



Univerza v Mariboru
University of Maribor

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



UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION

Predmet:	Fizika okolja
Subject Title:	Environmental Physics

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Enopredmetna izobraževalna fizika Single major Educational Physics		2	3

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45			30		165	8

Nosilec predmeta / Lecturer:

Aleksander Zidanšek

Jeziki /

Languages:

Predavanja / Lecture:

Vaje / Tutorial:

Slovenski/Slovene

Slovenski/Slovene

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

Predznanje klasične in moderne fizike.

Prerequisites:

Preknowledge of classical and modern physics.

Vsebina:

1. Fizikalni procesi in pojavi v okolju

Atmosferski procesi in pojavi ter njihov vpliv na zemeljsko površje (sončev spekter, sklopitev med svetlobo in snovjo, biološke molekule, ozon in UV svetloba)

Klima in klimatske spremembe (vreme in klima, modeliranje klimatskih sprememb).

Obravnava fizikalnih procesov in pojavov v okolju (transport polutantov, difuzija, tok v rekah, podzemnih vodah, morski tokovi, enačba dinamike tekočin, gore, gozd, urbana središča, potresna območja, vulkani, tektonika, erozija,...).

Vpliv biosfere na fizikalne procese v okolju (biogeokemijska kroženja, mikroklima,...).

2. Fizikalni procesi in pojavi v različnih tehniških aplikacijah

Obravnava fizikalnih procesov in pojavov v tehniških aplikacijah in njihov vpliv na okolje (elektrarne, bivalni objekti, pristanišča, zadrževalniki, transportna sredstva, družba in okolje, politika in okoljevarstvo, preprečevanje katastrof, akustika in človekovo zaznavanje zvoka,

Content (Syllabus outline):

1. Physical processes and phenomena in different environments

Atmospheric processes and phenomena and their influence on earth's surface (solar wind, coupling between light and matter, biological molecules, ozone and UV light)

Climate and climatic changes (weather and climate, modeling of climatic changes).

Treating of physical processes and phenomena in environment (transport of pollutants, diffusion, flow in rivers, underground waters, sea currents, equations of dynamics of fluids, mountains, forest, urban centers, earthquake areas, volcanoes, tectonic, erosion,...).

Biosphere and its influence on physical processes in the environment (biogeochemical cycles, microclimate,...).

2. Physical processes and phenomena in different technical applications

Treating of physical processes and phenomena in technical applications and their influence on environment (power plants, objects for residence,

kriteriji hrupa, zmanjševanje prepustnosti zvoka, aktivna kontrola zvoka ...)

3. Fizika energijskih virov

Od kod energija na Zemlji in energijski viri (obnovljivi, neobnovljivi).

Energijski viri v Sloveniji.

Jedrska energija (zlitje in cepitev jeder, varnost in sevanje, jedrski odpadki)

Alternativni energijski viri.

Varčna in okolju prijazna raba energijskih virov.

4. Fizika ravnanja z odpadki

Odpadki v gospodinjstvih.

Odpadki v industriji.

Posebni odpadki (jedrski, kemični, biološki in drugi odpadki).

Transport, shranjevanje in razgradnja različnih vrst odpadkov.

5. Ekoremediacije

Uporaba biotskih sistemov v okoljskih tehnologijah.

Predmet se izvaja v sodelovanju z Inštitutom za fizikalno biologijo, gostujoči strokovnjak dr. Alexis Zrimec.

harbors, reservoir, means of communication, society and environment, policy and environment protection, prevention of disasters, acoustic and human's perception of sound, criteria of noise, decreasing of transition of sound, active control of sound ...)

3. Physics of energy sources

Origin of energy on earth and energy sources (renewable, not renewable).

Energy sources in Slovenia.

Nuclear energy (fission and fusion of nuclei, security and radiation, radioactive waste)

Alternative energy sources.

Economic and environmental-friendly use of energy sources.

4. Physics of dealing with waste

Waste in housekeeping.

Waste in industry.

Special waste (nuclear, chemical, biological and other waste).

Transport, keeping and decomposition of different types of wastes.

5. Ecoremediations

The application of biotic systems in environmental technologies.

The subject is performed in collaboration with the Institute of physical biology; collaboration with the expert dr. Alexis Zrimec.

Temeljni literatura in viri / Textbooks:

- 1) E. Boeker, R. Grondelle, Environmental Physics, John Wiley & Sons, New York 1995.
- 2) J. Monteith, M. Unsworth, Principles of Environmental Physics, Elsevier, Burlington 1990.
- 3) C. Smith, Environmental Physics, Taylor & Francis, New York 2002.
- 4) Članki v revijah New Scientist, Scientific World in Computational Physics
- 5) Nekatera aktualna gradiva bodo objavljena na spletnih straneh Oddelka za fiziko <http://www.fizika.uni-mb.si/> / Some up to date teaching material will be published on the website of the Department of Physics <http://www.fizika.uni-mb.si/>

Cilji:

Študentje osvojijo znanja, potrebna za kompleksnejše razumevanje fizikalnih pojavov in procesov v okolju. Na različnih primerih iz naravnih in tehniških okolij spoznajo pomen in vrste energijskih virov ter energijskih pretvorb. Spoznajo vrste odpadkov in kako jih okolju prijazno transportiramo ter hranimo. Spoznajo možnost uporabe bioloških sistemov za trajnostni razvoj.

Objectives:

Students achieve knowledge that is necessary for complex understanding of physical phenomena and processes in environment. On different examples from natural or technical environments they understand importance and kinds of energy sources and energy transitions. Students conquest knowledge about different types of wastes and how we environment friendly transport and keep them. They learn about the use of biological systems in sustainable development.

Predvideni študijski rezultati:

Intended learning outcomes:

Znanje in razumevanje:

Razumevanje kompleksnih naravnih pojavov in procesov v okolju. Poznavanje pomena in vrste energijskih virov in energijskih pretvorb, pomen transporta in hranjenja odpadkov.

Prenesljive/ključne spretnosti in drugi atributi:

Predmet pripravlja študenta za delo na fizikalnih projektih s področja okoljevarstva.

Knowledge and Understanding:

Understanding of complex physical phenomena and processes in environment. Knowing the importance and types of energy sources and energy transformation, types of waste, its transportation and deposition.

Transferable/Key Skills and other attributes:

Subject prepares the student for work on some physics projects in environment.

Metode poučevanja in učenja:

Metodika obsega: teoretičen uvod v obravnavano snov ter terenske vaje v različnih naravnih in tehnoloških okoljih.

Learning and teaching methods:

They are based on: theoretical introduction to specific topics and exercises in different natural or technical environments.

Načini ocenjevanja:

Delež (v %) /

Weight (in %)

Assessment:

projektna naloga

50 %

project

ustni izpit

50 %

oral exam