



UCAM
UNIVERSIDAD
CATÓLICA DE MURCIA

2018/2019 Course Guide

Sports Physiology

Bachelor's in Physical Activity and Sports Science

Mode: On Campus

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Sports Physiology

Module: **Basic Sciences.**

Subject: **Sports Physiology.**

Level: **Biological Sciences.**

No. of Credits: **6 ECTS**

Academic Session: **Second Course – Quarterly**

Course Professor: **Carmen Daniela Quero Calero.**

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Professor coordinating the Module, Subject, or Course: **Carmen Daniela Quero Calero**

Brief Description

Sports physiology aims to provide students with the knowledge of various functioning physiological systems that make up the body, providing also the effects and adaptations that occur when performing physical activity. It is important to know this series of concepts to know later on how to plan evidence-based practice and to be able to identify any effects and adaptations that occur within the body.

Therefore, sports physiology intends to give students the knowledge and understanding of physiological factors that influence the practice of sport and physical activity. With this, they can apply these physiological principles to different areas of physical activity and identify the health-related risks which can be caused by improper physical activity.

This course is related to the overall objectives of the degree, including, "knowledge and understanding in an area of study based on general secondary education that reaches a level that includes knowledge from the forefront of the field of Physical Activity and Sport Science"; "to transmit information, ideas, problems and solutions to both specialized and non-specialized audiences"; and "to apply the knowledge gained to their work in a professional manner and to possess the skills necessary for preparation and defense of arguments and resolution of problems within the area of Physical Activity Sciences and Sports."

Prerequisites

There are no prerequisites

Objectives

1. To know the functioning of the organs and the systems of the human body.
2. To know the acute and chronic responses that exercise causes in the organs and systems of the human body.
3. To apply the physiology of sports to the design of fitness programs in different fields and populations.
4. To know the different systems of measurement and interpretation of results in the field of physical exercise.

Competencies and Learning Outcomes

Interdisciplinary Competencies

- (CT1) Analysis and synthesis.
- (CT2) Organization and planning.
- (CT3) Oral and written communication in one's native language.
- (CT4) Knowledge of a foreign language.
- (CT6) Managing information.
- (CT7) Problem-solving.
- (CT8) Decision-making.
- (CT9) Teamwork.
- (CT15) Autonomous learning.
- (CT21) Motivation for quality.

Specific Competencies

- (CES1) To know, understand, and know how to adapt physical activity to the structure, functions, and control of the physical-biological systems of the human body.
- (CES2) To apply anatomical, physiological, and biomechanical principles to the different fields of physical activity and sports.
- (CES3) To know, understand, and know how to adapt physical activity to the evolutionary development of the practitioners of physical activity and sports at a physical-biological level.
- (CES7) To know and apply scientific methods in the field of Physical Activity and Sports Sciences.
- (CES9) To know and apply the most common measurements and instrumentation protocols in the field of Physical Activity and Sports Science.
- (CES10) To apply information and communication technologies (ICT) to the field of Physical Activity and Sports Sciences.

UCAM Competencies

- (UCAMT1) To express oneself correctly in Spanish in one's disciplinary field.
- (UCAMT6) To work as a team, interacting with other people from the same of different professional field.
- (UCAMT7) To develop skills in initiating research.

