University: *Comenius University in Bratislava*	
Faculty: *Faculty of Physical Education and Sport*	
Subject code:	**Subject title:**
Type, range and method of educational activities: The course consists of one hour of lectures and two hours of seminars per week. Attendance in classes is crucial.	
Number of credits: 5	
Recommended semester/trimester of study: 4-5	
Degree of study: 1.	
Course prerequisites: *none*	
Conditions for completing the course: **Overall rating:** *A = 100% – 92%, B = 91% – 83%, C = 82% – 75%, D = 74% – 68%, E = 67% – 60%, FX = 59% and less.* *Credits will not be awarded to a student who:* *• did not attend at least 80% of the seminars during the semester,* *• received less than 59% of the overall rating*	
Learning outcomes: The student understands the structure and function of the basic components of a muscle cell. Understands the basic mechanisms of muscle contraction and the processes that create energy for muscle work. It understands the energy production process schedule in the organism based on the intensity level of the load. He knows the factors that limit energy production during anaerobic glycolysis and metabolism of carbohydrates and fats. He comprehends the functioning of organ systems that support muscles in energy production, including cardiovascular, respiratory and hormonal systems. He knows the mechanisms of thermoregulation during physical exertion, he understands the basics of controlling muscle activity by the central nervous system and regulating the activity of internal organs by the vegetative nervous system. The student knows the adaptive changes of individual organ systems during systematic endurance and strength training. He is ready to creatively apply the acquired knowledge in creating exercise programs to increase performance and promote health.	
Course contents: *1. Subject of physiology of physical exercises, structure of muscle fibers, excitation transmission, muscle contraction mechanism, and types of muscle fibers.* *2. Energy sources for muscle work, basic biochemical reactions of anaerobic glycolysis, and aerobic metabolism.* *3. Fats, sugars, proteins, and alcohol can be used as energy substrates to renew ATP, with varying energy values and equivalents.* *4. Function of the respiratory system during physical exertion, minute ventilation, respiratory volume, physical and physiological principles of respiratory exchange, oxygen transport by blood, and adaptive changes during systematic training.* *5. Parameters of cardiovascular functions at rest and during exercise, adaptive changes of the cardiovascular system during various forms of training, dilation and hypertrophy of the heart.* *6. Blood volume and composition during exercise and systematic training, physical and physiological nature of manipulation of hemoglobin changes, influence of hypoxia, hypobaric and normobaric hypoxia.* *7. Hormonal changes during exercise, the effect of systematic training, the practical*	

significance of changes in the hormonal system due to regular physical activity.
8. The basics of the morphology and physiology of the immune system, the consequences of the weakening of immunity during excessive training and the possibilities of influence.
9. Maximum oxygen consumption, principle of measurement, principles of determining VO2 max, share of heredity and training, possibilities of influencing VO2 max by training
10. Physiological mechanisms are involved in oxygen transport and utilization, limiting mechanisms of maximal oxygen consumption in patients, healthy individuals and endurance athletes.
11. The body's reaction to progressively increasing levels, physiological concept of aerobic and anaerobic threshold, one lactate equilibrium state, physiological principles and determination.
12. Energy expenditure, direct and indirect energy measurement, estimation of energy expenditure according to heart rate - conditions and pitfalls.
13. Mechanical efficiency of muscle work, assessment of efficiency of horizontal forms of locomotion, economy of running, walking, cycling, rowing, swimming.
14. Basics of the physiology of muscle strength, the concept of a motor unit, adaptive changes during strength training, the share of neuroregulatory mechanisms and hypertrophy, basic types of muscle contraction, the concept of muscle power, the "stretch shortening cycle", its essence and practical significance, plyometric training.
15. Thermoregulation during exercise, concept of more effective temperature, thermoregulation.

Recommended literature:

Essentials of Exercise Physiology; Autor: William D. McArdle, Frank I. Katch, Victor L. Katch

Language, knowledge of which is necessary to complete the course: *English language*

Notes:

Evaluating history:

Total number of evaluated students:

A	B	C	D	E	FX

Lecturer: *Mgr. Ľubica Žiška Böhmerová, PhD. doc. Mgr. Milan Sedliak, PhD.*

Last modification: *10.11.2021*

Supervisor: *prof. RNDr. Viktor BIELIK, PhD.*