

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	FIZIOLOGIJA ŠPORTA 1
Course title:	PHYSIOLOGY OF SPORT 1

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Športna vzgoja, prva stopnja	-	1.	2.
Kineziologija, prva stopnja	-	1.	2.
Športno treniranje, prva stopnja	-	1.	2.

Vrsta predmeta / Course type Obvezni

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
60			30		90	6

Nosilec predmeta / Lecturer: Doc. dr. Helena Lenasi, dr.med.

Jeziki / Languages:	Predavanja / Lectures:	Slovenski/slovene
	Vaje / Tutorial:	Slovenski/slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti: **Prerequisites:**

jih ni	none
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Vsebina: **Content (Syllabus outline):**

- Energetski vidik: pridobivanje in poraba energije
- Signaliziranje v telesu: živčevje, hormoni
- Živčnomišični sistem
- Srčnožilni sistem, dihalni sistem, prenos plinov
- Metode treninga, testi vzdržljivosti
- Vplivi okolja (fiziologija športa v ekstremnih razmerah)

FIZIOLOGIJA ŠPORTA 1

SPLOŠNO:

- Uvod v fiziologijo
- fiziologija in biologija celice: zgradba, osnove presnovnih procesov v celici,
- membranski potencial, prenos snovi skozi celično membrano
- komunikacija med celicami in znotraj celice, transdukcijske kaskade v celici
- homeostaza, uravnavanje količin
- volumni in sestava telesnih tekočin: razporeditev V po razdelkih, pufri
- mišica: zgradba, presnova, mehanizem mišične kontrakcije

KARDIOVASKULARNI SISTEM

- zgradba in funkcija, opis posameznih komponent, krvni obtok (sistemska, pljučna cirkulacija, razlike), kri. opis, sestavine krvi, funkcije
- srce: zgradba, mehanika, srčni cikl, električna aktivnost srca, sklopitev vzburjenje-kontrakcija, nadzor
- hemodinamika, nadzor krvnega tlaka
- uravnavanje KVS, telesna aktivnost in KVS

RESPIRATORNI SISTEM:

- zgradba, funkcije,
- mehanika dihanja, testi dih. funkcije
- transport plinov (difuzija, prenos po krvi)
- nadzor in uravnavanje dihanja

LEDVICE:

- zgradba in funkcije, ledvični krvni obtok
- glomerulna filtracija, principi reabsorpcije in sekrecije,
- transepiteljski transporti topljencev in vode vzdolž nefrona

- Energy transfer
- Types of signalling in the human body
- Neuromuscular system
- Support systems: cardiovascular system, respiratory system and gas exchange in the body
- Introduction to exercise, endurance tests
- Exercise training and adaptations
- Environmental physiology

SPORTS PHYSIOLOGY 1

GENERAL PHYSIOLOGY

- Introduction
- Basic concepts of cell biology and physiology
- Cell metabolism: oxidative phosphorylation, ATP
- Membrane potential, types of membrane transport
- Cell to cell communication, intracellular signalling
- Principles of homeostasis, regulation of some physiological parameters
- Body compartments: composition and regulation of body fluids
- Principles of muscle metabolism and contraction

CARDIOVASCULAR SYSTEM (CVS):

- Structure and function: systemic and pulmonary circulation
- Blood as a transport medium: composition and functions
- Heart: structure, heart cycle, electrical and mechanical properties, electrical activity of the heart, electro-mechanical coupling, heart regulation
- Haemodynamics, blood pressure regulation
- Regulation of the CVS, adaptation to exercise

RESPIRATORY SYSTEM:

- Structure and function
- Ventilation, respiratory mechanics, spirometry
- Respiratory gases transport: diffusion, convective transport
- Regulation of respiration, adaptation to exercise

- uravnavanje osmolarnosti in volumna, homeostaza natrija in kalija
 - acidobazna fiziologija, uravnavanje pH
- PRESNOVA IN PREBAVA:**
- prebava ogljikovih hidratov, beljakovin ni maščob, vitamini, osnovni principi absorpcije snovi v prebavilih,
 - funkcije jeter
 - presnova ogljikovih hidratov, beljakovin in maščob, načini pridobivanja energije (ATP) na celični ravni
- ENDOKRINOLOGIJA**
- osnove: endokrine žleze, delitev, zgradba, splošni principi delovanja hormonov,
 - spec. endokrinologija: homeostaza glukoze (in ostalih hranil), hormoni nadledvične žleze, rastni hormon, ščitnični hormoni, homeostaza kalcija in fosfata, reprodukcija, spolne žleze in hormoni, nosečnost in porod
- ŽIVČEVJE:**
- splošna shema živčevja: povezava anatomija/fiziologija, hierarhija organiziranosti (centralno, periferno živčevje), vegetativno živčevje, neuroendokrinologija, elektrofiziologija, senzorični sistemi, motorični sistemi

KIDNEY AND EXCRETION

- Structure and function, renal circulation
 - Glomerular filtration (rate), mechanisms of tubular reabsorption and secretion
 - Transepithelial transport of solutes and water along the nephron, corticomedular gradient
 - Principles of acido-base physiology, pH regulation
- DIGESTION AND METABOLISM**
- Digestion of carbohydrates, fat and proteins, absorption
 - Metabolism of carbohydrates, fat and proteins
 - Nutrition and diet

ENDOCRINOLOGY

- Basic principles, hormones and endocrine glands, hormone actions on the cellular level
- Special endocrinology: homeostasis of glucose, endocrine pancreas, hormones of the suprarenal gland, and of the thyroid, growth hormone, calcium and phosphate homeostasis, reproduction

NERVOUS SYSTEM

- Neuronal system organization and function: central vs. peripheral nervous system,
- Somatic vs. autonomic (vegetative) nervous system
- Neuroendocrinology,
- Electrophysiology
- Motoric and sensoric nervous system

Temeljni literatura in viri / Readings:

- Učna gradiva
- Lasan, M. (2005): Stalnost je določila spremembo, Fakulteta za šport, Inštitut za šport, Ljubljana
- Lasan, M. (2004): Fiziologija športa – harmonija med delovanjem in mirovanjem, Fakulteta za šport, Inštitut za šport, Ljubljana
- Foss, M.L., Keteyan, S.J. Fox's Physiological Basis for Exercise and Sports
- Navodila za vaje

Poglobljena literatura:

- Katch VL, McArdle WD. Essentials of Exercise Physiology. 4th Ed. Wolters Kluwer, Lippincott, Williams & Wilkins, 2011.

