Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Fizika**
Course title:	**Physics**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Univerzitetni študijski program Biologija, 1. stopnja		1.	1.
Undergraduate university programme Biology, 1st degree		1st	1st

Vrsta predmeta / Course type	Obvezni/Obligatory
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
30			**30**		**120**	**6**

Nosilec predmeta / Lecturer:	Aleš Fajmut

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski / slovene
	Vaje / Tutorial:	slovenski / slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Ni pogojev.	None

Vsebina:	**Content (Syllabus outline):**
Elektromagnetno valovanje: spektri, izvori, lastnosti, absorpcija, sevanje, ekesperimentalne metode, ki temeljijo na odboju / absorpciji / emisiji / fluorescenci / sipanju EM valovanja, Beer-Lambertov zakon	Electromagnetic waves: EM spectrum, sources, properties, absorption, emission; experimental methods based on the detection of reflected/emitted/ absorbed/scattered/fluoresced EM waves, Beer-Lambert's law
Termodinamika: pretok snovi (difuzija, osmoza) in toplote oz. energije (prevajanje, konvekcija, sevanje), energijski tok metabolizma, regulacija temperature v človeškem telesu. Mehanika: statika in dinamika točkastih in togih teles; kinematski in dinamski pristop k obravnavi gibanja točkastih teles v 1D; vrtenje; sila, tlak, navor (vzvodi v človeškem telesu), delo, energija, moč; energijski zakon; deformacije (kosti); hidrostatika in hidrodinamika; aplikacije Brnoullijeve enačbe, viskoznost, Hagen - Poiseuilleov zakon, Reynoldsovo število; laminarni in turbulentni tokovi.	Thermodynamics: flow of matter (diffusion, osmosis) and heat/energy (conduction, convection, radiation); metabolic energy flow, regulation of body temperature Mechanics: statics and dynamics of particles. and rigid bodies; kinematic and dynamic approach to the study of motion in 1D; rotation; force; pressure; torque (levers in the human body), work, energy, power, conservation of energy, deformations (in bones); hydrostatics, hydrodynamics, applications of Bernoulli's equation, Hagen – Poiseuille's law, Reynolds's number; laminar turbulent flow
Nihanje: harmonske oscilacije (HO), dušene oscilacije, periodično vzbujanje v HO, oscilacije v bioloških in kemijskih sistemih, samovzdrževane oscilacije, stabilnost	Oscillations: harmonic oscillations (HO), damped HO, periodically forced HO, oscillations in biological and chemical systems, self-sustained oscillations, stability
Zvok: lastnosti zvočnega valovanja, spektri, interval slišnosti, občutljivost ušesa, intenziteta, analiza zvoka, ultrazvočno slikanje	Sound: properties, spectra, interval of hearing, sensitivity of human ear, intensity, analysis of the sound, ultrasound imaging
Moderna fizika: zgradba in model atoma, aplikacije radioaktivnosti in ionizirajočega sevanja, varnost pred sevanji	Modern physics: structure and model of the atom, applicability of radioactivity and ionizing radiation, safety
Električno in magnetno polje: Električna sila, polje, potencial (aplikacije v biologiji in medicini) magnetna sila in polje, gibanje nabitih delcev v E in M polju, katodna cev, rentgenska cev, masni spektrometer	Electric and magnetic (EM) field: electric - force, field, potential (applications in biology and medicine), magnetic - field, force; motion of charged particles in EM fields, cathode ray tube, roentgen apparatus and imaging, mass spectrometer
Študent opravi 10 laboratorijskih vaj s področij mehanike, termodinamike, električnih in magnetnih pojavov, valovne	Students carries out 10 laboratory exercises from the fields of mechanics, thermodynamics, electric and magnetic

in geometrijske optike, moderne fizike in radioaktivnosti. Vsebina vaj je aplicirana na biološke sisteme.	phenomena, wave and geometric optics, modern physics and radioactivity. Lab work is applied to the study of biological systems.

