



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Didaktično-fizikalni praktikum 2
Course title:	Didactical-physical lab 2

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Dvopredmetna izobraževalna fizika	/	1,2	1,3
Double major Educational Physics	/		

Vrsta predmeta / Course type:

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Terenske vaje Field work	Samost. delo Individ. work	ECTS
5			40		75	4

Nosilec predmeta / Lecturer:

Jeziki / Languages:	Predavanja / Lectures:	<input type="text" value="slovenski / slovene"/>
	Vaje / Tutorial:	<input type="text" value="slovenski / slovene"/>

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

Prerequisites:

Vsebina:

Content (Syllabus outline):

PR:

Osnove varnega in didaktično ustreznega laboratorijskega dela v srednji šoli. Kvalitativne in kvantitativne meritve, specifik samostojnega in skupinskega eksperimentalnega dela. Opremljenost fizikalnega kabineta in učilnice za laboratorijsko delo v srednji šoli, prva pomoč ob nesrečah, varnostna pravila.

Ergonomija šolskega eksperimentalnega delovnega mesta.

LV:

Osredotočeno na fizikalno eksperimentalno delo v srednji šoli. Usposobljenost, da študenti znajo samostojno razvito vajo pripraviti na način, primeren za vključevanje v srednješolski pouk fizike. Vešči so izvajanja kompleksnejših meritev z različnih fizikalnih področij srednješolske fizike ter uporabe računalnika z vmesnikom in senzorji pri meritvah.

Projektna naloga:

Samostojno delo: zasnovati in pripraviti motivativno eksperimentalno vajo, izvesti vajo in poročilo o vaji, pripraviti navodila in varnostna opozorila, vajo predstaviti strokovni in laični javnosti ter odgovarjati na vprašanja.

Lectures:

Basics of safe and didactical adequate laboratory work in secondary school. Qualitative and quantitative measurements, specifics of a autonomous and group experimental work. Equipment of physics cabinet and classrooms for laboratory work in secondary school, emergency first aid, safety rules.

Ergonomics of school experimental workplace.

LW:

Focusing on physical experimental work in secondary school. Student are able to prepare the self-developed exercise in such a manner, which is suitable for inclusion in the advance teaching of physics. They are skilled to execute complex measurements of various physical fields of secondary school physics and use of computer with interface and sensors at measurements.

Project work:

Autonomous work: to design and prepare a motivative experimental exercise, execute and prepare report, prepare instructions and safety warnings, present exercise to professional and lay public and to answer questions.

Temeljni literatura in viri / Readings:

1. Navodila za izvedbo vaj/ Guidelines for the experiments
2. Znanstveni in strokovni članki v znanstvenih in strokovnih revijah / Scientific and technical papers in scientific and technical journals
3. Učbeniki, priročniki in e-gradiva s področja teme / textbooks, handbooks and e-materials on the chosen topic.
4. J. Strnad, Fizika, 1. in 2. del, (DMFA, Ljubljana, 2002)
5. Na spletnih straneh Oddelka za fiziko objavljena elektronska gradiva./ teaching material published on websites of Department of Physics
6. I. Gerlič. Didaktika pouka fizike v OŠ. PEF MB, 1992.
7. I. Gerlič, V. Udir. Problemski pouk fizike v OŠ. Zavod RS za šolstvo, Ljubljana, 2006.

Cilji in kompetence:

- Študenti poglobijo znanja iz didaktike fizike, natančneje s področja fizikalnega eksperimentiranja v srednji šoli.

Objectives and competences:

- Students deepen their knowledge in the field of didactics of physics, specifically in the field of physical experimentation in secondary school.

Predvideni študijski rezultati:

Znanje in razumevanje:

Poglobljeno znanje tem s področij didaktike fizike, osredotočeno na fizikalno eksperimentalno delo v srednji šoli. Razvijejo spretnosti varnega snovanja, izvajanja eksperimentalnih vaj in kompetenco pisnega in verbalnega izražanja pred strokovno in laično javnostjo. Usposobljeni so, da znajo samostojno razvito vajo pripraviti na način, primeren za vključevanje v srednješolski pouk fizike. Vešči so izvajanja osnovnih meritev z različnih fizikalnih področij srednješolske fizike ter uporabe računalnika z vmesnikom in senzorji pri meritvah.

