

**COURSE DATA****Data Subject**

Code	33207
Name	Human physiology and exercise
Cycle	Grade
ECTS Credits	9.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1312 - Degree in Physical Activity and Sport Sciences	Faculty of Physical Education and Sport Sciences	1	Annual
1331 - Degree in Physical Activity and Sport Sciences (Ontinyent)	Faculty of Physical Education and Sport Sciences	1	Annual

Subject-matter

Degree	Subject-matter	Character
1312 - Degree in Physical Activity and Sport Sciences	6 - Physiology	Basic Training
1331 - Degree in Physical Activity and Sport Sciences (Ontinyent)	6 - Fisiología	Basic Training

Coordination

Name	Department
GAMBINI BUCHON, JUAN	190 - Physiology
GOMEZ CABRERA, M. CARMEN	190 - Physiology
MONSALVE VILLALBA, ELENA	190 - Physiology

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.

OUTCOMES

1312 - Degree in Physical Activity and Sport Sciences

- Gain basic scientific training applied to physical activity and sport in their diverse forms.
- Know and understand the physiological and biomechanical factors that determine the practice of physical activity and sport.
- Apply the principles of fundamental rights, gender equality, equal opportunities, universal accessibility for people with disabilities, solidarity, environmental protection, the culture of peace and democratic values.
- Apply physiological, biomechanical, behavioural and social principles to the different fields of physical activity and sport.
- Identify health risks derived from inappropriate physical and sporting activities and propose alternatives.
- Understand the scientific literature in the field of physical activity and sport in English and in other languages with significant presence in the scientific field.
- Use the sources of certified scientific knowledge in the field of physical activity and sport sciences.
- Develop capacities to act under the ethical principles required for proper professional practice.
- Know and understand the physiological factors that determine the practice of physical activity and sport.
- 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.



- Promote and evaluate the acquisition of enduring and autonomous habits of practising physical activity and sport.
- Plan, implement and evaluate physical activity and sports programmes targeted at special populations.
- Apply physiological principles to the different fields of physical activity and sport.
- Identify health risks derived from inappropriate physical and sporting activities and propose alternatives.
- Evaluate physical fitness and prescribe health-oriented physical exercises.
- Understand the scientific literature in the field of exercise physiology, in English and in other languages with significant presence in science.
- Apply information and communication technologies (ICTs) in the field of physical activity and sport sciences.
- Use the sources of certified scientific knowledge in the field of physical activity and sport sciences.
- Apply the principles of fundamental rights, gender equality, equal opportunities, universal accessibility for people with disabilities, the culture of peace and democratic values.

LEARNING OUTCOMES

English version is not available

DESCRIPTION OF CONTENTS

1. General Physiology.

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
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
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

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 31. Arterial, capillary, venous and lymphatic circulation

TEMA 32. Arterial pressure. Exercise modifications

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 threshold
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

9. Laboratory programme.

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)
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**

ACTIVITY	Hours	% To be attended
Theory classes	60,00	100
Laboratory practices	30,00	100
Attendance at events and external activities	0,00	0
Development of group work	22,00	0
Development of individual work	30,00	0
Study and independent work	57,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	14,00	0
Preparing lectures	0,00	0
Resolution of online questionnaires	2,00	0
TOTAL	225,00	

TEACHING METHODOLOGY

Our subject contents will be divided into two sections that will be developed coordinately (human and 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

Basic

- 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

Additional

- 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.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

ADENDA A LA GUÍA DOCENTE MOTIVADA POR COVID 19

1. Contents of the subject

The contents will be maintained

2. Workload and temporary planning of teaching

The student's total workload and the subject schedule will be maintained.

3. Teaching methodology

The classes will be held by virtual teaching

4. Evaluation

The evaluation will be performed by virtual methods. The exam will be performed online on the same dates established in the teaching guide.

5. Bibliography



It will be maintained.

Addendum to the teaching guide for the 2nd term of the academic year 2020/2021:

The teaching from February 2021 will start on 8 February, in online and synchronous mode, and will be maintained until the Consell de Govern de la Universitat de València reports on its completion and/or modifications.