
8. Life and its regulation - Varieties of Homeostasis
  - Automatic and cultural homeostasis
9. Brain / macro-organization: three domains
10. The limbic system
11. The Frontex: the subregions
  - Frontex and Cognition
  - Frontal cortex and its relationship with the limbic system
  - Frontal cortex and social behavior
12. Medicine, Immortality and Algorithms
13. Some Final Thoughts on the Future of Humanity

### Recommended reading

1. Freitas, E. Py, L.; Tratado de Geriatria e Gerontologia. 2011, 3ª edição, Guanbara Koogan
2. Wolf, N. S. (2010). Comparative Biology of Aging. ISBN 978-90-481-3464-9 Springer.
3. Sapolsky, R. M. (2018). Comportamento - A biologia humana no nosso melhor e pior (1 ed. ). Lisboa: Temas e Debates Circulo Leitores.
4. Matt R. Kaeberlein, George M. Martin, (2016) Handbook of the Biology of Aging (Eighth Edition) Academic Press
5. Fahy, G. M. , West M. D. , Coles, L. . , Harris, S. B. (2010). The Future of Aging\_ Pathways to Human Life Extension. ISBN 978-90-481-3998-9 Springer

### Teaching and learning methods

- Theoretical classes: explanatory and reflective lessons using the available audio-visual aids. Theoretical-Practical classes: Bibliographic research and document analysis.

### Assessment methods

1. Final Written Exam and written work - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 70% (Includes all programmatic items)
  - Development Topics - 30% (Written work on a topic within the Biology of Aging)
2. Continuous evaluation: - (Regular, Student Worker) (Final)
  - Intermediate Written Test - 35% (Mid-term written test)
  - Development Topics - 30% (Written work on a topic within the Biology of Aging)
  - Intermediate Written Test - 35% (Mid-term written test)
3. Final Written Exam - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 100% (Includes all programmatic items)

**Language of instruction**

Portuguese, with additional English support for foreign students.

**Electronic validation**

Sílvia Filipa Alves Beato Salvador Salvador	Carina de Fatima Rodrigues	Ana Maria Nunes Português Galvão	Adília Maria Pires da Silva Fernandes
12-05-2024	23-05-2024	23-05-2024	31-05-2024