Temeljni literatura in viri / Readings:

1. Jay Newman (2000) Physics of the Life Sciences, Springer, New York
2. Douglas C. Giancoli (1998) Physics principles with applications (5th ed. ali višja), Prentice Hall, Englewood Cliffs
3. Klemen Bohinc (2014) Fizika človeškega telesa, Zdravstvena fakulteta Univerze v Ljubljani, Ljubljana
4. Interna skripta in navodila za laboratorijske vaje, izročki prosojnic s predavanj in druga dodatna interna študijska literatura, ki je v elektronski obliki dostopna na: http://estudij.fnm.uni-mb.si/ oz. na: https://estudij.um.si/ v okviru predmeta Fizika.

Cilji in kompetence:	**Objectives and competences:**
Usvojiti osnovne fizikalne koncepte in zakonitosti, pomembne za razumevanje procesov v živi in neživi naravi	The main objective is to gain the knowledge of fundamental physical concepts and laws which are essential for understanding the processes in nature.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Študent razume osnovne fizikalne procese v naravi **Prenesljive/ključne spretnosti in drugi atributi:** Študent zna kvalitativno in kvantitativno opisati nekatere osnovne fizikalne pojave v naravi in jih analizirati s preprostimi matematičnimi metodami in modeli.	**Knowledge and understanding:** Students get understanding of fundamental physical processes in nature **Transferable/Key Skills and other attributes:** Students are able to describe basic physical processes in nature, qualitatively and quantitatively, and to analyze them with fundamental mathematical methods and models

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja Laboratorijske vaje (v celoti opravljene laboratorijske vaje so pogoj za pristop k nadaljnjim preizkusom znanja)	Lectures Laboratory work (completed laboratory work is obligatory for the admittance to examination)

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni kolokvij iz laboratorijskih vaj (pozitiven kolokvij iz laboratorijskih vaj (rezultat mora biti višji ali enak 50 %) je pogoj za pristop k pisnemu in ustnemu izpitu)	30	Written test within laboratory work (positive test (result should be larger or equal to 50 %) is a precondition for the admittance to written and oral examination)

Pisni izpit (pisni izpit je možno opraviti z dvema pisnima kolokvijema, pri čemer mora biti skupni rezultat višji ali enak 50%, posamezni kolokvij pa ne sme biti nižji od 30%) Ustni izpit	50 20	Written exam (written test might be accomplished by two written tests, whereby the overall results should be equal or larger than 50 % and a single test should not be lower than 30 %) Oral exam

Reference nosilca / Lecturer's references:

- DOBOVIŠEK, Andrej, FAJMUT, Aleš, BRUMEN, Milan. Strategy for NSAID administration to aspirin-intolerant asthmatics in combination with PGE [sub] 2 analogue: a theoretical approach. Medical & biological engineering & computing, ISSN 0140-0118. [Print ed.], 2012, vol. 50, no. 1, str. 33-42, doi: 10.1007/s11517-011-0844-x. [COBISS.SI-ID 18845192]
- MBIKOU, Prisca, FAJMUT, Aleš, BRUMEN, Milan, ROUX, Etienne. Contribution of Rho kinase to the early phase of the calcium-contraction coupling in airway smooth muscle. Experimental physiology, ISSN 0958-0670, 2011, vol. 96, issue 2, str. 240-258, ilustr., doi: 10.1113/expphysiol.2010.054635. [COBISS.SI-ID 18009864]
- DOBOVIŠEK, Andrej, FAJMUT, Aleš, BRUMEN, Milan. Role of expression of prostaglandin synthases 1 and 2 and leukotriene C [sub] 4 synthase in aspirin-intolerant asthma: a theoretical study. Journal of pharmacokinetics and pharmacodynamics, ISSN 1567-567X, 2011, vol. 38, no. 2, str. 261-278, doi: 10.1007/s10928-011-9192-6. [COBISS.SI-ID 18203144]
- FAJMUT, Aleš, BRUMEN, Milan. MLC-kinase/phosphatase control of Ca[sup]2+ signal transduction in airway smooth muscles. Journal of theoretical biology, ISSN 0022-5193, 2008, vol. 252, no. 3, str. 474-481. http://dx.doi.org/10.1016/j.jtbi.2007.10.005, doi: 10.1016/j.jtbi.2007.10.005. [COBISS.SI-ID 15856392]