



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Mednarodne raziskave poučevanja fizikalnih vsebin
Course title:	International Studies in Teaching Physical Topics

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, 3 rd cycle		1. ali 2.	1., 2. or 4.

Vrsta predmeta / Course type

Izbirni za modul Izobraževalna fizika

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Lab. vaje Laboratory work	Mentorstvo Mentorship	Samost. delo Individ. work	ECTS
10	5				165	6

Nosilec predmeta / Lecturer:

Robert REPNIK

Jeziki /

Languages:

Predavanja /

Lectures:

slovenski/Slovenian

Vaje / Tutorial:

slovenski/Slovenian

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

Pogoji za vključitev v delo:

Pogojev ni.

Pogoji za opravljanje študijskih obveznosti:

Vsaka izmed naštetih obveznosti v načinih ocenjevanja mora biti opravljena s pozitivno oceno. Pozitivna ocena iz projektne naloge je pogoj za pristop k izpitu.

Prerequisites:

Conditions for Inclusion in the Course:

None.

Conditions for Fulfilling Study Obligations:

Each of the listed obligations in the assessment methods must be completed with a positive grade. Positive grade of project work is prerequisite for access to the exam.

Vsebina:

Razvoj poučevanja fizikalnih vsebin skozi čas na območju Slovenije.

Content (Syllabus outline):

The development of teaching physical topics over time in Slovenia.

Mednarodna primerjava razvoja poučevanja fizikalnih vsebin skozi čas.

Primerjalne študije razlik v poučevanju fizikalnih vsebin.

Raziskave in primerjave zastopanosti posameznih fizikalnih vsebin v poučevanju.

Uporaba znanstvenih metod pri raziskovanju razlik v poučevanju fizikalnih vsebin.

International comparison of the development of teaching physical topics over time.

Comparative studies of differences in the teaching of physics content.

Research and comparison of inclusion of particular physical topics in teaching.

Using scientific methods to explore differences in teaching physical topics.

Temeljni literatura in viri / Readings:

1. Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education* (8. izd.). Routledge. [COBISS.SI-ID 24180966]
<https://plus.cobiss.net/cobiss/si/sl/bib/pefmb/24180966>
2. Lederman, N. G., & Abell, S. K. (ur.). (2014). *Handbook of Research on Science Education, Volume II*. Routledge. [COBISS.SI-ID 24316936]
<https://plus.cobiss.net/cobiss/si/sl/bib/pefmb/24316936>
3. Panahi, S., Nazarimehr, F., Jafari, S., Sprott, J. C., Perc, M., Repnik, R. (2021). Optimal synchronization of circulant and non-circulant oscillators. *Applied Mathematics and Computation*, 394, 125830, 1–8. [COBISS.SI-ID 43339779]
<https://doi.org/10.1016/j.amc.2020.125830>

Dodatna literatura / Additional readings:

1. Vosniadou, S. (ur.). (2013). *International Handbook of Research on Conceptual Change*. Routledge. [COBISS.SI-ID 52176994]
 2. Članki v znanstvenih in strokovnih revijah s področja izobraževanja fizike / Articles in scientific and professional journals in the field of physics education.
 3. Poročila domačih in mednarodnih znanstvenih in strokovnih projektov s področja izobraževanja fizike / Reports from national and international research and professional projects in the field of physics education.
 4. Spletne strani Oddelka za fiziko in projekta Razvoj naravoslovnih kompetenc / Websites of the Department of Physics and the project Development of Science Competences.
- 1.

Cilji in kompetence:

Študent usvoji dodatno znanje in nadgradi obstoječe znanje o inovativnih projektih izobraževalne fizike za izboljšanje kakovosti učenja in poučevanja fizike v osnovnih in srednjih šolah ter na univerzi ter se usposobi za samostojno razvojnoraziskovalno delo na področju inovativnih projektov.

Objectives and competences:

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 and is qualified for advanced independent development and research work on the field of innovation projects.

Predvideni študijski rezultati:

Znanje in razumevanje:

Po uspešno zaključeni učni enoti študent:

- pozna in razume didaktiko fizike in raziskovanje fizikalno-didaktičnih procesov,
- usvoji znanstvene metode, potrebne za izvedbo mednarodnih primerjav poučevanja

Prenosljive/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:

On completion of this course the student:

- knows and understands the didactics of physics. and research processes in didactics of physics.
- acquires knowledge of scientific methods necessary for carrying out international comparisons of teaching

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:

- interaktivna predavanja
- obravnava študijskih primerov z diskusijo,
- projektno delo
- poučevanje na daljavo
- multimedijška predstavitev

Poučevanje in učenje potekata z didaktično uporabo informacijsko-komunikacijske tehnologije

Learning and teaching methods:

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

Teaching and learning are done through the didactic use of ICT.

Delež (v %) /

Weight (in %)

Assessment:

Načini ocenjevanja:

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Projekt		Project
Ustni izpit		Oral exam
	60%	
	40%	

Reference nosilca / Lecturer's references:

PANAHI, Shirin, NAZARIMEHR, Fahimeh, JAFARI, Sajad, SPOTT, Julien Clinton, PERC, Matjaž, REPNIK, Robert. Optimal synchronization of circulant and non-circulant oscillators. Applied

mathematics and computation. [Print ed.]. Apr. 2021, vol. 394, art. no. 125830, str. 1-8. ISSN 0096-3003. DOI: 10.1016/j.amc.2020.125830. [COBISS.SI-ID 43339779],

JOZIČ, Primož, ZIDANŠEK, Aleksander, REPNIK, Robert. Fuel conservation for launch vehicles: Falcon Heavy case study. *Energies*. 2020, vol. 13, no. 3, str. 1-10. ISSN 1996-1073. Digitalna knjižnica Univerze v Mariboru – DKUM, DOI: 10.3390/en13030660. [COBISS.SI-ID 25125640],

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- OSRAJNIK, Damjan, GRUBELNIK, Vladimir, REPNIK, Robert. Multirhythmicity but no deterministic chaos in vibrating strings. *Chaos, solitons and fractals*. [Print ed.]. Sep. 2021, vol. 150, str. 1-5. DOI: 10.1016/j.chaos.2021.111206. [COBISS.SI-ID 73698819], [JCR, SNIP, WoS, Scopus]