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, 3. stopnja		**1. ali 2.**	**1., 2. ali 4.**
PHYSICS, 3rd cycle		**1. or 2.**	**1., 2. or 4.**

Vrsta predmeta / Course type	Izbirni za vse module / elective for all modules
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	165	6

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:	**Prerequisits:**
Ni zahtev. Priporočeno znanje dodiplomske fizike ter osnov energetike in fizikalnih procesov v okolju.	None. Recommended knowledge of undergraduate physics as well as fundamentals of energetics and physical processes in environment.

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	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

se uporabljajo za študij okolja, kot so: Masna spektroskopija, NMR spektroskopija, optična spektroskopija, laserska spektroskopija (Lidar), plinska kromatografija 3. Uporaba izbranih fizikalnih modelov v okolju Modeliranje transporta polucije v vodi, zraku in zemlji 4. Uporaba izbranih fizikalnih meritev v okolju Izbrane vsebine iz uporabe spektroskopskih metod v okolju. Meritve na terenu.	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 selected physics models in environment Modelling of pollution transport in water, air and soil 4. Application of selected 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 Physics, John Wiley & Sons, New York 2011.
3) R. J. H. Clark, R. E. Hester, Spectroscopy in Environmental Science, John Wiley & Sons, Chichester 1995.
4) Članki v revijah New Scientist, Scientific World in Computational Physics
5) 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 pridobijo znanja, potrebna za razumevanje in interpretacijo meritev polutantov v naravnem okolju, za samostojno izvajanje fizikalnih meritev in za modeliranje transporta polutantov.	Students acquire knowledge that is necessary for complex understanding and interpretation of pollutant measurements in natural environment, for independent performance of physical measurements and for modelling the pollution transport.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Razume in uporablja spektroskopske tehnike, ki se uporabljajo pri meritvah polutantov v okolju. Sestavi modele transporta polutantov v vodi, zraku in zemlji, jih reši in ovrednoti rezultate. Prenesljive/ključne spretnosti in drugi atributi: Predmet pripravlja študenta za samostojno raziskovalno delo na projektih s področja okolja.	Knowledge and understanding: The students understand and apply spexctroscopic techniques for measurement of pollutants in the environment. They compose models of transport of pollutants in water, air and soil, solve them and evaluate results. Transferable/Key Skills and other attributes: Subject prepares the student for independent research work on projects in the field of environment.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Razlaga, razgovor, demonstracija, študij primerov, problemsko učenje ter terensko delo.	Lecture, discussion, demonstration, case studies, problem based learning, field work.

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

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]
- ZIDANŠEK, Aleksander, PUC, Uroš, ABINA, Andreja. Ground-penetrating radar Investigation of the St. Benedict Church in Kančevci. V: *SDEWES 2019*. 14th Conference on Sustainable Development of Energy, Water and Environment Systems, October 1-6 2019, Dubrovnik, Croatia. [S. l.]: SDEWES.ORG, 2019. Str. 1066-1-1066-7, ilustr. [COBISS.SI-ID 32795943]
- PUC, Uroš, ABINA, Andreja, JEGLIČ, Anton, ZIDANŠEK, Aleksander, KAŠALYNAS, Irmantas, VENCKEVIČIUS, Rimvydas, VALUŠIS, Gintaras. Spectroscopic analysis of melatonin in the terahertz frequency range. *Sensors*, ISSN 1424-8220, 2018, vol. 18, no. 12, str. 4098-1-4098-12, doi: 10.3390/s18124098. [COBISS.SI-ID 31962407]
- JAZBINŠEK, Mojca, PUC, Uroš, ABINA, Andreja, ZIDANŠEK, Aleksander. Organic crystals for THz photonics. *Applied sciences*, ISSN 2076-3417, 2019, vol. 9, no. 5, str. 882-1-882-45, doi: 10.3390/app9050882. [COBISS.SI-ID 32214055]
- VASUDEVAN, Aswathy, SHVALYA, Vasyl, ZIDANŠEK, Aleksander, CVELBAR, Uroš. Tailoring electrical conductivity of two dimensional nanomaterials using plasma for edge electronics : a mini review. *Frontiers of Chemical Science and Engineering*. 13 (**3**): 427-443, 2019, 17 str. ISSN 2095-0179. DOI:

10.1007/s11705-019-1805-4. [COBISS.SI-ID 32306471]