Learning Outcomes

- (RA) To distinguish and relate any implications of the structure, functions, and control of physical-biological systems in performing physical activity and sports.
- (RA) To design physical-motor activities in which the structure, functions, and control of the physical-biological systems of the human body are taken into account.
- (RA) To distinguish and relate activities in which anatomical, physiological, and biomechanical principles are applied in the different fields of physical activity and sport.
- (RA) To design activities in which anatomical, physiological, and biomechanical principles are applied in the different fields of physical activity and sport.
- (RA) To distinguish and know how to relate any evolutionary development in practitioners of physical activity and sport at a physical-biological level and adaptations to physical activity.
- (RA) To design physical-motor activities adapted to the evolutionary development of practitioners of physical activity and sport at a physical-biological level.
- (RA) To understand and distinguish the characteristics of scientific information and how to interpret it.
- (RA) To interpret and use specific scientific literature about physical activity and sport for performance in training and professional activities.
- (RA) To design and use research designs in physical activity and sports for performance in training and professional activities.
- (RA) To understand and distinguish characteristics of the different measurement and instrumental protocols in physical activity and sport.
- (RA) To interpret data obtained from measurements and specific instruments of physical activity and sport.
- (RA) To determine and use the different measurement and instrumental protocols most appropriate in physical activity and sports for performance in training and professional activities.
- (RA) To understand and distinguish any possibilities that different information and communication technologies have in physical activity and sport.
- (RA) To use Information and Communication Technologies (ICT) for performance in training and professional activities.
- (RA) To understand, reason and synthesize content from various fields of knowledge.
- (RA) To manage and organize any information acquired during the learning process.
- (RA) To correctly express oneself orally and in writing in one's native language.
- (RA) To correctly express oneself orally and in writing in at least one foreign language.
- (RA) To organize and know how to use information from different contexts.
- (RA) To acquire the necessary skills for conflict resolution.
- (RA) To decide between different options in a comprehensive and critical way.
- (RA) To acquire and implement collaboration strategies and skills promoting cooperative work.
- (RA) To proactively manage one's learning process.
- (RA) To value the importance of the proper performance in one's work.
- (RA) To correctly use the orthographic and grammatical norms in oral and written language.
- (RA) To collaborate with other professionals, recognizing the different contributions that other areas of knowledge make to the professional practice.
- (RA) To undertake actions promoting interest and motivation for research.

Methodology

Methodology	Hours	Hours of Classroom Work	Hours of Non-Classroom Work
Theoretical Lectures	42	60 hours (40 %)	
Follow-up Tutorials	3		
Seminars and Workshops	0		
Teaching or Laboratory Practicums	12		
Evaluation Activities	3		
Personal Study	60	90 hours (60 %)	
Preparation and Presentation of Projects	30		
TOTAL	150	60	90

Theoretical-Practical Lectures

Presentation of the theoretical-practical content by the professor in the classroom or through audiovisual media. The presentations and/or supporting study material will be made available to the students on the Virtual Campus.

Follow-up Tutorials

Two tutorials will be held throughout the semester to answer questions or problems that come up in the learning process, to direct projects, to review and discuss material and topics presented in class, and to orient students in their projects.

Seminars and Workshops

Topics related to each teaching unit will be addressed. Some theoretical content will be illustrated by computer and/or audiovisual material (documentary) to be discussed later. Group projects done by students will also be presented.

Teaching Practicums

Knowledge acquired in lectures will be applied at a practical level in these practicums. There will be nine practicums in the sports hall.

Autonomous Work

This includes the time the student devotes to the theoretical and practical personal study to assimilate the materials and topics presented in the classes.

Applied Work

This includes the time that the student devotes to the development of the work of the subject.

Syllabus

Theoretical Instructional Program

Teaching Unit I: Introduction to the Course.

Topic 1. General aspects of Sports Physiology

1.1. General Concepts

1.2. The cell as a morphological and fundamental unit of the entire human being.

1.2. Historical review of physiology and sports physiology.

1.3. Acute reactions to exercise and chronic physiological adaptations.

Teaching Unit II: Essential Issues of Movement

Topic 2. The muscular system and muscular control of movement.

2.1. Types of tissue.

2.2. Skeletal muscle tissue.

2.3. Muscular contractions.

2.4. Types of fibers.

2.5. Muscular fibers and movement.

Topic 3. The Nervous System and Neurological Control of Movement.

3.2. Cells of the Nervous System.

3.3. Synapse.

3.4. Organization of the Nervous System.

3.5. Sensorimotor Integration.

3.6. Superior centers of the brain.

3.7. Nervous control of movement.

Topic 4. Neuromuscular adaptations to resistance / counter-resistance training.

4.1. Necessary concepts to develop the topic.

4.2. Mechanisms for strength gain: structural and nervous adaptations.

4.3. Muscular damage.

Course

4.4. Resistance Training.

Teaching Unit III: Energy for Movement.

Topic 6. Energetic systems in sports: metabolism.

6.1. Energy for cellular activity.

6.2. Introduction to metabolism.

6.3. Bioenergetics: Production of ATP

6.4. Measuring energetic use.

6.5. Energy consumption at rest and during exercise.

6.6. Fatigue and its causes.

Topic 7. The endocrine system and hormonal regulation during exercise.

