



Univerza v Mariboru
University of Maribor

Fakulteta za naravoslovje in
matematiko / Faculty of Natural
Sciences and Mathematics



OPIS PREDMETA / SUBJECT SPECIFICATION

Predmet:	Fizika
Subject Title:	<i>Physics</i>

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Izobraževalna biologija / Educational Biology		1	Zimski ali poletni

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. Vaje Lab. Work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30	30		15	-	105	6

Nosilec predmeta / Lecturer:

Aleš Fajmut

Jeziki /

Predavanja / Lecture:

slovenski / Slovenian

Languages:

Vaje / Tutorial:

slovenski / Slovenian

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

Prerequisites:

Ni posebnih zahtev..

No special prerequisites.

Vsebina:

Contents (Syllabus outline):

Vsebina:

1. Osnove mehanike in biomehanike: kinematika teles-translacija, rotacija; mehanska nihanja; trki; energija, moč; sile in navori v kosteh in mišicah; deformacije; mehanika tekočin, tlak, krvni obtok.
2. Energija in energijski tokovi: temperatura in toplota; idealni plin; toplotni stroji; regulacija telesne temperature in temperature v prostorih.
3. Osnove elektrike in magnetizma. električni tok; električni stroji in generatorji napetosti; katodna cev, pospeševalnik; prevajanje električnega signala po živčnem vlaknu in aplikacija.
4. Zvok in svetloba: osnovne lastnosti snovnega in elektromagnetnega valovanja in njihova aplikacija v naravi in tehniki; spekter in energija valovanja, optična spektrometrija; uho, jakost zvoka; oko, občutljivost očesa; preslikave z lečami, napake leč; osvetljenost, barve.
5. Atom in atomsko jedro: energijska stanja atoma; stabilnost atomskega jedra; rentgenski žarki, absorpcija; radioaktivnost, ionizirajoča sevanja, detekcija in dozimetrija; uporaba radioaktivnih izotopov v tehniki in medicini; interakcije ionizirajočih sevanj z biološkim tkivom in zaščita.
6. Tehnike slikanja v tehnologiji, naravoslovju in medicini: optični mikroskopi; elektronski mikroskop; tomografske metode: rentgen, SPET in PET,

Contents:

1. Fundamentals of mechanics and biomechanics: kinematics-translation and rotation; mechanical oscillations; energy, power; forces and torques in bones and muscles; deformations; fluid mechanics, pressure, blood flow.
2. Energy and energy flows: temperature and heat; ideal gas; heat engines, regulation of the body temperature and the temperature in the room.
3. Fundamentals of electricity and magnetism: electrical current; electrical engines and generators; cathode ray tube, accelerators; transduction of electrical signal in neurons and its application.
4. Sound and light: fundamental properties of material waves and electromagnetic waves and their application in nature and technology; spectrum and energy of waves, optical spectrometry; ear, sound intensity; eye, sensitivity; geometrical optics, lens defects; luminosity, colours.
5. Atom and nucleus: atom structure; energy states of atom; stability of nucleus; X-rays, absorption; radioactivity, ionising radiation, detection and dosimetry; use of radioactive isotopes and their application in technology and medicine; interaction of ionising radiation with living matter and protection against it.
6. Photographic methods in technology, science and

magnetna resonanca; gama kamera; ultrazvok.
7. Osnove fizikalnih merjenj: metode merjenj, napake pri merjenjih, risanje diagramov, analiza rezultatov.

Laboratorijske vaje: študent samostojno opravi 6-7 laboratorijskih vaj iz vsebin predavanj in seminarjev
Seminar: sestoji iz demonstracijskih eksperimentov podkrepjenih z računskimi zgledi in predstavitev seminarских nalog. Izvedba seminarja bo v najmanj dveh skupinah z dvema različnima pristopoma: matematično/tehniškim in biološko/kemijskim.

medicine: optical microscopes; electronic microscope; ultrasound; tomographic methods, roentgen apparatus, SPET, PET, nuclear magnetic resonance, gamma camera.

