

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Fizika okolja
Course title:	Environmental Physics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Ekotehnologije, 3. stopnja		1	1
Ecotechnologies, 3 rd cycle		1	1

Vrsta predmeta / Course type Izbirni / Elective

Univerzitetna koda predmeta / University course code: EKO3-746

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15	15			15	105	5

**Navedena porazdelitev ur velja, če je vpisanih vsaj 15 študentov. Drugače se obseg izvedbe kontaktnih ur sorazmerno zmanjša in prenese v samostojno delo. / This distribution of hours is valid if at least 15 students are enrolled. Otherwise the contact hours are linearly reduced and transferred to individual work.*

Nosilec predmeta / Lecturer: Prof. dr. Aleksander Zidanšek

Jeziki / Languages: **Predavanja / Lectures:** slovenščina, angleščina
Slovenian, English
Seminar: Angleščina, English

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

Zaključena izobrazba druge stopnje ali primerljivo znanje osnov fizike.

Prerequisites:

Completed second level education or equivalent knowledge of fundamental physics.

Vsebina:

Značilne komponente fizike okolja:

- termodinamika;
- elektromagnetizem;
- prenos energije;
- fizikalni opis ekonomskih in družbenih sistemov;
- varstvo okolja.

Elementarna spektroskopija:

- sončni spekter;
- sklopitev med svetlobo in snovjo;
- biološke molekule;
- ozon;
- UV-svetloba.

Content (Syllabus outline):

Characteristic components of environmental physics:

- thermodynamics;
- electromagnetism;
- transport of energy;
- physical modelling of economic and societal systems;
- environmental protection.

Elementary spectroscopy:

- Solar spectrum;
- light-matter coupling;
- biomolecules;
- ozone;
- UV light.

Globalna klima:

- model tople grede;
- vreme in klima;
- modeliranje klimatskih sprememb.

Transport polutantov:

- difuzija;
- enačba dinamike tekočin;
- tok v rekah, podzemnih vodah.

Hrup:

- akustika;
- zaznavanje človeka in merila hrupa;
- zmanjševanje prepustnosti zvoka;
- aktivna kontrola zvoka.

Global climate:

- greenhouse model;
- weather and climate;
- modelling of climatic changes.

Transport of pollutants:

- diffusion;
- equations of fluid dynamics;
- river flow, underwater flow.

Noise:

- acoustics;
- human detection and criteria of noise;
- noise transmission reduction;
- active noise control.

Temeljni literatura in viri / Readings:

E. Boeker, R. Grondelle, Environmental Physics, John Wiley & Sons, New York 2011.

J. Monteith M. Unsworth, Principles of Environmental Physics, Academic Press, 2013.

Novjši članki, predvsem v revijah Science, Nature, Physical Review Letters, New Scientist, Scientific World in Computational Physics

Cilji in kompetence:

Študenti spoznajo najnovejše dosežke na področju fizike okolja in se pripravijo za raziskovalno delo s tega področja.

Splošne kompetence:

- obvladanje raziskovalnih metod, postopkov in procesov, razvoj kritične in samokritične presoje,
- sposobnost uporabe znanja v praksi,
- razvoj komunikacijskih sposobnosti in spretnosti, posebej komunikacije v mednarodnem okolju,
- kooperativnost, delo v skupini (in v mednarodnem okolju).

Predmetnospecifične kompetence:

- Predmet pripravlja študente za uporabo znanja s področja fizike okolja v raziskovalnem delu.

Objectives and competences:

Students become acquainted with the latest advancements in the field of environmental physics, and prepare themselves for research work in this field.

General Competences:

- The student will master research methods, procedures and processes
- The student will develop critical thinking
- The student will develop communications skills to present research achievement in the international environment
- Work in team (in international environment)

Course Specific Competences:

- This course prepares students to apply knowledge from environmental physics in their research work.

Predvideni študijski rezultati:**Znanje in razumevanje:**

- razumevanje fizikalnih procesov v okolju

Intended learning outcomes:**Knowledge and Understanding**

- The student will understand physical processes in environment

Vrednotenje in sinteza:

- sposobnost načrtovati fizikalne modele za izbrane primere iz okolja,
- sposobnost ovrednotiti rezultate elementarnih fizikalnih meritev v okolju,
- sposobnost komunikacije v angleškem jeziku na področju fizike okolja.

Evaluation and synthesis:

- Ability to plan physical models for selected environmental cases,
- Ability to evaluate results for elementary physical measurements in environment,
- Establish the ability to communicate in English in the field of environmental physics

Metode poučevanja in učenja:

- Interaktivna predavanja
- Seminarji
- Konzultacije
- Laboratorijsko delo

Learning and teaching methods:

- Interactive lectures
- Seminar work
- Consultations
- Laboratory work

Načini ocenjevanja:

- seminar
- ustni izpit

Delež (v %) /

Weight (in %)

Assessment:

- | | | |
|---------------|------|-------------|
| • seminar | 50 % | • seminar |
| • ustni izpit | 50 % | • oral exam |

Reference nosilca / Lecturer's references:

- ABINA, Andreja, PUC, Uroš, JEGLIČ, Anton, ZIDANŠEK, Aleksander. Structural characterization of thermal building insulation materials using terahertz spectroscopy and terahertz pulsed imaging. NDT & E International, ISSN 0963-8695. [Print ed.], 2016, vol. 77, str. 11-18, doi: 10.1016/j.ndteint.2015.09.004. [COBISS.SI-ID 28983847]
- PUC, Uroš, ABINA, Andreja, SLUBAN, Melita, ZIDANŠEK, Aleksander, JEGLIČ, Anton, VALUŠIS, Gintaras. Terahertz spectroscopic identification of explosive and drug simulants concealed by various hiding techniques. Applied optics, ISSN 1559-128X. Tiskana izd., 2015, vol. 54, no. 14, str. 4495-4502, doi: 10.1364/AO.54.004495. [COBISS.SI-ID 28541735]
- ABINA, Andreja, PUC, Uroš, JEGLIČ, Anton, ZIDANŠEK, Aleksander. Structural analysis of insulating polymer foams with terahertz spectroscopy and imaging. Polym. test.. [Print ed.], 2013, vol. 32, issue 4, str. 739-747, doi: 10.1016/j.polymertesting.2013.03.004. [COBISS.SI-ID 26612263]
- CORDOYIANNIS, George, KRALJ, Samo, KUTNJAK, Zdravko, JESENEK, Dalija, MUŠEVIČ, Igor, ZIDANŠEK, Aleksander. Different modulated structures of topological defects stabilized by adaptive targeting nanoparticles. Soft matter, 2013, vol. 9, no. 15, str. 3956-3964, doi: 10.1039/C3SM27644A. [COBISS.SI-ID 26557223]
- ABINA, Andreja, PUC, Uroš, CEVC, Pavel, JEGLIČ, Anton, ZIDANŠEK, Aleksander. Terrestrial and underwater pollution-source detection using electromagnetic multisensory robotic system. Chemical engineering transactions, 2013, vol. 34, str. 61-66, doi: [10.3303/CET1334011](https://doi.org/10.3303/CET1334011). [COBISS.SI-ID [27010855](https://doi.org/27010855)]