

## SCHOOL OF HEALTH AND SCIENCES

### SYLLABUS

<b>TITLE:</b>	Exercise Physiology I
<b>CODE:</b>	CFI 203
<b>PREREQUISITE:</b>	BIO 102
<b>CREDITS:</b>	3 credits   45 contact hours   1 term

### DESCRIPTION

It is the theoretical study of acute and chronic changes that occur in physiological systems with exercise, physical activity, and training. The muscular and neuromuscular system and its adaptations with exercise, physical activity and training are studied. Also, the student learns the systems responsible for the transport and use of energy, the cardiorespiratory systems and their adaptations during exercise, physical activity, and training. In addition, physiological responses are learned during exercise, physical activity, and training in a hot and cold environment.

### JUSTIFICATION

Any person whose profession is related to and directed to the development of human physical performance must know the basic principles of human physiology and how these principles present diverse responses and adaptations to the different stimuli of exercise, physical activity, and training.

### COMPETENCES

The course develops the following competences in students:

- **Critical questioning**
- **Research and exploration**

## **OBJECTIVES**

After completion of the course, students will be able to:

1. Know the definitions, terms, and applications, as well as the historical perspective in the field of study.
2. Identify acute and chronic responses to exercise in the human body.
3. Study the nature of skeletal muscles to analyze how muscles function during exercise and how the force needed to create movement is generated.
4. Know the function of the central nervous system and its importance in the control and execution of movements of the human body.
5. Know the effects that a muscular resistance program has on the muscular and neuromuscular system to describe how strength is gained through resistance training.
6. Analyze the biochemical processes by which the body uses food to create energy.
7. Discuss how measuring energy production and consumption helps us understand the effects of acute and chronic exercise on performance and conditioning.
8. Describe the importance of the endocrine system in enabling physical activity.
9. Describe the role of the cardiovascular system in physical activity and how each component adapts to internal changes in the body.
10. Describe the phases involved in breathing and gas exchange, how the respiratory system works when exercising, and how it can limit performance.
11. Understand the impact of extreme temperatures on performance to identify the thermoregulatory response and prevention mechanisms for heat-related injuries such as cramps, exhaustion, and muscle proprioceptors.

## **CONTENTS**

- I. Introduction to exercise physiology
  - A. Definition, terms, and applications
  - B. Historical perspective, acute and chronic responses to exercise
- II. Muscular control of movement
  - A. Structure and function of skeletal muscles
  - B. Skeletal muscles and the response to physical exertion, exercise, and rest
- III. Neurological control of movement
  - A. Structure and function of the nervous system
  - B. Sensory motor integration
    1. Motor response
- IV. Neuromuscular adaptations with resistance training
  - A. Acute and chronic muscular responses

- B. Strength gain with training
- V. Metabolism and energy systems
  - A. Energy sources and systems
  - B. Anaerobic and aerobic metabolisms
  - C. Maximal and submaximal intensity physiological exertion
    - 1. Alactic system vs. lactic oxygen debt
  - D. Aerobic capability and causes for fatigue
- VI. Hormonal regulation with exercise. Hormones and their characteristics
  - A. The hormonal effect on metabolism and energy systems
    - 1. Endocrine glands, their hormones, and their response to exercise, training, and rest
  - B. The central hormonal effect of fluids and electrolytes during exercise
- VII. Metabolic adaptations with training
  - A. Aerobic and anaerobic system adaptations and training
  - B. The answer to physical exertion, exercise, and rest
- VIII. Cardiovascular control during exercise
  - A. Structure and function of the cardiovascular system
    - 1. Cardiovascular response during physical exertion and rest
- IX. Respiratory control during exercise
  - A. Pulmonary ventilation and diffusion
  - B. O<sub>2</sub>/CO<sub>2</sub> transport and base exchange in muscles
    - 1. Regulation of pulmonary ventilation and metabolic system
    - 2. Respiratory limitations and their impact on athletic performance
    - 3. The importance of respiration regulation in the control of blood acids and bases.
- X. Cardiorespiratory adaptations to exercise
  - A. Aerobic capacity assessment
  - B. The effect of training on cardiovascular, respiratory, and metabolic adaptations
    - 1. Factors affecting aerobic training and athletic performance in high-performance disciplines
- XI. Thermoregulation and exercise
  - A. Physiological adaptations to physical exertion in the hot and cold environment
    - 1. Human limitations and acclimatization to different temperature environments
- XII. How to Quantify Sports Training
  - A. How to reach maximum physical effort during training