7. Fundamentals of measurements in physics: measuring methods, errors, drawing of diagrams, analysis of results.

Laboratory work: student works out 6-7 experimental assignments from the contents of lectures and seminar

Seminar: consists of demonstration experiments, practical assignments and presentations of seminar works. Seminar will be performed in at least two different groups with two different approaches based on: mathematics/technology and biology/chemistry.

Temeljni študijski viri / Textbooks:

- R. Kladnik, Visokošolska fizika. 1. del, Mehanski in toplotni pojavi, DZS, Ljubljana, 1985
- R. Kladnik, Visokošolska fizika 2. del, Električna, atomika, DZS, Ljubljana, 1991
- R. Kladnik, Visokošolska fizika. 3. del, Akustika in optika : valovni pojavi, DZS, Ljubljana, 1989
- D. C. Giancoli, Physics 4th ed., Prentice Hall, New Jersey, 1995
- D. Halliday, R. Resnick, J. Walker, Fundamentals of physics 5th ed. John Wiley, New York 1997
- P. P. Urone: Physics with health science applications. John Wiley, New York 1986
- P. Davidovits: Physics in Biology and Medicine (2. izdaja). Academic Press, San Diego 2001

Cilji:

- Usvojiti znanja, potrebna za razumevanje fizikalnih pojavov in procesov v naravnem okolju, v tehniki, v živih bitjih in v človeškem telesu.
- Na različnih primerih iz naravnih in tehniških okolij spoznati aplikacijo fizikalnega znanja in dobiti celosten pregled nad bazičnimi fizikalnimi vsebinami.

Objectives:

- To gain knowledge necessary for understanding of the phenomena and processes in natural environment, technology, living creatures and human body.
- To get knowledge on applicability of physical principles via different examples from nature and technology and to get entire overview over fundamentals of physics.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Razumevanje osnovnih procesov v naravi. Znao kvantitativno opisati nekatere osnovne pojave in izračunati rezultate.
- Pridobitev praktične spretnosti za delo z eksperimentalnimi napravami.
- Razumevanje fizikalnih metod merjenja.

Prenesljive/ključne spretnosti in drugi atributi:

- Sposobnost prepoznati problem ter ga teoretično in praktično obravnavati v okviru elementarne fizike;
- Uporaba osnovnih znanj za reševanje praktičnih problemov;
- Didaktični pristop pri obravnavi naravnih pojavov ter sposobnost prenesti znanje laiku

Knowledge and Understanding:

- Understanding of basic processes in the nature. Students are able to describe some basic phenomena and to solve basic problems.
- Gaining of practical skills for practical work with basic experimental equipment.
- Understanding of measuring methods within physics.

Transferable/Key Skills and other attributes:

- The ability to recognise the problem and to treat it with basic theoretical and experimental physical methods;
- Use of fundamental knowledge for solution of practical problems;
- A didactic approach to real-life phenomena and the ability to transfer this knowledge to a non-specialist

Metode poučevanja in učenja:

- eksperimentalna predavanja;
- laboratorijske vaje;
- seminar z eksperimenti.

Learning and teaching methods:

- lectures with experiments;
- laboratory work;
- seminar with experiments.

Načini ocenjevanja:Delež (v %) /
Weight (in %)**Assessment:**

• pisni izpit; • ustni izpit;	50 % 50 %	• written exam; • oral exam;
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Materialni pogoji za izvedbo predmeta :

- predavalnica s potrebno eksperimentalno opremo in multimedijskimi pripomočki;
- laboratorij z eksperimentalno opremo.

Material conditions for subject realization

- lecture room with necessary experimental equipment and multimedia facilities;
- laboratory room with experimental equipment.

Obveznosti študentov:*(pisni, ustni izpit, naloge, projekti)*

- pisni izpit;
- ustni izpit;
- opravljen seminar;
- opravljene laboratorijske vaje.

Students' commitments:*(written, oral examination, coursework, projects):*

- written exam;
- oral exam;
- completed seminar work;
- completed laboratory work.