



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Ekperimentalni projekti pri pouku fizike
Course title:	Experimental Projects in Physics Education

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

Vrsta predmeta / Course type

Izbirni iz nabora Fiziklno - didaktični predmeti za modul Izobraževalna fizika 2, 3

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
7	3				290	10

Nosilec predmeta / Lecturer:

Aleš Fajmut

Jeziki /

Languages:

Predavanja /

Lectures:

slovenski/Slovenian

Vaje / Tutorial:

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

Ni posebnih zahtev.

Prerequisites:

None.

Vsebina:

Predavanja:

- cilji in namen eksperimentalnega pouka fizike na vseh nivojih formalnega in neformalnega izobraževanja fizike

Content (Syllabus outline):

Lectures:

- goals and purpose of formal and informal curricula supported with experiments at all levels of Physics Education

- 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

- 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 experiments

Temeljni literatura in viri / Readings:

- 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 in kompetence:

Namen predmeta je posredovati poglobljena teoretična in praktična znanja, potrebna za pripravo in izvedbo novih eksperimentov

Objectives and competences:

The goal of the course is to transfer profound theoretical and practical knowledge that is needed for preparation and realisation of novel

uporabnih pri poučevanju fizike na različnih nivojih. Študenti si pridobijo znanja in spretnosti za samostojno, planiranje, pripravo in izvedbo novih eksperimentov.

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:

Znanje in razumevanje:

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 poučevanja fizike.

Prenesljive/ključne spretnosti in drugi atributi:

Samostojnost v razvijanju novih znanj, rešitev in idej za pripravo eksperimentov na področju poučevanja fizike.

Intended learning outcomes:

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:

Predavanja, seminar, samostojno delo študenta

Learning and teaching methods:

Lectures, seminar, individual work of students

Načini ocenjevanja:

Delež (v %) /

Weight (in %)

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)	Delež (v %) / Weight (in %)	Assessment:
Projektna naloga	50%	Project
Predstavitev projektne naloge	50%	Presentation of the project

Reference nosilca / Lecturer's references:

1. DOBOVIŠEK, Andrej, FAJMUT, Aleš, BRUMEN, Milan. Strategy for NSAID administration to aspirin-intolerant asthmatics in combination with PGE [sub] 2 analogue: a theoretical approach. *Medical & biological engineering & computing*, ISSN 0140-0118. [Print ed.], 2012, vol. 50, no. 1, str. 33-42, doi: [10.1007/s11517-011-0844-x](https://doi.org/10.1007/s11517-011-0844-x). [COBISS.SI-ID 18845192]
2. DOBOVIŠEK, Andrej, FAJMUT, Aleš, BRUMEN, Milan. Role of expression of prostaglandin synthases 1 and 2 and leukotriene C [sub] 4 synthase in aspirin-intolerant asthma: a theoretical study. *Journal of pharmacokinetics and pharmacodynamics*, ISSN 1567-567X, 2011, vol. 38, no. 2, str. 261-278, doi: [10.1007/s10928-011-9192-6](https://doi.org/10.1007/s10928-011-9192-6). [COBISS.SI-ID 18203144]
3. FAJMUT, Aleš, BRUMEN, Milan. MLC-kinase/phosphatase control of Ca[^{sup}]2+ signal transduction in airway smooth muscles. *Journal of theoretical biology*, ISSN 0022-5193, 2008, vol. 252, no. 3, str. 474-481. <http://dx.doi.org/10.1016/j.jtbi.2007.10.005>, doi: [10.1016/j.jtbi.2007.10.005](https://doi.org/10.1016/j.jtbi.2007.10.005). [COBISS.SI-ID 15856392]

4. FAJMUT, Aleš, BRUMEN, Milan, SCHUSTER, Stefan. Mathematical modelling of the interactions between Ca^{2+} , calmodulin and myosin light chain kinase. *FEBS letters*, ISSN 0014-5793. [Print ed.], 2005, 579, str. 4361-4366. [COBISS.SI-ID [14189576](#)]

5. FAJMUT, Aleš, JAGODIČ, Marko, BRUMEN, Milan. Mathematical modeling of the myosin light chain kinase activation. *Journal of chemical information and modeling*, ISSN 1549-9596. [Print ed.], 2005, [Vol.] 45, str. 1605-1609. [COBISS.SI-ID [14354184](#)]