

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: ZANIMIVA FIZIKA OKOLI NAS
Course title: Interesting Physics Around Us

Vrsta predmeta / Course type

D - Splošni izbirni predmet

Univerzitetna koda predmeta / University course code:

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Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	30	0	0	0	60	4

Nosilec predmeta / Lecturer:

doc. dr. Jurij Bajc

doc. dr. Barbara Rovšek

**Jeziki /
Languages:**

Predavanja / Lectures: slovenščina, angleščina

Vaje / Tutorial: slovenščina, angleščina

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

Znanje srednješolske fizike.

Prerequisites:

The student has to be enrolled in the study programme.

Vsebina:

Naravoslovno (predvsem fizikalno) ozadje

1. zanimivih naravnih pojavov (mavrica in drugi optični pojavi v naravi, vremenski pojavi,...);
2. aktualnih vprašanj okolja (topla greda, energijski viri,...);
3. modernih naprav (mikrovalovna pečica, gsm telefoni, LCD zasloni, CD in blue-ray predvajalniki, GPS naprave,...);
4. medicinskih diagnostičnih naprav (ultrazvok, rentgen, MRI,...) in uporaba laserjev v medicini;
5. športa (kolesarjenje, plavanje, plezanje,...);
6. dodatne teme na predlog slušateljev.

Content (Syllabus outline):

Science (especially physics) as a background of

1. interesting natural phenomena (rainbow and other atmospheric optical phenomena, weather phenomena, ...);
2. topics, related to environment and sustainable development (energy resources, greenhouse, ...);
3. modern technological devices (microwave oven, cellular telephones, LCD displays, CD and blue-ray devices, GPS devices, ...);
4. medical diagnostic appliances (ultrasound, X-ray apparatus, NMR, ...), use of lasers in medicine;
5. physics of sports (cycling, swimming, climbing, ...);
6. other topics, suggested by students.

Temeljni literatura in viri / Readings:

Obvezna / Compulsory:

1. M. Hribar in sodelavci: Srednješolska fizika, Modrijan

Dodatna / Additional:

1. Hewitt e tal.: Conceptual Physics Science,

2. Adison Wessley 2004 L. Mathelitsch: Narava in fizika, 45 str., DZS, 1995.

3. L. Mathelitsch: Fizika človeškega telesa, 35 str., Založba PeF, 1995.

Cilji in kompetence:

Cilji:

1. študenti prepoznajo posamezne pojave v naravi in sodobnem okolju in se zavedajo njihove kompleksnosti in prepletenosti;
2. nekatere preprostejše pojave razumejo in povežejo z elementarnimi fizikalnimi naravnimi zakoni;
3. znajo opazovati in zastavljati prava vprašanja;
4. zavedajo se potrebnosti znanstvenega raziskovanja naravnih pojavov;
5. razvito imajo naravoslovno besedišče in se zavedajo, da imajo nekatere običajne besede v naravoslovju natančno določen pomen, ki je lahko precej ožji od splošnega.

Kompetence:

1. študentje imajo razvito sposobnost komuniciranja naravoslovnih tem v slovenščini;
2. sposobnost kritičnega sprejemanja informacij;
3. analitično, sintetično in ustvarjalno mišljenje ter reševanje problemov;
4. avtonomnost, (samo)kritičnost, (samo)refleksivnost;
5. prizadevanje za kakovost;
6. splošna razgledanost;
7. vrednota osebnega stalnega strokovnega napredovanja.

Objectives and competences:

Objectives:

1. students recognize specific phenomena in nature and also in modern environment; they are aware of their complexity and interconnections.
2. they are able to identify elementary physical laws of nature in some basic phenomena;
3. they are able to observe and to ask the right questions;
4. they realize the necessity of performing scientific research of natural phenomena;
5. they have developed basic science vocabulary and are aware that some common words have very specific meaning in science.

Students develop abilities and gain competencies:

1. to communicate scientific issues;
2. to critically receive information;
3. of analytical, synthetic and creative problem solving;
4. they develop to become more autonomous, (self)critical, (self)reflective;
5. they establish commitment to quality;
6. they develop their general knowledge;
7. they recognize the importance of one-self permanent education.

Predvideni študijski rezultati:

Znanje in razumevanje:

1. študenti prepoznajo posamezne pojave v naravi in se zavedajo njihove kompleksnosti in prepletenosti;
2. nekatere preprostejše pojave razumejo in povežejo z elementarnimi fizikalnimi naravnimi zakoni;
3. znajo opazovati in zastavljati prava vprašanja;
4. razvito imajo osnovno naravoslovno besedišče in se zavedajo, da imajo nekatere običajne besede v naravoslovju natančno določen pomen, ki je lahko precej ožji od splošnega.

Uporaba:

1. študentu bodo pridobljena znanja večala njegovo splošno in posebej naravoslovno razgledanost;
2. uporabil jih bo ob sprejemanju odločitev, ki se tičejo njegovega življenja;
3. zmožen bo kritične distance do mnogokrat nezanesljivih informacij iz dvomljivih virov.

