



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Inovativni projekti
Course title:	Innovative projects

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 Fizikalno - didaktični predmeti za modul izobraževalna fizika 2, 3

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Mentorstvo Mentorship	Samost. delo Individ. work	ECTS
7	3				290	10

Nosilec predmeta / Lecturer:

Mitja SLAVINEC

Jeziki /

Languages:

Predavanja / slovenski/Slovenian

Lectures:

Vaje / Tutorial:

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

Jih ni.

Prerequisites:

None.

Vsebina:

- Analiza klasičnega in sodobnega poučevanja fizike.
- Sodobne smeri v didaktiki pouka fizike – inovativne učne metode in oblike.

Content (Syllabus outline):

- Analysis of classical and modern principles of physics education.
- Contemporary directions in didactics of physics – innovative educational methods and

- Domači in mednarodni projekti raziskav poučevanja fizike.
- Inovacije in pouk fizike. Analiza in metodologija inovativnih projektov.
- Planiranje in strokovno ter didaktično ovrednotenje uporabe inovativnih projektov za pouk fizike.
- Eksperimentalni izvedbeni projekt.

forms.

- Native and international projects of research in physics education.
- Innovations in physics education. Analysis and methodology of innovation projects.
- Planning as well as professional and didactical evaluation of use of innovative projects for physics education.
- Practical experimental project.

Temeljni literatura in viri / Readings:

- 1) Beiser: Concepts of Modern Physics. New York: Mc Graw-Hill, 1987.
- 2) Campbell, A., McNamara, O., Gilroy, P. (2004). Practitioner Research and Professional Development in Education. London: Paul Chapman Publishing.
- 3) Gerlič: Metodika in metodologija pouka fizike. Maribor: PEF Maribor, 1984.
- 4) Gerlič: Didaktika pouka fizike v osnovni šoli. PEF MB, 1992.
- 5) Gerlič, Udir: Problemski pouk fizike v osnovni šoli. Zavod RS za šolstvo, Ljubljana, 2006.
- 6) Gerlič: Sodobna informacijska tehnologija v izobraževanju. DZS, Ljubljana, 2000.
- 7) Lankshear, C., Knobel, M. (2006). A Handbook for Teacher Research. Glasgow, Open University Press.
- 8) Resnick, D. Halliday: Fundamentals of Physics. London: Wiley and Sons, 1993
- 9) Strnad. O poučevanju fizike. Sigma-DMFA, Ljubljana 2006.
- 10) Učbeniki, priročniki, napotki za projektno delo slovenskih in tujih založb.
- 11) Revije: Physics Teacher, Physics Education, Technology & Learning, Computers & Education, Educational Technology in slovenske fizikalne, računalniške ter didaktične revije.
- 12) Mladinsko raziskovalno delo, E. Kopal, DZS, Ljubljana 1990
- 13) J. Gharajedaghi, Systems Thinking, Managing Chaos and Complexity, Elsevier, Amsterdam, 2011.

Cilji in kompetence:

Študent/ka:

- Pridobi dodatno znanje in poglobi obstoječe znanje o inovativnih projektih izobraževalne fizike za izboljšanje kakovosti učenja in poučevanja fizike v osnovnih in srednjih šolah ter na univerzi.
- se usposobi za samostojno

Objectives and competences:

A student:

- Gains additional knowledge and deepens the existing one about innovative projects in physics education for improvement of physics teaching and physics education quality in primary and secondary schools and universities.
- Is qualified for advanced independent

razvojnoraziskovalno delo na področju inovativnih projektov.

development and research work on the field of innovation projects.

Predvideni študijski rezultati:

Znanje in razumevanje:

- Poglobljeno poznavanje in razumevanje didaktike fizike.
- Poglobljeno znanje in razumevanje raziskovanja fizikalno-didaktičnih procesov

Prenesljive/ključne spretnosti in drugi atributi:

- Sposobnost kritične uporabe znanstvenih in strokovnih spoznanj s področja didaktike fizike.
- Sposobnost samostojnega raziskovanja v didaktiki fizike.
- Spretnosti v prezentaciji, izražanju in objavi raziskovalnega dela.

Intended learning outcomes:

Knowledge and understanding:

- Deeper knowledge and understanding of the didactics of physics.
- Deeper knowledge and understanding of research processes in didactics of physics.

Transferable/Key Skills and other attributes:

- The ability of critical use and application of scientific and professional findings from the field of didactics of physics.
- The ability of independent research in didactics of physics.
- Writing and presentation skills and skills in publication of research work.

Metode poučevanja in učenja:

- predavanja
- obravnava študijskih primerov z diskusijo,
- projektno delo
- multimedijška predstavitev

Learning and teaching methods:

- interactive lectures
- case studies discussion,
- project work,
- multimedia presentation.

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)

- Projektna naloga
- Ustni izpit

Delež (v %) /

Weight (in %)

40%

60%

Assessment:

Type (examination, oral, coursework, project):

- Project
- Oral examination

Reference nosilca / Lecturer's references:

1. ÜLEN, Simon, ČAGRAN, Branka, SLAVINEC, Mitja, GERLIČ, Ivan. Designing and evaluating the effectiveness of Physlet-based learning materials in supporting conceptual learning in secondary school physics. *Journal of science education and technology*, ISSN 1059-0145, 2014, vol. 23, iss. 5, str. 658-667, tabele, doi: [10.1007/s10956-014-9492-x](https://doi.org/10.1007/s10956-014-9492-x). [COBISS.SI-ID [20475656](https://www.cobiss.si/id/20475656)]

- 2.** SVETEC, Milan, SLAVINEC, Mitja. Structural transition of nematic liquid crystal in cylindrical capillary as a result of the annihilation of two point defects. *The Journal of chemical physics*, ISSN 0021-9606, 2008, vol. 128, no. 8, str. 084704-1-084704-6, ilustr. <http://link.aip.org/link/?JCPA6/128/084704/1>, <http://dx.doi.org/10.1063/1.2839301>. [COBISS.SI-ID 15899400]
- 3.** RANJKESH SIAHKAL, Amid, AMBROŽIČ, Milan, SLAVINEC, Mitja. Study of phase transitions and structural order in perturbed nematic liquid crystals = Študij faznega prehoda in strukturnega reda v perturbiranemu nematičnemu tekočemu kristalu. *Anali PAZU*, ISSN 2232-416X, 2013, letn. 3, št. 2, str. 57-67, graf. prikazi. http://www.anali-pazu.si/sites/default/files/Separat_Ranjesh_et_al_.pdf. [COBISS.SI-ID 20496136]
- 4.** ÜLEN, Simon, ČAGRAN, Branka, SLAVINEC, Mitja, GERLIČ, Ivan. Designing and evaluating the effectiveness of Physlet-based learning materials in supporting conceptual learning in secondary school physics. *Journal of science education and technology*, ISSN 1059-0145, 2014, vol. 23, iss. 5, str. 658-667, tabele, doi: [10.1007/s10956-014-9492-x](https://doi.org/10.1007/s10956-014-9492-x). [COBISS.SI-ID 20475656]
- 5.** SVETEC, Milan, SLAVINEC, Mitja. Nematic liquid crystal locking menisci. *Advances in condensed matter physics*, ISSN 1687-8108, 2013, vol. 2013, art. ID 756902, str. 1-6. <http://dx.doi.org/10.1155/2013/756902>. [COBISS.SI-ID 19802888]