

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

<b>Code</b>	33207
<b>Name</b>	Human physiology and exercise
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	9.0
<b>Academic year</b>	2019 - 2020

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
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**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
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**

<b>Name</b>	<b>Department</b>
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

### 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



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UNIT 15. Neuromuscular adaptations to exercise

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**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

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**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

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**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

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**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

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**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

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## **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. Oxygen consumption  
TEMA 48. Anaerobic threshold  
TEMA 49. Laboratory tests in exercise physiology  
TEMA 50. Water and electrolytes metabolism during exercise  
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 action potential (2 hours)  
Practice 3.- Exploration of the nervous system I (2 hours)  
Practice 4.- Exploration of the nervous system II (2 hours)  
Practice 5.- Cardiac auscultation (2 hours)  
Practice 6.- Blood pressure measurement(2 hours)  
Practice 7.- Electrocardiography (2 hours)  
Practice 8.- Spirometry (2 hours)  
Practice 9.- Anthropometry I (2 hours)  
Practice 10.- Anthropometry II (2 hours)  
Practice 11.- Cardiovascular adaptations to exercise (2 hours)  
Practice 12.- Respiratory adaptations to exercise (2 hours)  
Practice 13.- Maximal oxygen consumption (2 hours)  
Practice 14.- Anaerobic capacity (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
<b>TOTAL</b>	<b>225,00</b>	

**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 students' marks will be obtained as follows:

- 1.- Exposition of the projects developed in the seminars (10% of the final mark)
- 2.- Theoretical exam with 60 test questions (4 from seminars, 7 from the practicum and 49 from the lectures)(90% of the final mark)

The attendance to 100% of the practicum will exempt the students from doing a practical exam. If the practical exam is taken it will be evaluated with the following criteria: "pass" or "fail".



The attendance to 100% of the practicum will exempt the students from doing a practical exam. If the practical exam is taken it will be evaluated with the following criteria: “pass” of “fail”.

## 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 - 2º CUATRIMESTRE (1º y 2º CONVOCATORIA)***

Adaptaciones para la evaluación de la Primera y Segunda Convocatoria del segundo cuatrimestre curso 2019/2020 motivadas por COVID-19:

#### 1. Contenidos

Debido a la situación de desaparición de la docencia presencial se van a priorizar los contenidos de las prácticas y los seminarios de la asignatura.

Se reducen los contenidos teóricos inicialmente recogidos en la guía docente seleccionando los conceptos indispensables para adquirir las competencias.



## 2. Volumen de trabajo y planificación temporal de la docencia

Se reduce el peso de las clases teóricas y se aumentará el peso asignado a las prácticas de la asignatura y a los seminarios.

No se mantienen los horarios y se da libertad al estudiante para realizar las tareas programadas de acuerdo a un horario establecido de antemano por los profesores.

## 3. Metodología docent

Se cargará el material de prácticas y se recepcionarán los seminarios a través del Aula Virtual.

Las tutorías se atenderán a través del correo electrónico.

## 4. Evaluación

Adaptaciones para la evaluación de la Primera y Segunda Convocatoria del segundo cuatrimestre curso 2019/2020 motivadas por COVID-19:

Examen teórico: 40% de la calificación final.

Asistencia a las prácticas y realización de las actividades de prácticas (30%)

Trabajo de seminario: 30%. De éste se valorarán: aspectos estéticos, aspectos estructurales, aspectos de contenido, actualidad y calidad del mismo.