

1. BASIC INFORMATION

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| Course | Module 1: Exercise Physiology and Biochemistry |
| Degree Program | Master's Degree in Sports Training and Nutrition |
| School | Real Madrid Graduate School/School of Sports Sciences |
| Year | First |
| ECTS | 2 ECTS |
| Credit type | Mandatory |
| Language | English |
| Delivery Mode | Campus-Based |
| Semester | Annual |
| Academic Year | 2020/2021 |
| Coordinating professor | Dr. HELIOS PAREJA/ALFREDO SANTALLA |

2. PRESENTATION

“Exercise Physiology and Biochemistry” is the first module in the program and is worth 2 ECTS. This module comprises biochemistry and human physiology content related to physical exercise and sporting performance.

Through campus-based classes, lab practice and self-study, students learn about the relationships between food, energy production and the human body, how force is transmitted and applied in sporting movements, exercise in hot and humid conditions, and how to analyze cardiovascular and respiratory responses to different physical workloads.

The grade for this module is based on lab practice, group work and a multiple-choice exam.

3. COMPETENCIES AND LEARNING OUTCOMES

Core competencies:

- *CB1. Students should possess and understand knowledge that provides a basis or opportunity to be innovative in the development and/or application of ideas, often in a research context.*

- *CB2. Students should be able to apply their acquired knowledge and problem-solving ability in new or little-known environments within broader (or multidisciplinary) contexts related to their area of study.*
- *CB3. Students should be able to integrate knowledge and tackle the complexity of formulating judgements based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities related to the application of their knowledge and judgements.*
- *CB4. Students should be able to communicate their conclusions –and the ultimate reasons that support them– to specialized and non-specialized audiences in a clear and unambiguous way.*
- *CB5. Students should possess learning skills that allow them to continue studying in a largely self-directed or autonomous way.*

Cross-curricular competencies:

- *CT1. Self-learning skills:* being able to choose the most effective strategies and tools at the most appropriate time to learn and autonomously put our learning into practice.
- *CT3. Capacity to adapt to new situations:* being able to assess and understand different situations, adapting our own approach insofar as is necessary or appropriate.
- *CT6: Interpersonal skills:* being able to interact positively with other people by verbal and non-verbal means through assertive communication, this being the ability to express or transmit what one wants, thinks or feels without inconveniencing, insulting or upsetting the other person.
- *CT7. Responsibility:* being able to fulfill the commitments a person makes to themselves and to others when performing a task and trying to achieve a set of goals as part of the learning process. The ability of any individual to acknowledge and accept the consequences of their own actions.
- *CT8. Information management:* being able to find, select, analyze, and integrate information from different sources.
- *CT9: Teamwork: being able* to participate and cooperate actively with other people, areas and/or organizations in order to achieve common goals.
- *CT10. Initiative and entrepreneurial spirit: being able* to decisively undertake difficult or risky actions. The ability to anticipate problems, suggest improvements and persevere

in carrying them out. A preference for initiating activities and seeing them through to completion.

Specific competencies:

- CE1. Having in-depth knowledge of how the human organism adapts to different physical loads in individuals of different ages and performance levels, or that belong to special population groups.
- CE2. Analyzing and applying physiological, biomechanical, psychological and social principles to different sporting fields and nutrition, identifying unsuitable practices that represent a health risk, in order to avoid them and correct them in the different types of population.
- CE3: Understanding and knowing how to access scientific documentation related to the areas of human performance and sports nutrition.
- CE6: Designing and carrying out research in the field of sports and nutrition, contributing new knowledge in a specific area of scientific and social interest, respecting ethical limits and values.
- CE7: Exchanging knowledge and leading research and development projects with the rest of the scientific community, based on a cooperative and multidisciplinary approach.
- CE9: Diagnosing level of physical fitness, motor skills and nutritional health in order to be able to design training programs and provide nutritional advice applicable to different sporting specialties and performance levels.
- CE11. Acquiring knowledge independently (self-learning).

