Global Learning Semesters
Course Syllabus
Course: SPSC-440 Exercise Metabolism and Muscle Fatigue
Department: Liberal Arts
Host Institution: Intercollege, Nicosia, Cyprus

Course Summary		
Course Code	**Course Title**	**Recommended Credit Hours**
SPSC-440	Exercise Metabolism and Muscle Fatigue	3
Semester Offered	**Contact Hours**	**Prerequisites**
Please contact us	42-45	SPSC-210; SPSC-215, SPSC-250, SPSC-330
Department	**Level of Course**	**Language of Instruction**
Liberal Arts	Upper Division	English

Course Description

This course forms the bridge among the Biochemistry of Exercise in year 2, Sports Nutrition in year 3 and Advanced Coaching courses offered in year 4. The course will begin by examining the available fuel sources and the control and selection mechanisms that regulate their use during different types of activity. The students will examine in detail the mechanisms that activate fuel mobilisation, transport and oxidation at the level of the liver during exercise. The second part of the course will focus on methods to study the metabolism from the whole body to the molecular level. Then, with the basic knowledge of metabolic pathways and the available methods, the final part of the module will study the metabolic interactions of different organs. The relationship between metabolism and muscular fatigue (contraction failure) during sprinting and endurance exercise will be discussed (electrophysiological, metabolic, molecular and central mechanisms leading to fatigue both during high intensity and prolonged endurance exercise). The most recent literature will be screened to discover the exercise signal by which strength training leads to muscle hypertrophy and endurance training to mitochondrial biogenesis. At the end of the course, students should be able to present an integrative overview of the mechanism by which metabolism is regulated during exercise and of the molecular muscle adaptation to training and chronic exercise.

Prerequisites

SPSC-210; SPSC-215, SPSC-250, SPSC-330

Topic Areas

1. Analysis of the mechanistic activation of fuel mobilisation, transport and oxidation of pathways activated during exercise.
2. The role of liver during energy transformation and muscle contraction (aerobic and anaerobic energy-supply processes).
3. Substrate utilization; effect of diet manipulation on substrate stores and utilization, and performance;
4. Hormonal control and regulation during exercise.
5. Methods to study metabolism from whole body to the molecular level as well as some analysis and writing skills.
6. Examination of the metabolic interactions of different organs at onset and during various types of exercise.
7. The relationship between metabolism and muscular fatigue (contraction failure) during sprinting and endurance exercise (electrophysiological, metabolic, molecular and central mechanisms leading to fatigue both during high intensity and prolonged endurance exercise).
8. Skeletal muscle adaptations to endurance and heavy-resistance training.
9. Skeletal muscle fibre type characteristics, relation to metabolism and physical performance
10. The most recent literature will be screened to discover the exercise signal by which strength training leads to

muscle hypertrophy and endurance training to mitochondrial biogenesis.
11. The metabolic and molecular in the muscle as well as whole body metabolism in response to chronic exercise.

Learning Outcomes

By the end of the module students should be able to:

1. Have an understanding of the process of muscle contraction.
2. Have an understanding of the biochemical pathways involved in metabolism.
3. Have understanding of regulation of exercise metabolism.
4. Have an understanding of integration of metabolism in different organs during exercise.
5. Have an understanding of causes of fatigue in different exercise settings.
6. Have a basic understanding of the components of the immune system.
7. Read a recent research paper (related to exercise metabolism and muscle fatigue) critically and write a concise abstract of a study or paper.

Assessment

One Seminar Presentation:	(15%)
One 1500 Words Essay:	(15%)
Midterm Examination:	(25%)
Final Examination:	(35%)
A Scientific Abstract:	(10%)

Readings and Resources

Required Textbooks

1. The Biochemical Basis of Sports Performance; Maughan, R.J and Gleeson, M. (2004). Oxford University Press.
2. Biochemistry of Exercise IX; Maughan, R.J and Shirreffs S.M editors (1994). Human Kinetics.

Recommended Textbooks

1. Scott Powers & Edward Howley (2003). Exercise Physiology: Theory and Application to Fitness and Performance. 5th Edition.
2. Frayn 1996. Metabolic Regulation: A Human Perspective. ISBN 1855780488.