UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Physiology of Effort

Academic Year 2024/2025

1. Organic Unit

Faculty of Business and Economic Sciences

2. Course

Sport Organization Management

3. Cycle

1st

4. Course Unit

Physiology of Effort (C1112)

5. Scientific Area

6. Curricular Year

2nd

7. Type of Curricular Unit / Semester

1st Semester

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8. Class type and workload (work time)

Theoretical classes:	
Practical classes:	
Theoretical-Practical Classes	30,00
Tutorial Guidance:	20,00

9. ECTS Credits

6,00

10. Scientific Area Coordinator

11. Regent

Prof. Doutora EMA ADELAIDE CASTRO MENDES CARVALHO DE BRITO AZEVEDO DE AVELAR

12. Assistants

13. Teaching Language

Portuguese

14. General Objectives

This curricular unit aims to develop skills and knowledge in the area of human physiology, with emphasis on adaptive processes related to physical activity in the execution of motor tasks in stress situations. It is intended to develop an integrated knowledge using them in the formulation, resolution and discussion of problems in the area of training and student intervention.

15. Specific Objectives

- Know the assumptions and concepts associated with the physiology of effort.
- Understand the adaptive response processes related to the performance of an integrated motor task performance system.
- Understand the organic functional changes induced by exercise.

16. Skills to be acquired

- Know and explain the concepts associated with the Physiology of Effort in physical activity.
- Understand the adaptability of different biological systems when subjected to different training stimuli and environmental conditions.
- Interpret the physiological parameters in relation to the monitoring, control and evaluation of the training process.
- Know and explain the adaptive processes that physiologically arise in response to the developed effort.

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17. Teaching Methodology

Classes take place on a theoretical-practical basis. In theoretical classes, the subject is exposed along with illustration with practical examples. In the practical classes, there are forms, application of the procedures and protocols studied in the theoretical-practical classes.

18. Course Unit Program

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1.Notion of physiological adaptation.
Notion of adaptation, homeostasis and heterostasis.
Notion of stimulus and motor action.
The stimulus as a triggering factor of organic changes.
The directed stimulus as a functional load.
Stimulus characteristics.
Stimulus and adaptation relationship.
Biochemical and genetic mechanisms of adaptation.
General stress adaptation syndrome.

2. Bioenergetics
General notions of bioenergetics.
Thermodynamics, principles of conservation of energy and entropy.
Direct and indirect calorimetry.
Energy metabolism at skeletal muscle level.
Alactic anaerobic process.
Lactic anaerobic process.
Aerobic process.
Metabolic adaptations: increased reserves and an increase in enzymatic activity.

3. Pulmonary and respiratory adaptations
Effects of physical activity on:
Ventilatory function;
Lung volumes and capacities;
Volume of dead space;
Ventilation/perfusion ratio;
Notion of maximum oxygen consumption;
Ventilatory anaerobic threshold;
Respiratory quotient (RQ);
Ventilatory equivalents;
Practical explorations and respiratory variables used in Exercise Physiology or Effort Physiology.

4. Cardiovascular adaptations
Effects of physical activity on:
Cardiac muscle function;
Cardiac output, heart rate and stroke volume, end-diastolic volume, end-systolic volume, ejection fraction;
Systolic, diastolic, mean and differential blood pressure;
Peripheral vascular resistance;
Product pressure frequency;
Blood oxygen content and arteriovenous difference;
Regulation of circulation in exercise situations;
Cardiovascular adaptations due to different types of exercise;

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Basic notions of stress electrocardiography;
Practical exploration, cardiovascular variables, used in physiology of the Exercise.

5. Neuromuscular adaptations
Importance of nervous, muscular and mechanical factors in the development of neuromuscular adaptations.
Types of muscle contraction in the force/velocity relationship.
Functional characteristics of striated muscle: strength/length, strength/velocity, and power production.
Implications of motor unit and muscle fiber types for exercise.
Mechanical and contractile characteristics of muscle fiber types.
Forms of manifestation of strength (maximum strength, fast strength, endurance strength).
Muscle cycle lengthening shortening.
Concept of functional overload and adaptation.
Neuromuscular adaptation forms: improvement of coordinative processes, muscle remodeling and hypertrophy.
Specificity and overload as determining factors. Neuromuscular adaptations to exercise.
Energy reserves for muscle work, glucidic and lipidic source.
Role of proteins, protein resynthesis in active adaptation.
Physiological interpretation of exercise-induced muscle hypertrophy, different theories.
Strength deficit, as a neuromuscular evaluation parameter.

6. Introduction to the study of fatigue
Conceptual definition.
Different types of fatigue.
Prevention and early diagnosis of situations of muscle fatigue.
Overtraining, overuse, injury.
Introduction to the pathophysiology of the musculoskeletal system.

19. Assessment Methods

Continuous evaluation.
It is mandatory for the student to attend at least 70% of the scheduled classes.
The assessment consists of two written tests.
Final exam.
It will be carried out in accordance with the regulations in force at Universidade Lusíada de Lisboa.

20. Didactic Resources

The work will be developed with the active participation of students using bibliographical support elements and audio-visual means.

21. Sustainability Objectives

Promote knowledge that contributes to health and well-being.
Raise awareness for a healthy and ecologically balanced living environment.
Ensure an inclusive and quality education for all.

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22. Keywords

Physiology
Effort
Stimulus
Adaptation
Bioenergetics

23. Main Bibliography

Author(s):	William D. McArdle, Frank I. Katch, Victor L. Katch		
Title:	Exercise Physiology: Nutrition, Energy, and Human Performance		
Edition:	8th	Year:	2014
Local:	USA		
Publisher:	LWW		

Author(s):	Terry J. Housh, Dona J. Housh, Herbert A. deVries		
Title:	Applied Exercise and Sport Physiology, With Labs		
Edition:	4th	Year:	2016
Local:	UK		
Publisher:	Routledge		

Author(s):	D. Costill,W. L. Kenney Dr. J. H. Wilmore		
Title:	Physiology of Sport And Exercise		
Edition:	6th	Year:	2015
Local:	UK		
Publisher:	Human Kinetics		

24. Complementary Bibliography

Author(s):	Foss, M. e Keteyian, S. Fox.		
Title:	Bases fisiológicas do exercício e do esporte.		
Edition:		Year:	2000
Local:	. Rio de Janeiro		
Publisher:	Guanabara Koogan		

Author(s):	Powers, S. e Howley, E.		
Title:	Fisiologia do Exercício: Teoria e Aplicação ao Condicionamento e ao Desempenho,		
Edition:		Year:	2000
Local:	São Paulo		
Publisher:	Editora Manole		

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Ficha técnica MIP / MIP Datasheet	
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Autor / Author	Prof. Doutora EMA ADELAIDE CASTRO MENDES CARVALHO DE BRITO AZEVEDO
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