Learning outcomes:

The ways in which energy is produced and transmitted by food and the human body.

- RA1. The ways in which force is produced, applied and transmitted in each sporting activity or movement.
- RA2. The responses of the human body to different physical workloads in situations of extreme heat and humidity.
- RA3. Identification of the mode of interaction and predominance of each energy pathway during response to different physical workloads, sport or specialty.
- RA4. Analysis of cardiovascular and respiratory responses to different physical workloads.

- RA5. Differentiation of adequate and inadequate cardiovascular, respiratory and muscular responses to different physical workloads of population groups classified by age, sex, performance level and sporting specialty.

The table below shows the relationship between the competencies developed in the course and the learning outcomes pursued:

| Competencies | Learning outcomes |
|--|-------------------|
| CB1, CB2, CB3, CB4, CB5 CT1; CT3, CT6, CT7, CT10 CE1, CE2, CE3, CE6, CE11. | RA1 |
| CB1, CB2, CB3, CB4, CB5, CT1; CT3, CT8; CT9 CT10 CE1, CE2, CE3, CE6, CE11. | RA2 |
| CB1, CB2, CB3, CB4, CB5 CT1; CT3, CT8; CT9 CT10 CE1, CE2, CE7, CE9, CE11. | RA3 |
| CB1, CB2, CB3, CB4, CB5 CT1; CT3, CT6, CT7 CE1, CE2, CE3, CE6, CE7. | RA4 |
| CB1, CB2, CB3, CB4, CB5 CT1; CT3, CT6, CT7. CE1, CE6, CE7, CE9, CE11. | RA5 |

4. COURSE CONTENT

1. Neuromuscular system.
2. Energy pathways for energy production: phosphagen system, glycolytic pathway, oxidative pathway.
3. Cardiorespiratory system: responses and adaptations to exercise.
4. Analysis of energy consumption.
5. Metabolic responses and adaptations to exercise.
6. The responses of the human body to exercise in atmospheric conditions of extreme heat and humidity.
7. Macronutrients: carbohydrates, lipids and proteins.
8. Micronutrients: vitamins and minerals.

5. LEARNING METHODOLOGIES

The types of teaching methodologies are listed below:

- Master Class
- Case Method
- Cooperative learning
- PBL

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

| Learning activity | Number of Hours |
|--------------------------------|--|
| Exercise biochemistry (1 ECTS) | 10 hours on campus 10 hours of self-directed learning |
| Exercise physiology (1 ECTS) | 20 hours on campus 10 hours of self-directed learning |
| TOTAL | 50 h |

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

| Assessment system | Weight |
|--|---|
| Lab practice for lactate analysis, CPK, and VO2 maxi | MANDATORY ATTENDANCE PASS or FAIL |
| Group work for intermittent/hypoxic training or training in hot conditions | 50% |
| Multiple-choice exam | 50 % |

When you access the course on the *Campus Virtual*, you'll find a description of the activities you have to complete, as well as the deadlines and assessment procedures for each one. Both group work and lab practice can be changed due to master's needs.

7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10. The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This section indicates the schedule with delivery dates of evaluable activities of the subject:

| Assessable activity | Date |
|--|--------------------|
| Activity 1. Lab practice for lactate analysis, CPK, and VO ₂ max | October / November |
| Activity 2. Group work for intermittent/hypoxic training or training in hot conditions | October / November |
| Activity 3. Multiple choice exam | January |

This schedule may undergo modifications for logistical reasons of the activities. Any modification will be notified to the student in a timely manner.

9. BIBLIOGRAPHY

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10. DIVERSITY ATTENTION UNIT

Students with specific educational support needs:

Adaptations or curricular adjustments for students with specific educational support needs, in order to guarantee equal opportunities, will be guided by the Diversity Attention Unit (UAD).

The issuance of a report of curricular adaptations / adjustments by said Unit will be essential, so students with specific educational support needs should contact through: unidad.diversidad@universidadeuropea.es at the beginning of each semester

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.