7.1. The nature of hormones.

7.2. Endocrine glands and their hormones.

7.3. Endocrine responses to exercise.

7.4. Hormonal effects on metabolism and energy.

7.5. Hormonal effects on fluid and electrolyte balance during exercise.

Topic 8. Metabolic adaptations in training.

8.1. Adaptations in aerobic training.

8.2. Training of the aerobic system.

8.3. Adaptations in anaerobic training.

8.4. Controlling changes during exercise.

Teaching Unit IV: Cardiorespiratory Function and Performance.

Topic 9. The cardiovascular system and cardiovascular control during exercise.

9.1. Structure and function of the cardiovascular system: Heart.

9.2. Structure and function of the cardiovascular system: Circulatory system.

9.3. Structure and function of the cardiovascular system: Blood.

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9.4. Cardiovascular response to exercise.

Topic 10. The respiratory system and respiratory regulation during exercise.

10.1. Pulmonary ventilation.

10.2. Pulmonary diffusion.

10.3. Transportation of oxygen and carbon dioxide.

10.4. Gas exchange in muscles.

10.5. Regulation of pulmonary ventilation.

10.6. Ventilation and energetic metabolism.

10.7. Respiratory regulation of acid-base balance.

10.8. The pulmonary system as a limitation of performance in resistance training exercises.

Topic 11. Cardiorespiratory adaptations in training.

11.1. Resistance capacity

11.2. Evaluation of resistance

11.3. Cardiovascular adaptations in training

11.4. Respiratory adaptations in training

11.5. Metabolic adaptations

11.6. Long-term improvement to resistance

11.7. Factors that influence the response to aerobic training

11.8. Cardiorespiratory resistance and performance

Practical Instructional Program

Laboratory Practicum 1. Systems for measuring body composition: anthropometry.

Laboratory Practicum 2. Evaluation systems of the neuromuscular system: electromyography and muscle ultrasound.

Laboratory Practicum 4. Determination of the capacity of the respiratory system I: spirometry.

Laboratory Practicum 5. Evaluation of the heart contraction and its variability: Electrocardiogram.

Laboratory Practicum 6. Determination of the capacity of the respiratory system II: stress tests.

Relationship to Other Courses in the Study Plan

The Sports Physiology Subject is directly related to the other subjects in the Biological Sciences module.

Sports Physiology is related to the other subjects in the Applied Sciences and Motor Skills module, especially the subjects of Methodology, Planning and Control of Sports Training.

Grading System

For the February/June/September Sessions:

- **Theoretical Part:** 70% of the total grade.

Written tests: 70% of the total grade. Students who exceed 60% class attendance: In this case the theoretical part of the subject will be evaluated in two eliminatory partial exams, which must each be passed independently. The value of each exam will be: the first partial 35% and the second partial 35%.

- **Practical Part:** 30% of the total grade.

Practical part: 20% of the grade for the practical workshops and for the work dynamic developed in the seminars and workshops and 10% of the grade from a group research project or from the application of the theoretical content of the course

In order to pass the subject, at least half of the score of each of the assessment instruments must be obtained.

The student shall pass the subject when the weighted average is equal to or greater than 5 points and all the parts that make up the grading system have been passed, with an overall weight equal to or greater than 20%.

If the student has less than 5 in any of the parts with a weight equal to or greater than 20%, the subject will be suspended, and the student must retake the part(s) in the next session within the same academic year. The suspended part(s) in official sessions (February/June) will be saved for successive sessions that are held in the same academic year.

In the case that the subject is not passed in the September session, the passed parts will not count for successive academic years.

Course

The **grading system** (RD 1.125/2003. of September 5) shall be the following:

0-4.9 Suspended (SS)

5.0-6.9 Passed (AP)

7.0-8.9 Excellent (NT)

9.0-10 Outstanding (SB)

Honorable mention may be granted to students who have earned a grade equal to or greater than 9.0. This number may not exceed 5% of the total number of students enrolled in a subject in the corresponding academic year, unless the number of students enrolled is less than 20, in which case only a single honorable mention may be granted.

Bibliography and Reference Sources

Basic Bibliography

- Baechle, T. R. (2008). *ER: Essentials of strength and conditioning. NSCA 3rd Edition* Human Kinetics.
- Kenney, W. L., Wilmore, J., & Costill, D. (2011). *Physiology of sport and exercise 5th Edition.* Human kinetics.

