Univerza v Mariboru
University of Maribor

FAKULTETA za NARAVOSLOVJE in MATEMATIKO
FACULTY OF NATURAL SCIENCE and MATHEMATICS

OPIS PREDMETA / SUBJECT SPECIFICATION	
Predmet:	Eksperimentalni projekti pri pouku fizike
Subject Title:	Experimental Projects in Physics Education

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
FIZIKA PHYSICS		2	1

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30	20				250	**10**

Nosilec predmeta / Lecturer: Aleš Fajmut

Jeziki / Languages: **Predavanja / Lecture:** slovenski/Slovenian; **Vaje / Tutorial:**

Pogoji za vključitev v delo:
Ni posebnih zahtev.

Prerequisites:
None.

Vsebina:
Predavanja:
- cilji in namen eksperimentalnega pouka fizike na vseh nivojih formalnega in neformalnega izobraževanja fizike
- težavne stopnje eksperimentalnega dela
- načini eksperimentiranja pri pouku fizike (samostojno, skupinsko, demonstracijsko, domači eksperiment)
- načrtovanje, izdelava in priprava eksperimentov in eksperimentalnega dela
- učenčeva priprava na eksperimentalno delo
- izvedba eksperimenta
- vrednotenje rezultatov
- ugotovitve, sklepi in diskusija
- varnost in nevarnosti pri eksperimentiranju
- primerjava med simulacijami, animacijami in realnim eksperimentom

Seminar:
- zgledi in primeri že obstoječih eksperimentov
- predstavitev projektnih nalog o samostojno razvitih ali prirejenih eksperimentih

Contents:
Lectures:
- goals and purpose of formal and informal curricula supported with experiments at all levels of Physics Education
- different levels of experimentation
- ways of experimenting at Physics classes (individual, group, demonstration, home experiments)
- projecting, realisation and preparation of experiments and experimental work
- student's preparation for experimental work
- realisation of experimental work
- evaluation of experimental results
- findings, conclusions and discussion
- safety and hazards at experimental work
- comparison between simulations and animations and real experiments

Seminar:
- examples and cases of existing experiments
- presentation of projects of individually developed or arranged eksperiments

Temeljni študijski viri/Textbooks:
1. J. C. Sprott, Physics Demonstrations: A Sourcebook for Teachers of Physics, The University of Wisconsin Press, Madison 2006
2. Y. Kraftmakher, Experiments And Demonstrations in Physics: Bar-Ilan Physics Laboratory, World Scientific Publishing Company, 2006
3. L. A. Bloomfield, How Things Work: The Physics of Everyday Life, Wiley, 2005

4. A. C. Melissinos, J. Napolitano, Experiments in Modern Physics 2nd Ed., Academic Press, 2003.
5. L. C. McDermott, P. S. Shaffer, M. L. Rosenquist, Physics by Inquiry: An Introduction to Physics and the Physical Sciences, Vol. 2, John Wiley&Sons, 1996.
6. L. C. McDermott , Physics by Inquiry: An Introduction to Physics and the Physical Sciences, Vol. 1, Wiley, 1995
7. J. Cunningham, N. Herr, Hands-On Physics Activities with Real-Life Applications: Easy-to-Use Labs and Demonstrations for Grades 8 – 12, The Center for Applied Research, 1994.

Cilji	**Objectives:**
Namen predmeta je posredovati poglobljena teoretična in praktična znanja, potrebna za pripravo in izvedbo novih eksperimentov uporabnih pri poučevanju fizike na različnih nivojih. Študenti si pridobijo znanja in spretnosti za samostojno, planiranje, prirpravo in izvedbo novih eksperimentov.	The goal of the course is to transfer profound theoretical and practical knowledge that is needed for preparation and realisation of novel experiments needed at Physics classes at different levels of education. Students get knowledge and skills for individual planning, preparation and realisation of novel experiments.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanja in razumevanja: Poglobljeno poznavanje in razumevanje teoretičnih in praktičnih znanj ter pridobljene izkušnje in spretnosti s področja samostojne priprave, izvedbe in kreiranja novih eksperimentov na različnih nivojih počevanja fizike. Prenosljive/ključne spretnosti in drugi atributi: Samostojnost v razvijanju novih znanj, rešitev in idej za pripravo eksperimentov na področju poučevanja fizike.	Knowledge and Understanding: Deep knowledge and understanding of theoretical and practical topics as well as gained experiences and skills in the field of planning, realisation and creation of novel experiments applicable in the curricula of Physics at different levels. Transferable/Key Skills and other attributes: Self-independence in developing novel knowledge, solutions and idea for preparing experiments applicable in education of Physics.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminar, samostojno delo študenta	Lectures, seminar, individual work of students

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Projektna naloga	50%	Project
Predstavitev projektne naloge	50%	Presentation of the project