

Course Unit	Biology of Aging	Field of study	Biology and Biochemistry
Bachelor in	Gerontology	School	School of Health
Academic Year	2022/2023	Year of study	1
Type	Semestral	Semester	2
Level	1-1	ECTS credits	5.0
Code	9833-346-1202-00-22		
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) Carina de Fatima Rodrigues, Ricardo Jorge Fernandes

### 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. Kaeblerlein, 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			
Carina de Fatima Rodrigues, Ricardo Jorge Fernandes	Hélder Jaime Fernandes	Ana Maria Nunes Português Galvão	Adília Maria Pires da Silva Fernandes
09-05-2023	23-05-2023	24-05-2023	28-06-2023