COURSE DATA

DATA SUBJECT

Code: 34501
Name: Physiology of aging
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1204 - Degree in Medicine	Facultat de Medicina i Odontologia	3	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1204 - Degree in Medicine	Optional subjects	ELECTIVES

COORDINATION

BORRAS BLASCO CONSUELO

SUMMARY

The subject of Physiology of Ageing has as the general objective the knowledge of physiological changes in the body and of the physical and chemical laws governing these functions; the acquisition of the necessary methodology for its study; and the skills development versus maintenance of health, prevention and treatment of a growing sector of the population, the elderly.

On this subject the functional changes of different organs and organ systems with ageing and the changes they undergo both elderly men and women are studied.

Physiology of Ageing is very important for the study of preventive and curative medicine.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

COMPETENCES / LEARNING OUTCOMES

1204 - Degree in Medicine

Acknowledge diversity and multiculturality.

Capacity for communicating with professional circles from other domains.

Consideration of ethics as a fundamental value in the professional practise.

Criticism and self-criticism skills.

Proper organisation and planning of the workload and timing in professional activities.

Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.

Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.

Team-working skills and engaging with other people in the same line of work or different.

Understand and recognise the effects of growth, development and aging which affect individuals and their social environment.

Working capacity to function in an international context.

DESCRIPTION OF CONTENTS

1. Introduction: ageing as a stage of the life-cycle.

Stages of prenatal and postnatal life. Periods of maturity and ageing. Physiological, clinical and intervention considerations.

2. Demographic, comparative and differential ageing.

Demography of ageing. Comparative physiology of ageing. Differential ageing in humans.

Degenerative changes in cells and cell death. Complexity of of pathology in ageing. Diseases of ageing.

3. Ageing and disease.

Disuse and ageing.

4. Theories of ageing.

Genetic and environmental interactions in ageing. Molecular theories. Cell theories. Systems theories.

5. Cancer and aging

Converging mechanisms and divergent mechanisms between cancer and aging. Role of p53, arf and oxidative stress

6. Ageing of immune system.

Thymus and thymosin. Ageing of cellular constituents. Reversibility of immune dysfunction with age.

7. Ageing of endocrine control systems.

Rating endocrine function. Adrenal cortex. Adrenal medulla. Hypophysis. Neuroendocrine and immune responses to stress of ageing.

8. Ageing of nervous system: biochemical, structural and functional changes.

Neuronal cell loss. Dendritic loss. Synaptic changes. Accumulation of lipofuscin. Neutritic plaques and neuro-fibrillar agglomerates. Neurotransmission and cellular communication. Neuro-trophic factors. Motor changes. Changes in sleep and wakefulness. Memory and ageing. Senile dementia.

9. Ageing of sensory systems.

Vision. Hearing. Somatic sensations. Olfaction. Taste.

10. Menopause and andropause: a physiological phenomenon.

Functional characteristics of menopause. Endocrinology of menopause. Effects of oestrogen deprivation on the response of target organs. Risks and benefits of hormone replacement therapy. Loss of fertility age dependent. Changes in testes related to age. Responses of testes to gonadotropin stimulation. Sexual function.

11. Ageing of the thyroid gland and basal metabolism.

Structural changes in the hypothalamic-hypophy thyroid axis. Endocrine pancreas and metabolism of carbohydrates and glucides. Ageing of endocrine pancreas. Glucagon changes with ageing. Ageing and diabetes mellitus. Ageing of gastrointestinal tract and liver. Gastrointestinal tract: physiological and pathological changes associated with age. Ageing of exocrine pancreas. Ageing of liver. Ageing of blood cells. Ageing of hematopoietic system.

12. Cardiovascular disorders with age: atherosclerosis, coronary artery disease and hypertension.

Causes and pathology. Plasma lipoproteins. Ageing of breathing. Lung changes associated with ageing. Respiratory disorders in old age. Kidney, lower urinary tract, prostate and body fluids. Age-related changes in renal function. Ageing prostate. Distribution of water and electrolyte, and acid-base balance.

13. Ageing of bones, joints and muscles.

Ageing of skeleton. Ageing of joints. Ageing of striated muscle. Responses of aged striated muscle to exercise. Ageing of cardiac muscle.

14. Frailty and dependence.

Concept of frailty. Frailty criteria. Dependence and old age.

15. Skin and connective tissue: changes with ageing.

Ageing of skin. Ageing of skin appendages. Ageing of collagen.

