COURSE DATA

DATA SUBJECT

Code: 33207
Name: Human physiology and exercise
Cycle: Undergraduate Studies
ECTS Credits: 9
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1312 - Degree in Physical Activity and Sport Sciences	Facultat de Ciències de l'Activitat Física i Esports	1	Annual
1331 - Degree in Physical Activity and Sport Sciences (Ont)	Facultat de Ciències de l'Activitat Física i Esports	1	Annual

SUBJECT-MATTER

Degree	Subject-matter	Character
1312 - Degree in Physical Activity and Sport Sciences	Physiology	BASIC
1331 - Degree in Physical Activity and Sport Sciences (Ont)	Fisiología	BASIC

COORDINATION

GOMEZ CABRERA M CARMEN

SUMMARY

The goal of Physiology is to study the nature of a living organism in a functional way. Thus, we aim to study the function of different tissues, organs, and systems, and their regulation and interaction in the living beings.

Exercise Physiology is the science that aim to study the functioning of different tissues, organs, and systems in living beings during exercise, since the molecular and cellular level to the higher level of integration. The interrelation between the different systems and with the environment and the regulation mechanisms that make the practice of physical exercise possible are also being studied in exercise physiology at present. Moreover, exercise physiology deals with the structural and functional modifications as a consequence of exercise training.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

A basic knowledge in Biology, Physics and Chemistry is advisable.

COMPETENCES / LEARNING OUTCOMES

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Apply information and communication technologies (ICTs) in the field of physical activity and sport sciences.

Apply physiological principles to the different fields of physical activity and sport.

Apply the principles of fundamental rights, gender equality, equal opportunities, universal accessibility for people with disabilities, the culture of peace and democratic values.

Evaluate physical fitness and prescribe health-oriented physical exercises.

Identify health risks derived from inappropriate physical and sporting activities and propose alternatives.

Know and understand the effects of the practice of physical exercise on the function of the human body.

Know and understand the fundamentals of physical fitness for physical activity and sport.

Know and understand the physiological factors that determine the practice of physical activity and sport.

Plan, implement and evaluate physical activity and sports programmes targeted at special populations.

Promote and evaluate the acquisition of enduring and autonomous habits of practising physical activity and sport.

Understand the scientific literature in the field of exercise physiology, in English and in other languages with significant presence in science.

Use the sources of certified scientific knowledge in the field of physical activity and sport sciences.

DESCRIPTION OF CONTENTS

UNIT 1. Introduction to Human and Exercise Physiology
UNIT 2. Internal environment. Homeostasis. Body fluids
UNIT 3. Transport of substances through the cell membrane
UNIT 4. Membrane potentials and action potentials

1. General Physiology.

UNIT 1. Introduction to Human and Exercise Physiology
UNIT 2. Internal environment. Homeostasis. Body fluids
UNIT 5. Propagation of the cell action potential
UNIT 6. Smooth and cardiac muscle physiology
UNIT 7. Skeletal muscle physiology
UNIT 8. Skeletal muscle fiber types and muscle force

2. Nervous System Physiology.

UNIT 9. Organization of the nervous system
UNIT 10. Autonomic nervous system
UNIT 11. Sensory physiology
UNIT 12. Organization of the motor system
UNIT 13. Nervous control of the motor system
UNIT 14. Superior functions of the nervous system
UNIT 15. Neuromuscular adaptations to exercise

3. Endocrinology.

TEMA 16. Introduction to Endocrinology
TEMA 17. Pituitary hormones and their control by the hypothalamus
TEMA 18. Sexual hormones
TEMA 19. Adrenocortical hormones
TEMA 20. Thyroid hormones. Calcium and phosphate metabolism
TEMA 21. Pancreatic hormones. Glycemic control
TEMA 22. Endocrinological adaptations to exercise

4. Blood Physiology.

TEMA 23. Blood functions and general components
TEMA 24. Erythrocytes. Genesis of blood cells
TEMA 25. Resistance of the body to infection
TEMA 26. Physiology of the hemostasis
TEMA 27. Hematological adaptations to exercise

TEMA 28. Cardiovascular functions and general components
TEMA 29. Electrical activity of the heart. The normal electrocardiogram
TEMA 30. Mechanical activity of the heart. Cardiac output and cardiac cycle
TEMA 31. Arterial, capillary, venous and lymphatic circulation
TEMA 32. Arterial pressure. Exercise modifications