- Wilmore J, Costill D, Kenney WL, Costill DL. Physiology of Sport and Exercise. 4th Ed. Human Kinetics Publishers, 2007.
- Astrand PO, Rodahl K, Dahl H, Strømme SB. Textbook of Work Physiology 4th Ed. Physiological Basis of Exercise. Human Kinetics Publishers, 2003.

Cilji in kompetence:

- Spoznati delovanje človeškega organizma kot celote, soodvisnost in koordinirano delovanje organov in organskih sistemov
- Spoznati osnovni princip homeostaze, ki vlada v telesu
- Spoznati odzivanje organizma na okolje
- Spoznati reakcije organizma na stres, vključno s temeljnimi prilagoditvami organizma na telesni napor
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Objectives and competences:

- Learning about the functioning of the human body, interdependence and subordination of organ systems
- Apprehension of the basic homeostasis principles in the human body
- Impact of environment on the human body: adaptation to stress, including exercise

Predvideni študijski rezultati:

Znanje in razumevanje:

- Razumevanje osnovnih zakonitosti delovanja organizma. Dojeti principe homeostaze in na njej sloneče uravnavne kroge z negativno povratno zvezo.
- Razumeti osnove adaptacijskega odgovora organizma na telesno aktivnost.
- Razumevanje in opis osnovnih celičnih delcev in njihova vloga pri človekovi gibalni aktivnosti
- Sposobni so ovrednotiti nekatere fiziološke parametre v procesu treninga
- Prispevek k razumevanju funkcioniranja človeka na celičnem nivoju
- Sposobni so razmišljati o spremembah, ki nastajajo v procesu treniranja in iskati nadaljnja pojasnila
- Prenos teoretičnih znanj v športno prakso ter umestitev v kontekst metod in vsebin športne aktivnosti

Intended learning outcomes:

Knowledge and understanding:

- Comprehension of the basic physiology of the human body
- Comprehension of homeostasis and the operating of the negative feed-back loops in the body
- Physiological adaptations to exercise, including the cellular level
- Estimation of some physiological parameters during the training process
- Impact of endurance on the human body

Metode poučevanja in učenja:

<ul style="list-style-type: none"> • Predavanja • Laboratorijske vaje

Learning and teaching methods:

<ul style="list-style-type: none"> • Lectures • Laboratory work

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

Način: pisni izpit, za izboljšanje ocene možno ustno izpraševanje	100 %	Type (examination, optional oral to improve the note)
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Reference nosilca / Lecturer's references:

1. LENASI, Helena, KOHLSTEDT, Karin, FICHTLSCHERER, Birgit, MULSCH, A., BUSSE, Reinhard, FLEMING, I. Amlodipine activates the endothelial nitric oxide synthase by altering phosphorylation on Ser(1177) and Thr(495). *Cardiovasc. Res.* [Print ed.], 2003, letn. 59, št. 4, str. 844-853. [COBISS.SI-ID [17197785](#)]
2. LENASI, Helena, ŠTRUCL, Martin. Effect of regular physical training on cutaneous microvascular reactivity. *Med. sci. sports exerc.*, 2004, str. 606-612. [COBISS.SI-ID [19021785](#)]
3. LENASI, Helena, ŠTRUCL, Martin. The effect of nitric oxide synthase and cyclooxygenase inhibition on cutaneous microvascular reactivity. *Eur. j. appl. physiol. (Print)*. [Print ed.], 2008, letn. 103, št. 6, str. 719-726, doi: [10.1007/s00421-008-0769-8](#). [COBISS.SI-ID [24385497](#)]
4. LENASI, Helena. The role of nitric oxide- and prostacyclin-independent vasodilatation in the human cutaneous microcirculation : effect of cytochrome P450 2C9 inhibition. *Clin. physiol. funct. imaging (Print)*, 2009, letn. 29, št. 4, str. 263-270, doi: [10.1111/j.1475-097X.2009.00862.x](#). [COBISS.SI-ID [26142937](#)]
5. LENASI, Helena, ŠTRUCL, Martin. Regular physical activity alters the postocclusive reactive hyperemia of the cutaneous microcirculation. *Clin. hemorheol. microcirc.*, 2010, letn. 45, št. 2/4, str. 365-374, doi: [10.1016/j.neuropsychologia.2010.08.005](#). [COBISS.SI-ID [27444953](#)]
6. LENASI, Helena. Regular training enhances the nitric oxide and prostacycline independent endothelium-dependent vasodilation in the cutaneous microcirculation. V: *9th World Congress for Microcirculation, Paris, September 25-28, 2010*. Bologna: Medimond - Monduzzi Editore International Proceedings Division, 2010, str. 47-51, ilustr. [COBISS.SI-ID [28396249](#)]
7. LENASI, Helena. Assessment of human skin microcirculation and its endothelial function using laser doppler flowmetry. V: ERONDU, Okechukwu Felix (ur.). *Medical imaging*. Rijeka: InTech, 2011, str. 271-296, ilustr. [COBISS.SI-ID [29192409](#)]