Additional Bibliography

- McArdle, W.D., Katch, F.I. y Katch, V.L. (2004). *Fundamentos de fisiología del ejercicio. [Foundations of the Physiology of Exercise.]* Madrid: McGraw-Hill.
- Åstrand, P.O., Rodahl, K., Dahl, Hans A., Strømme, S.B. (2010). *Manual de fisiología del ejercicio. [Manual of the Physiology of Exercise.]* Barcelona: paidotribo.
- Merí, A. (2005). *Fundamentos de Fisiología de la Actividad Física y del Deporte. [Foundations of the Physiology of Physical Activity and Sports.]* Madrid: Panamericana.
- Mora, R. (2009). *Fisiología del deporte y el ejercicio, prácticas de campo y laboratorio. [The Physiology of Sports and Exercise, field and laboratory training.]* Madrid: Panamericana.
- Haff, G. y Dumke, C. (2012). *Laboratory Manual for exercise physiology.* United States: human Kinetics
- Calderón, J. (2007). *Fisiología aplicada al deporte. [Physiology Applied to Sports.]* Madrid: Tébar.
- Pocock, G. y Richards, C. (2005). *Fisiología humana la base de la medicina. [Human Physiology as a Basis in Medicine.]* Barcelona: Masson.
- Mulrone, S.E. y Myers, A.K. (2011). *Netter, fundamentos de fisiología. [Netter, Foundations in Physiology.]* Barcelona: Elsevier masson.
- Guyton, A.C. y Hall, J.E. (2007). *Compendio de fisiología médica. [An Overview of Medical Physiology.]* Madrid: Elsevier.

Related Websites

Culture, Science, and Sports Magazine; <http://www.ucam.edu/ccd>
The Spanish Federation of Sports Medicine; <http://www.femedes.es/>
Online Book Viewer; <http://books.google.es/>
The Library Department of the UCAM; <http://www.ucam.edu/biblioteca/>

Study Recommendations

It is recommended that students use the resources and tools at their disposal (Virtual Campus, digital material, etc.) which will allow for follow-up and a greater understanding of the subject.

Likewise, it is advisable to create work groups and discussion groups, to carry out the work, tasks, and other activities necessary to pass the subject, providing the student with a criterion that allows them to assess and evaluate aspects related to sports physiology.

It is also recommended that students do additional work alongside the syllabus proposed by the professor for a better understanding and adequate follow-up of the contents presented in class, in addition to the creation of discussion forums (available on the campus) about the content of the subject, which will allow for an exchange of information in a fluid way between the teacher and students.

Lastly, students are recommended to attend class and participate actively in the process. In the bibliography previously mentioned and with the instructions from the professor during class, students will be able to obtain complementary material that will allow them to go deeper into the topic of sports physiology.

Teaching Materials

The teaching materials that will be used in this subject to facilitate the acquisition of competencies are:

- Presentations (PowerPoint), which the professor will use as a guide (not as notes for the subject). Students should prepare their own notes using all the teaching materials described here.
- Scientific articles, which will be shared through the Virtual Campus and which will be related to the specific topics. The forum and social networks (Twitter) will be used to ask questions of reflection and practical application for each of the articles.
- Supporting documents, which will also be shared through the Virtual Campus or students will be asked to look for them through information and communication technologies. They will also be related to each topic.

Tutorials

Brief Description

Academic Tutoring

In academic tutorials, the focus will be to work on Decree No. 359/2009, of October 30th, which establishes and regulates an educational response to the diversity of students in the Autonomous Community of the Region of Murcia. Attending the academic tutorials is fundamental in knowing the purpose and the use of all the teaching materials and the regulations of this subject. With these, it is intended to guide and advise the student in the teaching-learning process and to contribute to the consolidation of knowledge, abilities, skills, capabilities, and attitudes related to the transversal or general competencies such as group work, oral and written communication, values, and professional deontology and autonomous learning in the student.

Personal Tutoring

The University also has a Special Body of Tutors that conducts personal tutoring with the students enrolled in the degree. The personal tutor accompanies the students throughout the university phase. You can check the following link:

<http://www.ucam.edu/servicios/tutorias/preguntas-frecuentes/que-es-tutoria>