- 1. Overtraining
  - B. Physiological changes when stopping training
  - C. Restart of training by laboratory tests

## METHODOLOGY

The following strategies from the active learning methodology are recommended:

- Lectures
- Discussion (debates as a learning strategy)
- Project based learning (labs, field tests)
- Collaborative learning

## EVALUATION

Partial assignments	40%
Immersion project	10%
Final project or exam	25%
Compositions	15%
Oral presentation	10%
<b>Total</b>	<b>100%</b>

## LEARNING ASSESSMENT

The institutional assessment rubric is applied to the course's core activity.

## BIBLIOGRAPHY

### TEXTBOOK

Kenney, W. L., Wilmore, J., & Costill, D. L. (Eds.). (2020). *Physiology of Sport and Exercise*. (7<sup>th</sup> ed.). Human Kinetics, Inc.

### REFERENCES

Bishop, P.A. (2018). *Measurement and Evaluation in Physical Activity Applications: Exercise Science, Physical Education, Coaching, Athletic Training and Health*. (2<sup>nd</sup> ed.). Routledge

Ehrman, J.K., Gordon, P.M., Visich, P.S., & Keteyian, S.J. (2013). *Clinical Exercise*

*Physiology*. (3<sup>rd</sup> ed.). Human Kinetics, Inc.

Haff, G.G., Dumke, C. (2019). *Laboratory Manual for Exercise Physiology*. (2<sup>nd</sup> ed.).  
Human Kinetics, Inc.

Kramer, W.J., Fleck, S.J., & Deschenes, M.R. (2016). *Exercise Physiology. Integrations  
Theory and Application*. (2<sup>nd</sup> ed.). Lippincott William & Wilkins

Marieb, E.N. (2015). *Essentials of Human Anatomy and Physiology*. (11<sup>th</sup> ed.). Pearson.

McArdle, W.D., Katch, F.I., & Katch, V.I. (2014). *Exercise Physiology*. (7<sup>th</sup> ed.). Wolters  
Kluwer

Milner, C.E. (2019). *Functional Anatomy for Sport and Exercise*. (2<sup>nd</sup> Ed.). Routledge.

Murray, R., Kenney, W.L. (2015). *Practical Guide to Exercise Physiology*. (1<sup>st</sup> ed.).  
Human Kinetics, Inc.

Plowman, S.A., Smith, D.L. (2017). *Exercise Physiology for Health Fitness and  
Performance*. (5<sup>th</sup> ed.). Wolters Kluwer.

Powers, S., Howley, E. (2017). *Exercise Physiology: Theory and Application to Fitness  
and Performance*. McGraw Hill.

Radak, Z. (2018). *The Physiology of Physical Training*. (1<sup>st</sup> ed.). Academic Press.

For more information resources related to the course's topics, access the library's  
webpage <http://biblioteca.sagrado.edu/>

## **REASONABLE ACCOMMODATION**

For detailed information on the process and required documentation you should visit the  
corresponding office. To ensure equal conditions, in compliance with the ADA Act (1990)  
and the Rehabilitation Act (1973), as amended, any student in need of reasonable

accommodation or special assistance must complete the process established by the Vice Presidency for Academic Affairs.

## **ACADEMIC INTEGRITY**

This policy applies to all students enrolled at Universidad del Sagrado Corazón to take courses with or without academic credit. A lack of academic integrity is any act or omission that does not demonstrate the honesty, transparency, and responsibility that should characterize all academic activity. Any student who fails to comply with the Honesty, Fraud, and Plagiarism Policy is exposed to the following sanctions: receive a grade of zero in the evaluation and / or repetition of the assignment in the seminar, a grade of F (\*) in the seminar, suspension, or expulsion as established in the Academic Integrity Policy effective in November 2022.

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