

## 26313 - Basic physiological principles for physical activity and sport

### Syllabus Information

**Academic Year:** 2019/20

**Subject:** 26313 - Basic physiological principles for physical activity and sport

**Faculty / School:** 229 -

**Degree:** 295 - Degree in Physical Activity and Sports Science

**ECTS:** 12.0

**Year:** 2

**Semester:** Annual

**Subject Type:** Basic Education

**Module:**

### 1.General information

#### 1.1.Aims of the course

#### 1.2.Context and importance of this course in the degree

#### 1.3.Recommendations to take this course

### 2.Learning goals

#### 2.1.Competences

#### 2.2.Learning goals

#### 2.3.Importance of learning goals

### 3.Assessment (1st and 2nd call)

#### 3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

The student must show that he has achieved the learning results that are expected through the evaluation activities

GLOBAL TEST EVALUATION MODALITY

First partial (January):

Contents: First half of the theoretical and practical topics of the official program. Two kind of evaluation activities will be made (written test and ability of practice), which have to be passed separately to eliminate subject matter.

*Evaluation mode:*

1) Written test which contents two parts that will have to be passed separately (90%):

-Twenty five test questions with five possible answers, in which the effect of chance will be subtracted (50%)

- Four short answers (50%)

Between the questions, there will be included theoretical and practical questions learned in the classroom and in the laboratory.

In order to pass the exam and eliminate the subject, the student must obtain at least 45% of the maximum score in each of the two parts of the test.

The students who obtain the 45% of the maximum score may compensate with the qualification of the second part (only if the average of the two partial exams is more than 50% of the maximum score).

2) Evaluation of the skill of the practice(10%)

The performance of the practical part will be evaluated by an evaluation rubric, which evaluates different parameters related to attitude, performance and other aspects of the practical activities in the laboratory. Students who do not attend more than 20% of laboratory activities, must take a practical exam.

*Second part and final exam (June):*

- *Evaluation of first part: the same structure as the first partial exam- Evaluation of the second part:*

Option 1: This option will be only available for those students that assist at least to 80% practical seasons of the second part of the subject and had responded at least 80% of the tracking test.

1.- Written exam (65%): test and graph interpretation.

2.- Evaluation of practices (20%): Assistance and delivery of the practice tracking sheet in a timely manner

3.- Follow-up of the subject (15%): at the end of each theme an evaluation test will be done in the classroom. The note in this section will be the arithmetic average of all the tests performed by the student.

Option 2: any student may be presented

1.- Written test (100%): it will be composed of questions type test and performance / interpretation of graphs. The official day of the examination calendar proposed by the center will take place.

To pass the subject, the arithmetic mean of the two parts must exceed 5 out of 10. You can compensate one part with another provided you get at least 4 points out of 10 possible in each of them. *Final exam (September):* In case of not passing the subject in June, the student will have to examine the whole subject in this call.

- *Evaluation of first part:* the same structure as the first partial exam

- *Evaluation second part:*

1.- Written exam (100%): It will be composed of questions type test and performance / interpretation of graphs.

## 4.Methodology, learning tasks, syllabus and resources

### 4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. The first part of the course focuses on understanding the main concepts of General Physiology. The second part helps the student to understand Exercise Physiology. A wide range of teaching and learning tasks are implemented, such as lectures, practice sessions, laboratory practice sessions, and tutorials.

### 4.2.Learning tasks

The course includes 6 ECTS organized according to:

- Lectures (3 ECTS): 75 hours.

- Practice sessions (1,4 ECTS): 35 hours.

- Practical seminars (0,4 ECTS): 10 hours.

- Assignments (0,4 ECTS): 10 hours.

- Autonomous work (6,64 ECTS): 166 hours.

- Evaluation (0.16 ECTS): 4 hours.

