Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Izbrana poglavja iz fizike okolja**
Course title:	**Selected Chapters from Environmental Physics**

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
FIZIKA		**1**. ali 2.	**1., 2. ali 3.**
PHYSICS		1. or 2.	**1., 2. or 3.**

Vrsta predmeta / Course type

Izbirni za modula Biofizika 3 in Fizika 1, 2, 3

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje	Samost. delo Individ. work	ECTS
4			**4**	**7**	**435**	**15**

Nosilec predmeta / Lecturer: **Aleksander Zidanšek**

Jeziki / Languages:	
Predavanja / Lectures:	slovenski/Slovenian
Vaje / Tutorial:	slovenski/Slovenian

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

Predznanje dodiplomske fizike in predmetov na drugi stopnji Fizikalne meritve v okolju in Fizikalni procesi v ekosistemih.

Prerequisits:

Knowledge of undergraduate physics, and second degree courses Physical Measurements in Natural Environment and Physical Processes in Ecosystems.

Vsebina:

Content (Syllabus outline):

1. Pregled fizikalnih modelov v okolju Izbrana poglavja iz modeliranja v okolju: Širjenje polucije v vodi, zraku in zemlji 2. Pregled fizikalnih meritev v okolju Izbrana poglavja iz spektroskopskih metod, ki se uporabljajo za študij okolja, kot so: Masna spektroskopija, NMR spektroskopija, optična spektroskopija, laserska spektroskopija (Lidar), plinska kromatografija 3. Uporaba preprostih fizikalnih modelov v okolju Modeliranje transporta polucije v vodi, zraku in zemlji 4. Uporaba preprostih fizikalnih meritev v okolju Izbrane vsebine iz uporabe spektroskopskih metod v okolju. Meritve na terenu.	1. Review of physics models in environment Selected chapters from environmental modelling: Pollution transport in water, air and soil 2. Review of physics measurements in environment Selected chapters from spectroscopic methods, which are applicable for environmental studies, such as: Mass spectroscopy, NMR spectroscopy, optical spectroscopy, laser spectroscopy (Lidar), gas chromatography 3. Application of elementary physics models in environment Modelling of pollution transport in water, air and soil 4. Application of elementary physics measurements in environment Selected chapters from application of spectroscopic methods in environment. Field measurements.

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) E. Boeker, R. Grondelle, Environmental Physics, John Wiley & Sons, New York 1995.
4) R. J. H. Clark, R. E. Hester, Spectroscopy in Environmental Science, John Wiley & Sons, Chichester 1995.
5) Mark A. Nanny, Roger A. Minear, Jerry A. Leenheer, Nuclear Magnetic Resonance Spectroscopy in Environmental Chemistry, Oxford University Press, 1997.
6) Članki v revijah New Scientist, Scientific World in Computational Physics
7) 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 usvojijo znanja, potrebna za razumevanje in interpretacijo meritev polutantov v naravnem okolju, za samostojno	Students achieve knowledge that is necessary for complex understanding and interpretation of pollutant measurements in natural environment,

izvajanje preprostih meritev in za modeliranje transporta polutantov.	for independent performance of elementary measurements and for modelling the pollution transport.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Razumevanje spektroskopskih tehnik, ki se uporabljajo pri meritvah polutantov, in obvladovanje modelov širjenja polutantov. Prenesljive/ključne spretnosti in drugi atributi: Predmet pripravlja študenta za samostojno delo na fizikalnih projektih s področja ekologije in okoljevarstva.	Knowledge and understanding: Understanding of spexctroscopic techniques for measurement of pollutants and mastering the models of pollutant transport. Transferable/Key Skills and other attributes: Subject prepares the student for independent work on some physics projects in ecology and environmental protection.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Metodika obsega: predavanja, laboratorijske in terenske vaje v različnih naravnih okoljih.	They are based on: lectures, laboratory and field work comprising also exercises in different natural environments.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
projektna naloga ustni izpit	**50%** **50%**	project oral examination

Reference nosilca / Lecturer's references:

1. LAVRIČ, Marta, TZITZIOS, Vassilios, KRALJ, Samo, CORDOYIANNIS, George, LELIDIS, Ioannis, NOUNESIS, George, GEORGAKILAS, V., AMENITSCH, Heinz, ZIDANŠEK, Aleksander, KUTNJAK, Zdravko. The effect of graphene on liquid-crystalline blue phases. *Applied physics letters*, ISSN 0003-6951, 2013, vol. 103, no. 14, str. 143116-1-143116-4, doi: 10.1063/1.4824424. [COBISS.SI-ID 27110951]

2. CORDOYIANNIS, George, JAMPANI, Venkata Subba R., KRALJ, Samo, KUTNJAK, Zdravko, JESENEK, Dalija, MUŠEVIČ, Igor, ZIDANŠEK, Aleksander, et al. Different modulated structures of topological defects stabilized by adaptive targeting nanoparticles. *Soft matter*, ISSN 1744-683X, 2013, vol. 9, no. 15, str. 3956-3964, doi: 10.1039/C3SM27644A. [COBISS.SI-ID 26557223]

3. KRALJ, Samo, CORDOYIANNIS, George, JESENEK, Dalija, ZIDANŠEK, Aleksander, LAHAJNAR, Gojmir, NOVAK, Nikola, AMENITSCH, Heinz, KUTNJAK, Zdravko. Dimensional crossover and scaling behavior of a smectic liquid crystal confined to controlled-pore glass matrices. *Soft matter*, ISSN 1744-683X, 2012, vol. 8, issue 8, str. 2460-2470, doi:

10.1039/C1SM06884A. [COBISS.SI-ID 25534759]

4. ZIDANŠEK, Aleksander, AMBROŽIČ, Milan, MILFELNER, Maja, BLINC, Robert, LIOR, Noam. Solar orbital power : sustainability analysis. V: DUIĆ, Neven (ur.), GUZOVIĆ, Zvonimir (ur.). *Proceedings of the 5th Dubrovnik Conference on Sustainable Development of Energy, Water and Environment Systems, 30 September 2009 to 3 October 2009, Dubrovnik, Croatia*, (Energy, ISSN 0360-5442, vol. 36, no. 4, 2011). Oxford; New York: Pregamon Press, 2011, vol. 36, no. 4, str. 1986-1995. [COBISS.SI-ID 24602919]
tipologija 1.08 -> 1.01

5. ZIDANŠEK, Aleksander, BLINC, Robert, JEGLIČ, Anton, KABASHI, Skender, BEKTESHI, Sadik, ŠLAUS, Ivo. Climate changes, biofuels and the sustainable future. V: GUZOVIĆ, Zvonimir (ur.), DUIĆ, Neven (ur.), BAN, Marko (ur.). *Proceedigs of the 4th Dubrovnik Conference on Sustainable Development of Energy, Water and Environment Systems, Dubrovnik, Croatia, June 2007*, (International journal of hydrogen energy, ISSN 0360-3199, vol. 34, no. 16, 2009). Oxford; New York: Pergamon Press, 2009, vol. 34, no. 16, str. 6980-6983. [COBISS.SI-ID 22976551]
tipologija 1.08 -> 1.01