5. Cardiovascular Physiology.

TEMA 28. Cardiovascular functions and general components
TEMA 29. Electrical activity of the heart. The normal electrocardiogram
TEMA 30. Mechanical activity of the heart. Cardiac output and cardiac cycle TEMA 33. Cardiovascular adaptations to exercise. Cardiovascular regulation

6. Respiration.

TEMA 34. Respiratory physiology. Pulmonary ventilation
TEMA 35. Diffusion of oxygen and carbon dioxide through the respiratory membrane
TEMA 36. Transport of oxygen in blood
TEMA 37. Transport of carbon dioxide in blood
TEMA 38. Respiratory adaptations to exercise. Respiratory regulation

7. Kidneys.

TEMA 39. Introduction to the kidneys physiology. Glomerular filtration
TEMA 40. Tubular functions
TEMA 41. Renal regulation of fluid osmolarity and sodium concentration
TEMA 42. Regulation of acid-base balance
TEMA 43. Renal function and physical exercise

8. Exercise physiology.

TEMA 44. Exercise metabolism I
TEMA 45. Exercise metabolism II
TEMA 46. Energetics and metabolic rate in basal conditions and during exercise
TEMA 47. Energy expenditure at rest and during exercise
TEMA 48. Oxygen consumption
TEMA 49. Anaerobic thershold
TEMA 50. Laboratory tests in exercise physiology
TEMA 51. Muscle fatigue
TEMA 52. Exercise performance: Ergogenic aids
TEMA 53. Exercise performance: Doping
Seminar 1
Seminar 2
Seminar 3

Practice 1.- Study of the membrane potential (2 hours)
Practice 2.- Study of the skeletal muscle physiology (2 hours)
Practice 3.- Anthropometry I (2 hours)

9. Laboratory programme

Practice 1.- Study of the membrane potential (2 hours)
Practice 2.- Study of the skeletal muscle physiology (2 hours)Practice 4.- Anthropometry II (2 hours)
Practice 5.- Exploration of the nervous system I (2 hours)
Practice 6.- Exploration of the nervous system II (2 hours)
Practice 7.- Cardiac auscultation (2 hours)
Practice 8.- Blood pressure measurement (2 hours)
Practice 9.- Electrocardiography (2 hours)
Practice 10.- Cardiovascular adaptations to exercise (2 hours)
Practice 11.- Spirometry simulation (2 hours)
Practice 12.- Respiratory adaptations to exercise simulation (2 hours)
Practice 13.- Maximal oxygen consumption (2 hours)

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	60,00
Laboratory	30,00
Total hours	**90,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	52,00
Independent study and work	67,00
Preparation of lessons	0,00
Preparation for assessment activities	16,00
Resolution of case studies	0,00
Total hours	**135,00**

TEACHING METHODOLOGY

Our subject contents will be divided into two sections that will be developed coordinately (human an exercise physiology). The theoretical content in each section will be developed in the lectures. The practical content will be underpinned in the theoretical concepts. We will follow no more than two reference books in our subject.

Taking into account both the theoretical and the practical classes we will suggest that the students develop of an individual/group project that will be guided during the supporting seminars. The students will share their doubts with the other students and with the professor during the seminars. Moreover, the students have to develop their own personal study work to achieve competence in physiology. The students'

projects will be made public.

EVALUATION

The following evaluation system will be used to respond to the assessment of the competences involved in this matter:

1. Preparation and presentation of the seminar (10% of the final grade)

2. Final theoretical exam with 50 test questions (70% of the final grade)

3. Final practice exam with 10 test questions (10% of the final grade)

4. Attendance and / or completion of practical activities (10% of the final grade)

In case of not passing the two exams that will be taken, the rest of the marks obtained by the student will not be added and, therefore, it will not be possible to pass the subject that is passed with a minimum of 5

REFERENCES

- Segura Cardona R (1987). Prácticas de Fisiología. 1ª ed. Barcelona. Ediciones científicas y técnicas, Masson-Salvat. -Fox SI (2008). Fisiología Humana. 8ª ed. Madrid. Ed. McGraw-Hill Interamericana de España S.A.U.

- Guyton AC, Hall JE (2006). Tratado de Fisiología Médica. 12ª ed. Madrid. Ed. Elsevier. -López-Chicharro J, Fernández-Vaquero A (2009). Fisiología del Ejercicio. 3ª ed. Panamericana