### 4.3.Syllabus

The course will address the following topics:

#### SECTION I. Physiology by systems

##### Lectures

#### 1. GENERAL PHYSIOLOGY

1. Concept of Physiology, internal environment and homeostasis

2. Fundamentals of Cellular Physiology

3. Transmembrane transport

4. Potential for action

#### 2. NERVOUS SYSTEM

5. Functional organization of the nervous system

6. Sensory functions of the nervous system

7. Reflected action

8. Higher regulation of motor activity

9. Vegetative nervous system and thermoregulation

10. Superior functions of the nervous system

#### 3. LOCOMOTOR APPARATUS

11. Functional structure of the muscle. Types of muscle fibers. Mechanism of muscle contraction

12. Motor unit. Neuromuscular junction. Excitation-contraction coupling

13. Biophysics of muscle contraction. Isotonic and isometric contraction

#### 4. INTERNAL MEDIUM AND KIDNEY

14. Biological liquids. Structure and general functions of the kidney

15. Glomerular filtration. Resorption and tubular secretion

16. Regulation of the isoosmia and isoionía. Urination

## 5. BLOOD AND IMMUNITY

17. General functions of the blood. Plasma and formed elements
18. Red blood cells. Metabolism of iron. Blood groups
19. Platelets. Hemostasis
20. Leukocytes. Immunity

## 6. CARDIOVASCULAR SYSTEM

21. Characteristics and general functions of the cardiovascular system
22. Electrical activity of the heart
23. Mechanical activity of the heart. Cardiac cycle
24. Regulation of cardiac function
25. Arterial physiology. Microcirculation
26. Venous and lymphatic returns
27. Regulation of blood flow. Local circulation

## 7. RESPIRATORY FUNCTIONS

28. Functions of the respiratory tract. Respiratory muscles
29. Thoracic pressures. Respiratory mechanics Functions of the pleura and pleural fluid
30. Respiratory cycle. Alveolar ventilation Respiratory membrane
31. Transport of blood gases. Regulation of breathing

## 8. DIGESTIVE APPARATUS

32. Functions of the mouth, esophagus and stomach
33. Exocrine biliary and pancreatic secretions
34. Intestinal physiology. Drugs

## 9. METABOLISM AND ENDOCRINE SYSTEM

35. Metabolism of carbohydrates, proteins and lipids
36. Energy metabolism
37. Endocrine control system. Hormones. Hypothalamus-pituitary axes. Endocrine pancreas. adrenal glands

### Practice sessions

- Practice 1: Exploration of the nervous system and senses
- Practice 2: Functional problem of the nervous system: motor activity
- Practice 3: Dynamometry. Electromyography
- Practice 4: Physico-chemical analysis of a urine sample. Urinary sediment
- Practice 5: Kidney functional problem: electrolyte imbalance
- Practice 6: Hematocrit and blood groups
- Practice 7: Blood functional problem: athlete's anemia
- Practice 8: Electrocardiogram at rest. Exploration of arterial pressure and pulse.
- Practice 9: Spirometry at rest
- Practice 10: Endocrine functional problem: glycemia

## SECTION II. Exercise physiology

### Lectures

1. Introduction to exercise physiology. Historical perspective and key concepts.
2. Energy system and exercise.
3. Muscular responses and adaptations to physical exercise.
4. Cardiovascular responses and adaptations to physical exercise.
5. Pulmonary responses and adaptations to physical exercise.
6. Aerobic functional capacity.
7. Anaerobic functional capacity.
8. Neuroendocrine responses and adaptations to physical exercise.
9. Renal gastrointestinal function and physical exercise.
10. Age and gender related to physical exercise: children, elderly and women.
11. Environmental stress and physical exercise. Thermal stress, hyperbaria and altitude.

### Practice sessions

1. Physical work assessment. Ergometers.

2. Work, power and energy.
3. Indirect calorimetry.
4. Electromiography and exercise.
5. Heart rate and blood pressure response to exercise. Heart rate monitors.
6. Anaerobic threshold determination by ventilatory and cardiologic methods.
7. Lactate threshold.
8. Oxygen consumption assessment.
9. Oxygen consumption estimation. Problems.
10. Physiological simulation. PhysioLogical.
11. Thermal regulation problems.
12. Video ?El éxito de los keniatas?.

#### **4.4.Course planning and calendar**

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Health and Sports Sciences website.

#### **4.5.Bibliography and recommended resources**

The updated bibliography of the subject is consulted through the library web page:

<http://psfunizar7.unizar.es/br13/ebuscar.php?tipo=a>