

Anatomy and Physiology 1. (2 ECTS)

Oktatás célja

Aim of the subject

To acquire basic physiological and sportphysiological knowledge on anatomical bases with a complex approach. The first semester positions the topic in the system of life sciences, discusses the structure and function of the cells and tissues, covers the nervous and muscle systems as well as those of the circulatory and breathing system. Finally, it is about the foundations of sports physiology.

Acquired competencies

Knowledge

- Knowledge about the body composition, about the main organ systems and their functions.
- Knows the cellular bases of the vital functions, the structure and operation of the cells.
- Being familiar with the anatomical structure and the functions of the internal organs (i.e. the cardio-vascular, respiratory, gastro-intestinal, excretory, reproductive systems).
- Knows the structure and main elements of the nervous system.
- Knows the structure of the motor system and the bases of motor regulation.
- Has some knowledge about the basic sport physiological processes.

Attitude

- Applies physiological approach to physical activity and leisure.
- In his/her work observes anatomical features and physiological needs.
- Requires constant renewing of the anatomical and physiological knowledge especially regarding sport physiological processes.

Abilities

- He/she takes notice about anatomical-physiological points of view when planning a given activity
- He/she can judge about a physiological feasibility of a given leisure/sport activity.
- Has enough knowledge to solve sports-physiological tasks.

Tantárgy tartalma

Major topics

1. Introduction. The living world and men's place. Structure of the human body (bone-, muscle-, skin-, circulatory-, respiratory- digestive-, excretory-, neuro-hormonal-immune systems). Cells and tissues.
2. Structure and function of the cells. Cell membrane: the unit membrane and the fluid-mosaic membrane models. Transport processes (passive, facilitated diffusion, active transport, mass flow). Bases of material and energy metabolism, composition of the important nutrients. The carbohydrate, protein and lipid metabolism.
3. Generation of neuronal excitement and their types. Local and propagating potentials, role of the ion channels. Structure of the neurons. The synapse. Glia. Structure, types and basic functions of the muscle cells.
4. Muscle structure and functions. The muscular and the motor unit. Contraction types. Tendons, joints, motor types and patterns. Locomotion.
5. Central motor regulation: basal ganglia, cerebellum, motor cortex. Organization of the movements.
6. The internal environment and the homeostasis. Fluid compartments and distribution.

Composition of the blood. Blood production and clotting. Structure of the circulatory system.

7. Structure and operation of the heart: atria, ventricles, in- and output. The mechanical cardiac cycle: systole and diastole. The wind-cassel function. Stimulation and conduction in the heart. Automacy of the heart. ECG. Regulation of the cardiac functions: mechanical aspects, ions, hormones, neuronal effects.
8. Bases of the circulation; ideal and real fluids, role of the cross section and the pressure conditions. Arterial and venous flow, distribution of the blood vessels. Pressure, distribution and velocity in the circulatory system. Capillary structure. Filtration and fluid withdrawal int he vessels. Microcirculation and local circulation, capillary networks and shunts, redistribution of he blood. Lymph production and lymphatic circulation.
9. Regulation of the blood circulation. Autoregulation, local factors, hormonal effects, neuronal influence, and their relationships.
10. Anatomy and physics of the respiratory functions. Structure of the lungs. Pressure conditions and the air flow. Lung movements. Exchange and transport of the respiratory gases. Partial pressure and air circulation. Dissolving and binding of oxygen and carbon-dioxide, the central role of the hemoglobin. Respiratory regulation. Medullar and pontine respiratory centers. Joint regulation of circulation and breathing.
11. Foundations of sports physiology I. Aerob and anaerob metabolism.
12. Foundations of sports physiology II. Loading zones.

Planned teaching methods

Lecture with slides. Individual learning from a textbook. Consultation if necessary.

Számonkérési és értékelési rendszere

Requirements and evaluation

Knowledge of the material.

Understanding the relationships.

Reproducing figures and tables.

Evaluation: exam mark (1 to 5)

The evaluation criteria:

- Knowledge of concepts.
- The most important anatomical details name.
- Physiological relationships and operational knowledge learned and cheese.
- Systematic knowledge.

Irodalom

Compulsory literature

- Donáth Tibor: Anatómia-Élettan, 10. kiadás. Medicina, Budapest, 2015.
- Pavlik G: Élettan-sportélettan, Medicina, 2011.