Univerza v Mariboru

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Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Fizikalni procesi v okolju
Course title:	Physical Processes in Environment

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Fizika 2. st.		2	**3**
Physics 2nd degree			

Vrsta predmeta / Course type	izbirni/optional
Univerzitetna koda predmeta / University course code:	

Predavanja **Lectures**	**Seminar** **Seminar**	**Sem. vaje** **Tutorial**	**Lab. vaje** **Laboratory work**	**Teren. vaje** **Field work**	**Samost. delo** **Individ. work**	**ECTS**
15			15	15	105	**5**

Nosilec predmeta / Lecturer:	Aleksander Zidanšek

Jeziki / Languages:	**Predavanja / Lectures:**	slovenski/Slovenian in/and angleški/English
	Vaje / Tutorial:	slovenski/Slovenian in/and angleški/English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Predznanje osnov fizike in fizike okolja.	Knowledge of classical physics and physics of environment.

Vsebina:	**Content (Syllabus outline):**
1. Fizikalni procesi in pojavi v okolju Matematični opis in modeliranje fizikalnih procesov: gradientne relacije, ki poganjajo tokove (snovni, toplotni, električni); dinamika tekočin, reakcijski in transportni sistemi, transport in difuzija polutantov, tokovi v morju, rekah, podzemnih vodah; vpliv biosfere na fizikalne procese v okolju. 2. Atmosferski procesi in pojavi Atmosferski procesi in pojavi ter njihov vpliv na	1. Physical processes and phenomena in environment Mathematical description and modeling of physical processes: gradient relations in mass, heat and electric currents; dynamics of fluids, reaction and transport systems, transport and diffusion of pollutants, flow sea, rivers, underground waters; biosphere and its influence on physical processes in the environment. 2. Atmospheric processes and phenomena Atmospheric processes and phenomena and their

zemeljsko površje (spekter Sončevega sevanja, sevalno ravnovesje v atmosferi, učinek tople grede, ozon in UV svetloba, sončni veter). Klima in klimatske spremembe (vreme in klima, modeliranje lokalne in globalne klime). 3. Izbrane fizikalne meritve v okolju 3.1 Osnovne meritve Meritve temperature, tlaka in vlažnosti zraka. Meritve hrupa. Meritve radioaktivnosti. 3.2 Elementarna spektroskopija Masna spektroskopija, NMR spektroskopija, optična spektroskopija, laserska spektroskopija (Lidar), težke kovine, plinska kromatografija 3.3 Nedestruktivno iskanje polutantov Georadar, magnetometer, magnetogradiometer, indukcijski senzor.	influence on Earth surface (Solar radiation spectrum, radiation equilibrium in the atmosphere, greenhouse effect, ozone and UV light, Solar wind) Climate and climatic changes (weather and climate, modeling of local and global climate). 3. Selected physical measurements in envoronment 3.1 Basic measurements Measurements of temperature, pressure and humidity. Masurements of noise. Measurements of radioactivity. 3.2 Elementary Spectroscopy Mass spectroscopy, NMR spectroscopy, Optical spectroscopy, Laser spectroscopy (Lidar), heavy metals, gass chromatography 3.3 Nondestructive search of pollutants Georadar, magnetometer, magnetogradiometer, induction sensor.

Temeljni literatura in viri / Readings:

1) John Houghton, Nigel Mason, Peter Hughes, Randall McMullan, Ross Reynolds, Lester Simmonds, John Twidell Introduction to Environmental Physics: Planet Earth, Life and Climate, CRC Press, Boca Raton 2001.
2) Egbert Boeker, Rienk van Grondelle, Environmental Science: Physical Principles and Applications, John Wiley & Sons, New York 2001.
3) Članki v revijah New Scientist, Scientific World in Computational Physics
4) Na spletnih straneh Oddelka za fiziko objavljena elektronska gradiva / teaching material published on websites of Department of Physics

Cilji in kompetence:	**Objectives and competences:**
Študentje osvojijo znanja, potrebna za kompleksnejše razumevanje in matematično modeliranje fizikalnih pojavov in procesov na različnih primerih iz naravnega okolja in klimatskega sistema. Spoznajo tudi osnovne merske metode za meritve v okolju.	Students achieve knowledge that is necessary for complex understanding and mathematical modeling of physical phenomena and processes, using different examples from natural environment and climate system. Students also learn basic methods for measurements in environment.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Razumevanje kompleksnih naravnih pojavov in procesov v okolju. Poznavanje klimatskih modelov in razumevanje klimatskih sprememb. Pregledno znanje o meritvah v okolju.	**Knowledge and Understanding:** Understanding of complex physical phenomena and processes in environment. Knowing the basic climate models and understanding of climate change. Knowledge of basic measurements in environment.

Prenesljive/ključne spretnosti in drugi atributi:	**Transferable/Key Skills and other attributes:**
Predmet pripravlja študenta za delo na fizikalnih projektih s področja okolja.	Subject prepares the student for work on some physics projects in environment.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Metodika obsega: teoretičen uvod v obravnavano snov, seminarske in terenske vaje v različnih naravnih okoljih.	They are based on: theoretical introduction to specific topics, tutorial work and field work comprising also exercises in different natural environments.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
• projektna naloga	50 %	• project
• ustni izpit	50 %	• oral examination

Reference nosilca / Lecturer's references:

ZIDANŠEK, Aleksander, AMBROŽIČ, Milan, MILFELNER, Maja, BLINC, Robert, LIOR, Noam. Solar orbital power : sustainability analysis. Energy (Oxford). [Print ed.], 2011, vol. 36, no. 4, str. 1986-1995. [COBISS.SI-ID 24602919]

KABASHI, Skender, BEKTESHI, Sadik, AHMETAJ, Skender, KABASHI, Gazmed, NAJDOVSKI, Dimitrij, ZIDANŠEK, Aleksander, ŠLAUS, Ivo. Effects of Kosovo's energy use scenarios and associated gas emissions on its climate change and sustainable development. Appl. energy. [Print ed.], 2010, vol. 88, no. 2, str. 473-478. [COBISS.SI-ID 24118823]

ZIDANŠEK, Aleksander, BLINC, Robert, JEGLIČ, Anton, KABASHI, Skender, BEKTESHI, Sadik, ŠLAUS, Ivo. Climate changes, biofuels and the sustainable future. Int. j. hydrogen energy. [Print ed.], 2009, vol. 34, no. 16, str. 6980-6983. [COBISS.SI-ID 22976551]

BLINC, Robert, NAJDOVSKI, Dimitrij, BEKTESHI, Sadik, KABASHI, Skender, ŠLAUS, Ivo, ZIDANŠEK, Aleksander. How to archieve a sustainable future for Europe?. Therm. sci., 2008, vol. 12, no. 4, str. 19-25, doi: 10.2298/TSCI0804019B. [COBISS.SI-ID 22250023]

BLINC, Robert, ZIDANŠEK, Aleksander, ŠLAUS, Ivo. Sustainable development and global security. Energy (Oxford). [Print ed.], 2007, vol. 32, str. 883-890. [COBISS.SI-ID 19598631]