Prenosljive/ključne spretnosti in drugi atributi:

Strokovna in informacijska pismenost. Podajanje znanja za različne razvojne stopnje.

Intended learning outcomes:

Knowledge and Understanding:

Deeper knowledge in the fields of didactics of physics, focusing on physical experimental work in secondary school. Students develop skills of safe design, execution of experimental exercises and competence in writing and verbal expression in front of professional and lay public. They are able to prepare the self-developed exercise in such a manner, which is suitable for inclusion in the secondary teaching of physics. They are skilled to execute basic measurements of various physical fields of secondary school physics, and use of computer with interface and sensors at measurements.

Transferable/Key Skills and other attributes:

Scientific and informational literacy. Knowledge communication at different development stages.

Metode poučevanja in učenja:**Learning and teaching methods:**

Multimedijska predavanja

Vodeno eksperimentalno delo

Problemsko učenje

Samostojno terensko in laboratorijsko delo

Multimedia lectures

Guided experimental work

Problem-based learning

Autonomous field and laboratory work

Delež (v %) /

Načini ocenjevanja:Weight (in %) **Assessment:**

a) priprave na vajo

a) 10 %

a) preparing on exercise

b) izdelano poročilo laboratorijskih vaj ter zagovor

b) 70 %

b) elaborate a report of laboratory exercises, and defense it

c) projektna naloga (izdelava in predstavitev)

c) 20 %

c) project work (execution and presentation)

Reference nosilca / Lecturer's references:

1. MILFELNER, Maja, AMBROŽIČ, Milan, KRAŠNA, Marjan, CVETKO, Matej, ZIDANŠEK, Aleksander, REPNIK, Robert. Visualization of nematic director field with the RGB color system. *Mol. cryst. liq. cryst. (Phila. Pa. : 2003)*, 2012, vol. 553, no. 1, str. 50-57, doi: [10.1080/15421406.2011.609370](https://doi.org/10.1080/15421406.2011.609370). [COBISS.SI-ID [18901000](https://www.cobiss.si/id/18901000)], [ICR, WoS do 6. 5. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 27. 2. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0]

2. JESENEK, Dalija, GERLIČ, Ivan, VIŠNIKAR, Anja, REPNIK, Robert, KRALJ, Samo. Thin nemantic films : laboratory of physics for topological defects. *Mol. cryst. liq. cryst. (Phila. Pa. : 2003)*, 2012, vol. 553, no. 1, str. 153-160, doi: [10.1080/15421406.2011.609461](https://doi.org/10.1080/15421406.2011.609461). [COBISS.SI-ID [25534503](#)], [JCR, WoS do 6. 10. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 6. 9. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0]
3. REPNIK, Robert, GERLIČ, Ivan. Liquid crystals and development of natural science competences. *Mol. cryst. liq. cryst. (Phila. Pa. : 2003)*, 2012, vol. 553, no. 1, str. 168-174, doi: [10.1080/15421406.2011.609464](https://doi.org/10.1080/15421406.2011.609464). [COBISS.SI-ID [19420680](#)], [JCR, WoS do 7. 11. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 16. 10. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0]
4. REPNIK, Robert, POPA-NITA, Vlad, KRALJ, Samo. Mixtures of nanoparticles and liquid crystal phases exhibiting topological defects. *Mol. cryst. liq. cryst. (Phila. Pa. : 2003)*, 2012, vol. 560, iss. 1, str. 115-122, ilustr. <http://www.tandfonline.com/doi/full/10.1080/15421406.2012.663187>, doi: [10.1080/15421406.2012.663187](https://doi.org/10.1080/15421406.2012.663187). [COBISS.SI-ID [19420936](#)], [JCR, WoS do 7. 11. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0, Scopus do 16. 10. 2012: št. citatov (TC): 0, čistih citatov (CI): 0, normirano št. čistih citatov (NC): 0]
5. KRALJ, Samo, REPNIK, Robert. Patterns in symmetry breaking transitions. V: LAMANAUSKAS, Vincentas (ur.). *Philosophy of mind and cognitive modelling in education - 2012*, (Problems of education in the 21st century, vol. 46). Siauliai: Scientific Methodological Center Scientia Educologica, 2012, str. 74-84, ilustr. [COBISS.SI-ID [19462920](#)]