16. Drug treatment in the elderly.

Physiological changes that affect pharmacokinetics and pharmacodynamics. Adverse drug reactions in the elderly. General guidelines.

17. Considerations for a healthy ageing. "Anti-ageing" medicine.

Effects of diet on ageing. Models of dietary restriction. Antioxidant supplementation. Wellness and health promotion. Future prospects in biomedical gerontology.

18. SEMINARY PRACTICAL LESSONS

1. Aging and oxidative stress: Longevity differences between males and females.
2. Longevity-related genes.
3. Stem cells and aging.
4. Possible interventions against Alzheimer's disease.
5. Assessment of sensitivity in aging.
6. Assessment of reflexes in aging.
7. Vision and hearing assessment in aging.
8. Study of cardiovascular responses and adaptations to exercise in aging.
9. Study of respiratory responses and adaptations to exercise in aging.
10. Assessment of frailty in the elderly.

Likewise, a contest will be held to resolve issues after the presentation of the seminars on the subject of the physiology of aging. The objective is to promote attention and active participation of students in seminars. The free Kahoot smartphone application will be used. We will pose 5 multiple-choice questions at the end of the seminar presentation that the students must answer individually in the shortest possible time. Not only will it be taken into account that they answer the question correctly, but also the time it takes to answer.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	19,00
Seminar	26,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	26,00
Independent study and work	34,50
Preparation of lessons	0,00
Preparation for assessment activities	7,00
Resolution of case studies	0,00
Total hours	**67,50**

TEACHING METHODOLOGY

In the **theoretical lessons**, the teacher will expose, through master class, the most important concepts and contents in a structured way, to obtain the knowledge and skills that the students must acquire. The students' participation will be encouraged. The teaching materials used by the professor will be available, if he considers it appropriate, through the electronic resource Aula Virtual.

Classroom practices: **seminars.** In reduced groups, the professor will set specialized topics in depth, cases studies, bibliography management, current topics… the group work and the oral presentation will be encouraged. It could be understood as "cooperative learning".

The gender perspective, the respect for diversity, and the sustainable development goals (SDGs) will be incorporated into teaching, whenever possible.

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EVALUATION

Theoretical evaluation: 50% of the final grade. It will be carried out by means of a written test that will deal with the contents of the theoretical program and will have the objective of evaluating the acquisition of knowledge. The test will consist of 30 multiple choice questions with 3 possible answers. Each wrong answer will subtract 1/3 of the final mark of the test. Blank answers will not subtract.

Practical evaluation: 50% of the final mark. It will be carried out through the evaluation of the Participation in the different 20% activities: (10% seminar presentation, 10% result of the question resolution contest) and with the completion of a test that evaluates the acquisition of skills related to general and specific (30%). The test will consist of 15 multiple choice questions with 3 possible answers. Each wrong answer will subtract 1/3 of the final mark of the test. Blank answers will not subtract.

A continuous evaluation will also be carried out.

Attendance at practical activities is mandatory. The student is considered to meet this requirement if he or she has attended a minimum of 80% of these activities and has adequately justified the impossibility of attending the remaining sessions due to the occurrence of a cause of force majeure. It will be essential to comply with this requirement to pass the subject.

The subject is passed with a 5, and it is not necessary to pass each part (theory and practices separately).

It is a requirement to access the advance call for this subject that the student has completed all of his practices.

Students are reminded of the importance of conducting evaluation surveys to the entire teachers of degree subjects.

REFERENCES

- Guyton AC, Hall JE (2011). Tratado de Fisiología Médica. 13ª ed. Madrid. Ed. Elsevier.
- Paola S. Timiras (1997) Bases fisiológicas del envejecimiento y geriatría. 2ª ed. (traducida) Barcelona. Ed. Masson.
- Segura Cardona R (1987). Prácticas de Fisiología. 1ª ed. Barcelona. Ediciones científicas y

técnicas, Masson-Salvat.
- Fox SI (2008). Fisilogía Humana. 8ª ed. Madrid. Ed. McGraw-Hill Interamericana de España S.A. U.
- ENLACE DE INTERÉS: Sociedad Española de Geriatría y Gerontología www.segg.es/
- RECURSOS e-Salut:

  - ClinicalKey Student Medicina, Odontologia y Enfermería [https://uv-es.libguides.com/RecursosSalut]
  - Acces Medicina [https://uv-es.libguides.com/Access_Medicina]
  - Médica Panamericana [https://uv-es.libguides.com/Medica_Panamericana]