Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Znanstveno-raziskovalno delo v fizikalnem izobraževanju z osnovami pedagoške statistike**
Course title:	**Scientific-research work in physics education with basics of pedagogical statistics**

Študijski program in stopnja **Study programme and level**	**Študijska smer** **Study field**	**Letnik** **Academic year**	**Semester** **Semester**
Enovit magistrski študijski program druge stopnje Predmetni učitelj	**/**	**4,5**	**7,9**
Five-year master's degree program Subject Teacher	**/**		

Vrsta predmeta / Course type	Izbirni / Optional
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**
30		**15**			**75**	**4**

Nosilec predmeta / Lecturer:	Robert Repnik

Jeziki /	**Predavanja / Lectures:**	slovenski / Slovenian
Languages:	**Vaje / Tutorial:**	slovenski / Slovenian

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Pogojev ni. Priporočljiva znanja: Osnovna znanja iz didaktike fizike.	None. Recommended knowledge: Basic knowledge of didactics of physics

Vsebina:

Predavanja:

- Uvod.
- Razvoj raziskav v izobraževanju fizike
- Raziskovalne paradigme in socialna perspektiva
- Etična perspektiva raziskovanja
- Osnove raziskovalnega dela v poučevanju fizike
- Iskanje in obravnava literature
- Raziskovalne strategije: študije primera in pedagoški eksperimenti

Laboratorijske vaje:

- Kvalitatine, kvantitativne in kombinirane raziskovalne metode, raziskovalne strategije in statistika
- Planiranje, pridobivanje podatkov, analiza podatkov, ugotavljanje zaključkov, raziskovalno delo, poročila in publikacije
- Primeri in sodobni problemi pri uporabi raziskovalnih metod na področju izobraževanja fizike (vprašalniki, intervjuji, opazovanje, raziskovanje biografij,…)
- Nacionalni in mednarodni raziskovalni projekti

Content (Syllabus outline):

Lectures:

- Introduction.
- The development of physics education research
- Research paradigms and social perspectives
- An ethical approach to research
- Getting started: beginning a research project in physics education
- Accesing and using literature
- Research strategies: case studies and pedagogical experiments

Seminar work:

- Qualitative, quantitative and mixed research approaches, research strategies, statistics
- Planing, process of data collection, data analysis, concluding, research work reports and publications
- Examples and new problems in using research methods in the field of physics education (questionnaires, interviews, observation, research of biographies...)
- National and international research projects

Temeljni literatura in viri / Readings:

- BURTON, Diana, BARTLETT, Steve. Key issues for education researchers, Sage Publications Ltd., London UK, 2009
- FRAENKEL, Jack R., WALLEN, Norman E., HYUN, Hellen H.. How to design and evaluate Research in Education, McGraw-Hill Companies Inc., New York, USA, 2012
- NEWBY, Peter. Research Methods for Education, Pearson Education Ltd., Harlow, Essex, UK, 2010
- ČAGRAN, Branka. Univariatna in multivariatna analiza podatkov : zbirka primerov uporabe statističnih metod s SPSS. Maribor: Pedagoška fakulteta, 2004
- IVANUŠ-GRMEK, Milena, ČAGRAN, Branka, SADEK, Lidija. Eksperimentalna študija primera pri pouku spoznavanja okolja. 1. natis. Ljubljana: Pedagoški inštitut, 2009

Cilji in kompetence:

Objectives and competences:

Cilj predmeta je, da študenti spoznajo znanstveno-raziskovalno delo v fizikalnem izobraževanju, razumejo njegov pomen in cilje. Študenti poznajo in znajo uporabljati raziskovalne metode za lastno znanstveno-raziskovalnemu delo v fizikalnem izobraževanju.	The objective of this course is to acquaint students with scientific research in physics education and give them an understanding of the goals of the research. Students should learn how to use different research methods in their own research work in physics education.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Po uspešno zaključeni učni enoti je študent zmožen: • razumeti namen in cilje znanstveno-raziskovalnega dela v fizikalnem izobraževanju, • organizirati in izvajati znanstvene raziskave v fizikalnem izobraževanju, • aktivno razvijati področje znanstveno-raziskovalnega dela v fizikalnem izobraževanju. **Prenesljive/ključne spretnosti in drugi atributi:** • Spretnosti komuniciranja: pisno izražanje pri pripravi poročila o raziskavi ter usvojene veščine javnega nastopanja ob predstavitvi raziskave. • Uporaba informacijske tehnologije: uporaba računalnika in elektronskih informacijskih virov pri iskanju literature in relevantnih informacij. • Reševanje problemov: organiziranje in izvedba raziskave v fizikalnem izobraževanju, časovno in vsebinsko načrtovanje raziskave, sposobnost razrešitve in interpretacije zastavljenega raziskovalnega problema.	**Knowledge and understanding:** On completion of this course the student will be able to • understand goals of scientific research in physics education, • organise and conduct scientific research in physics education • actively contribute to development of scientific research in the field of physics education **Transferable/Key Skills and other attributes:** • Comunication skills: writing skills when preparing report on research project and public performance skills when presenting the work • Use of information technology: use of computer and on-line information sources when searching for literature and relevant information. • Problem solving: organisation and conduct of research in physics education, time and content planning, ability to solve and interpret a chosen research problem.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja (razlaga, razgovor, demonstracija), eskperimentalna predavanja	• Lectures (explanation, discussion, demonstration), experimental lectures

• Seminarske vaje (metoda dela s tekstom, metoda pisnih in grafičnih del) Poučevanje in učenje potekata z didaktično uporabo informacijsko-komunikacijske tehnologije.	• Seminar work (work with text, work with graphic elements) Teaching and learning are done through the didactic use of ICT.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
• pisno poročilo o raziskavi in predstavitev • ustni izpit Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno. Pozitivna ocena iz poročila o raziskavi in predstavitve raziskave je pogoj za pristop k izpitu.	80 % 20 %	• written research report and presentation • oral examination Each of the mentioned commitments must be assessed with a passing grade. Positive grade of research report and presentation are prerequisite for access to the exam.

Reference nosilca / Lecturer's references:

EŠIĆ, Vanes, NEUMANN, Knut, AVIANI, Ivica, HASOVIĆ, Elvedin, BOONE, William J., ERCEG, Nataša, GRUBELNIK, Vladimir, SUŠAC, Ana, SALIBAŠIĆ GLAMOČIĆ, Džana, KARUZA, Marin, VIDAK, Andrej, ALIHODŽIĆ, Adis, REPNIK, Robert. Measuring students' conceptual understanding of wave optics : a rasch modeling approach. *Physical review, Physics education research*, ISSN 2469-9896, 2019, vol. 15, iss. 1, str. 010115-1-010115-20, doi: 10.1103/PhysRevPhysEducRes.15.010115. [COBISS.SI-ID 24513288], [JCR, SNIP, WoS do 9. 5. 2019: št. citatov (TC): 0, čistih citatov (CI): 0]

ROVŠEK, Barbara, REPNIK, Robert. Physics competitions for learners of primary schools in Slovenia. V: FAZIO, Claudio (ur.), SPERANDEO-MINEO, Rosa Maria (ur.). *Teaching/learning physics : integrating research into practice*, GIREP - MPTL 2014 International Conference, July 7 - 12, 2014, University of Palermo, Italy. Palermo: Universitá degli Studi di Palermo, Dipartamento di Fisica e Chimica. cop. 2015, str. 949-953, tabele. http://www1.unipa.it/girep2014/proceedings/Chapter%207.pdf,http://pefprints.pef.uni-lj.si/id/eprint/3189. [COBISS.SI-ID 10760777]

REPNIK, Robert, ŠABEDER, Aljaž, KRAŠNA, Marjan. E-learning materials to study properties of liquid crystals at university level and in schools. V: BILJANOVIĆ, Petar (ur.). *MIPRO 2014 : proceedings*, MIPRO 2014, 37th International Convention, May 26-30, 2014, Opatija, Croatia, (MIPRO ... (CD-ROM), ISSN 1847-3946). Rijeka: Croatian Society for Information and Communication Technology, Electronics - MIPRO. cop. 2014, str. 767-770, ilustr. [COBISS.SI-ID 20873480]