Intended learning outcomes:

Knowledge and understanding:

1. students recognize specific phenomena in nature and also in modern environment. They are aware of their complexity and interconnections;
2. they are able to identify elementary physical laws of nature in some basic phenomena;
3. they are able to observe and to ask the right questions;
4. they realize the necessity of performing scientific research of natural phenomena. They have developed basic science vocabulary and are aware that some common words have very specific meaning in science;

Application:

1. gained knowledge will extend students' general and scientific literacy;
2. it will support them in making competent decisions that affect their lives;
3. they will be able to maintain a critical distance to the often unreliable information from dubious sources.

Refleksija:

1. zaveda se potrebnosti sistematičnega znanstvenega raziskovanja naravnih pojavov;
2. zaveda se pomena, ki ga imajo naravoslovne znanosti na življenje modernega človeka, na moderne tehnologije, medicino;
3. zaveda se pomena racionalnega delovanja človeka v okolju ter posledic, ki jih ima človekovo ravnanje za okolje.

Prenosljive spretnosti:

1. študent ima razvito sposobnost komuniciranja naravoslovnih tem v slovenščini in sposobnost kritičnega sprejemanja informacij;
2. razvito ima analitično, sintetično in ustvarjalno mišljenje ter sposobnost za reševanje problemov;
3. je avtonomen, (samo)kritičen, (samo)refleksiven in si prizadeva za kakovost.

Reflection:

1. students will be aware of the need for systematic scientific exploration of natural phenomena;
2. they will recognize the importance of natural sciences for the life of modern man, for modern technology, and medicine;
3. they will have a clear view on the impact which human actions have on the environment.

Transferable skills:

1. students will develop the ability to communicate scientific issues and also the ability of critical reception of information;
2. they will develop analytical, synthetic and creative thinking and ability to solve problems;
3. they will become autonomous, (self)critical, (self)reflexive and will strive for quality.

Metode poučevanja in učenja:

Predavanja, seminar.

Learning and teaching methods:

Lectures, seminar.

Načini ocenjevanja:

**Delež (v %) /
Weight (in %)**

Assessment:

seminarska predstavitev	50	Seminar presentation
ustni izpit	50	oral exam
	/	

Reference nosilca / Lecturer's references:

doc. dr. Jurij Bajc:
Jurij Bajc:

1. ZIHERL, Saša, ČEPIČ, Mojca, BAJC, Jure. Positive and negative birefringence of materials in microwave region. American journal of physics : a publication of American association of physics teachers. [Print ed.]. 2018, vol. 86, issue 2, str. 110-118, ilustr. ISSN 0002-9505. <http://aapt.scitation.org/doi/pdf/10.1119/1.5009237>, DOI: 10.1119/1.5009237. [COBISS.SI-ID 11937353].
2. ZIHERL, Saša, ČEPIČ, Mojca, BAJC, Jure. Analogies in physics : an example of microwaves and wood. V: Zbornik radova. Beograd: Društvo fizičara Srbije, 2018. Str. 25-34, ilustr., tabela. Nastava fizike, br. 7. ISSN 2406-2626. [COBISS.SI-ID 12249673].
3. SUSMAN, Katarina, ZIHERL, Saša, BAJC, Jure. Ten years of the project Chain experiment. European journal of physics. 2017, vol. 38, no. 3, 14 str. (pdf), ilustr. ISSN 1361-6404. <http://iopscience.iop.org/article/10.1088/1361-6404/aa65f3/pdf>, <http://pefprints.pef.uni-lj.si/id/eprint/4429>, DOI: 10.1088/1361-6404/aa65f3. [COBISS.SI-ID 11509577].
4. BAJC, Jure. The physics of a rainbow. V: NESIĆ, Lj. (ur.). Zbornik izabranih radova. Aleksinac: Aleksinačka gimnazija, 2017. Str. 13-22, ilustr. [COBISS.SI-ID 11479881].

Barbara Rovšek:

1. ROVŠEK, Barbara, GUŠTIN, Andrej. Two activities with a simple model of the solar system : discovering Kepler's 3rd law and investigating apparent motion of Venus. Physics Education. 2018, vol. 53,

no. 1, 12 str. (pdf), ilustr., tabele, graf. prikazi. ISSN 0031-9120.
<http://iopscience.iop.org/article/10.1088/1361-6552/aa95d6/pdf>, DOI: 10.1088/1361-6552/aa95d6.
[COBISS.SI-ID 11849033].

2. ROVŠEK, Barbara. Assessing learning outcomes from experiments in a science competition. European journal of physics. 2017, vol. 38, no. 3, 15 str. (pdf), ilustr. ISSN 1361-6404.
<http://iopscience.iop.org/article/10.1088/1361-6404/aa5560>, <http://pefprints.pef.uni-lj.si/id/eprint/4376>,
DOI: 10.1088/1361-6404/aa5560/meta. [COBISS.SI-ID 11461705].

3. ROVŠEK, Barbara. Observe your shadow. The Physics teacher. 2016, vol. 54, no. 4, str. 223-226,
ilustr., tabele. ISSN 0031-921X. [COBISS.SI-ID 11005513].

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