

Course Unit	Physiology of Exercising		Field of study	Sport Sciences	
Master in	Physical Exercise and Health		School	School of Education	
Academic Year	2023/2024	Year of study	1	Level	2-1
Type	Semestral	Semester	1	ECTS credits	8.0
Code	6125-520-1102-00-23				
Workload (hours)	216	Contact hours	T 17	TP 25	PL 16
			TC -	S 5	E -
			OT -	O -	

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) José Augusto Afonso Bragada, Pedro Miguel Queirós Pimenta Magalhaes

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Correctly describe the operation of energy systems, and understand how to run these systems with the characteristics of physical and / or training performed.
2. Understand and interpret accurately the acute and chronic adaptations that occur in the human body as a result of physical exercise and training, respectively.
3. Describe the functioning of the cardiovascular, respiratory and endocrine systems and interpret the changes that occur in these systems depending on the type of exercise or training performed.
4. Understand and interpret the mechanisms of thermoregulation during exercise, especially in extreme environments of heat and cold.
5. Physical activity at altitude. Immediate and long term effects of training at altitude.

### Prerequisites

Before the course unit the learner is expected to be able to:  
Understand, interpret and analyze texts specific to this field.

### Course contents

Exercise bioenergetics; Acute and chronic adaptations to exercise and training; Endocrine adaptations to physical exercise and training; The cardiovascular system and exercise; The respiratory system and exercise; Exercise myopathy; Thermal regulation in physical exercise; Exercise in different environments: Exercise at altitude; Exercise in hot environments; Exercise in cold environments.

### Course contents (extended version)

1. Exercise bioenergetics
  - Interaction between aerobic and anaerobic systems of ATP production
  - Exercise metabolism
2. Acute and chronic adaptations to exercise and training
  - Homeostasis in different organs
  - Metabolic, cardiovascular and endocrine adaptations
3. The endocrine system and exercise
  - Hormonal regulation and action
  - Hormonal control of substrate mobilization during exercise
4. The cardiovascular system and exercise
  - Overall functioning of the circulatory system
  - Changes in the release of oxygen to peripheral tissues during exercise
  - Regulation and cardiovascular response to exercise
5. The respiratory system and exercise
  - Transport of CO<sub>2</sub> and O<sub>2</sub> in the blood
  - Ventilation and acid-base balance
  - Ventilatory and blood gases responses to physical exercise
6. Exercise myopathy
  - Theories of exercise myopathy
  - Type/intensity of exercise and skeletal muscle injury
  - Cellular, systemic and proprioceptive injury markers
  - Acute phase response and cell recovery
7. Exercise at altitude
  - Physiological adjustments in response to lower PO<sub>2</sub>
  - Immediate responses: Hyperventilation; Increased cardiovascular response; Evil acute mountain
  - Long-term Physiological responses
  - Effect of altitude training at sea level
8. Exercise in hot environment
  - Thermoregulation of temperature in a hot environment
  - Physiological response to acclimation
  - Complications of thermic stress
  - Effect of clothing on heat exposure
9. Exercise in cold environment
  - Thermoregulation in the cold exposure
  - Effect of clothing in cold exposure
  - Wind chill index

### Recommended reading

1. POWERS, SK ; HOWLEY, ET (2014). Fisiologia do exercício. Teoria e aplicação ao condicionamento e ao desempenho. (8ª Edição). Manole.
2. BROOKS, GA ; FAHEY, TD ; WHITE, TP ; BALDWIN, KM (2004). Exercise Physiology. Human bioenergetics and it's applications. (4th Edition). McGraw-Hill Education.
3. FOSS, ML ; KETEVIAN, SJ (2000). Bases fisiológicas do exercício e do esporte. (6ª Edição). Editora Guanabara Koogan.
4. MC ARDLE, W; KATCH F; KATCH V (1992): Fisiologia do exercício - energia, nutrição e desempenho humano. Editora guanabara Koogan, Rio de Janeiro

### Teaching and learning methods

Lectures and through multimedia and interactive content; Research work, analysis and interpretation of text/articles; Application of knowledge acquired in lectures, tutorials and seminars through the implementation of activities such as worksheets and reports.

**Assessment methods**

1. Continuous assessment - (Regular, Student Worker) (Final)
  - Intermediate Written Test - 75% (2 writing test)
  - Practical Work - 25% (2 individual work)
2. Exam evaluation - (Regular, Student Worker) (Supplementary)
  - Final Written Exam - 100%

**Language of instruction**

Portuguese

**Electronic validation**

José Augusto Afonso Bragada, Pedro Miguel Queirós Pimenta Magalhaes	Pedro Miguel Monteiro Rodrigues	Pedro Miguel Queirós Pimenta Magalhaes	Carlos Manuel Costa Teixeira
26-12-2023	25-02-2024	26-02-2024	27-02-2024