Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Analiza in razvoj kurikuluma**
Course title:	**Analysis and Development of Curriculum**

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, 3rd cycle		**1. or 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	Terenske vaje Field work	Samost. delo Individ. work	ECTS
10	**5**				**165**	**6**

Nosilec predmeta / Lecturer:	**Robert Repnik**

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Pogojev ni.	None.

Vsebina:	**Content (Syllabus outline):**
1. Teoretični temelji zasnove kurikula. 2. Spoznavanje kognitivno problematičnih konceptov in metod za njih vpeljavo na področju izobraževanja fizike in naravoslovja. 3. Analiza in primerjava obstoječih domačih in tujih kurikulov s področja fizike in naravoslovja.	1. Theoretical foundations of projecting curriculum. 2. Conception of cognitively problematic concepts and methods for enrolement in the field of physics and science education. 3. Analysis and comparison of existing home and foreign curricula from the field of physics and life sciences.

4. Simulacije kurikularnih tem, tudi z upoštevanjem časovnih oziroma organizacijskih omejitev. 5. Proces in postopki v razvoju kurikuluma 6. Razvoj kurikula s področja fizike in naravoslovja skozi čas, v Sloveniji in mednarodna primerjava Analiza in razvoj kurikuluma v povezavi z raziskovalnimi metodami v izobraževanju fizike - vse vsebine se osredotočajo na teorijo in primere s področja izobraževanja fizike. Temeljne značilnosti kvalitativnega glede na kvantitativno raziskovanje. Vrste pretežno kvalitativnih pedagoških raziskav (študija primera, akcijska raziskava). Faze kvalitativne in kvantitativne raziskave. Pretežno kvalitativni postopki zbiranja podatkov (opazovanje z udeležbo ali brez nje, nestrukturirani ali polstrukturirani intervju) in kvalitativne obdelave podatkov (analize dokumentov). Pretežno kvantitativni postopki zbiranja podatkov (anketiranje, preizkusi znanja, ocenjevalne lestvice, lestvice stališč, sistematično opazovanje). Metode analize atributivnih spremenljivk (frekvenčne porazdelitve, t-preizkus hipoteze neodvisnosti in enake verjetnosti, mere kontingence). Metode analize razlik s parametričnimi preizkusi (t-preizkus, analiza variance, analiza kovariance). Metode analize razlik z neparametričnimi preizkusi (Mann-Whitneyev preizkus,Wilcoxonov preizkus, Kruskal-Wallisov preizkus, Friedmanov preizkus). Metode analize povezanosti (bivariatna, multipla korelacija in regresija). Računalniška obdelava podatkov s statističnim programom SPSS - profesionalni nivo. Pisanje raziskovalnih poročil, strokovnih in znanstvenih člankov. Raba znanstvenega aparata.	4. Simulations of curricular themes by considering temporal and organisational limitations. 5. The process and procedures in curriculum development 6. Curriculum development in the field of physics and natural science through time, Slovenia and international comparison Analysis and development of curriculum in conection with research methods in physics education research - the content (theory and examples) is focused on the field of physics education. Characteristics of qualitative versus quantitative research. Type of mostly qualitative pedagogical research (study case, action research). Phases of qualitative and quantitative research. Mostly qualitative ways of collecting the data (participant or non-participant observation, informal or semistructured interview) and qualitative analyzing the data (content - document analysis). Mostly quantitative ways of collecting the data (survey, knowledge testing, scaling, attitude measurement, structured observation). Statistical methods for the analysis of nominal and ordinal variables (frequency distributions, chi-square test hypothesis about independence and hypothesis of equal probability, measures of contingency). Statistical methods for the analysis of differences whit parametric tests (t-test, analysis of variance, analysis of covariance). Statistical methods for the analysis of differences whit non-parametric tests (Mann-Whitney,Wilcoxon, Kruskal-Wallis, Friedman test). Statistical methods for the analysis of relationships (bivariate, multiple correlation and regression). Computer analysis of the data by means of SPSS statistical program - professional use. Writing research reports, technical and scientific papers. Use of scientific sources.

Iskanje in študij primerov raziskav s področja izobraževanja fizike.	Search and study of research examples from the field of physics education.

Temeljni literatura in viri / Readings:

1) Gerlič: Metodika in metodologija pouka fizike. Maribor: PEF Maribor, 1984.
2) Gerlič: Didaktika pouka fizike v osnovni šoli. PEF MB, 1992
3) Potrjeni kurikulumi fizike in naravoslovnih predmetov
4) Strokovni in znanstveni članki v revijah / Articles published in professional and scientific journals.
5) Spletne strani Oddelka za fiziko ter spletne strani domačih in tujih institucij z objavljenimi dokumenti v zvezi z razvojem kurikuluma

Cilji in kompetence:	**Objectives and competences:**
• Študent usvoji metode za kvalitativno analizo kurikulumov, pozna obstoječe kurikulume in medpredmetne povezave ter je sposoben formiranja predlogov in obdelave novih vsebin v kurikulumih.	• Student gains the knowledge of methods for qualitative analysis of curriculum, knowledge of existing curricula and interdisciplinary connections and the ability to form proposals and handling of novel topics in curricula

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Po uspešno zaključeni učni enoti študent: • razume pomembne koncepte pri konstrukciji in razvoju kurikuluma, • poznava problematične vsebine, • pozna obstoječe kurikulume in poti do kurikularnih sprememb, • usvoji sposobnost za samostojno odkrivanje raziskovalnih problemov, • zna vsebinsko in metodološko opredeliti raziskovalne probleme za raziskave s področja izobraževanja fizike, • usvoji sposobnost za korektno prevzemanje in samostojno izdelovanje strukturiranih in polstrukturiranih inštrumentov zbiranja podatkov za raziskave s področja izobraževanja fizike,	Knowledge and understanding: On completion of this course the student: • understands concepts that are important for construction and development of curriculum, • is aware of problematic topics. • has knowledge of existing curricula. • has knowledge of the procedures necessary for enforcement of curricular modifications. • gains ability of autonomous finding of research problems and defining their content and methodology for physics educational research • gains ability of correct usage and autonomous construction of structured and semi structured instruments for physics educational research,

• usvoji sposobnost izbiranja in uporabljanja ustreznih postopkov kvantitativne in kvalitativne obdelave podatkov ter interpretiranje (deskriptivno, eksplikativno) izidov analize z vidika njihove statistične in praktične pomembnosti za raziskave s področja izobraževanja fizike, • usvoji sposobnost samostojnega pisanja raziskovalnih poročil, strokovnih in znanstvenih člankov.	• gains ability of selecting and using appropriate ways of qualitative and quantitative analyzing and interpretation (descriptive, explicative) of what the results imply in theory and practice (for physics educational research), • gains ability of autonomous writing research reports, professional and scientific papers.
Prenesljive/ključne spretnosti in drugi atributi:	Transferable/Key Skills and other attributes:
• Sposobnost recenziranja kurikulumov iz sorodnih naravoslovno tehniških področij. • Iskanje in ustvarjanje medpredmetnih povezav v sorodnih naravoslovno-tehničnih kurikulih.	• The ability to revise the curricula from the related field from natural sciences and technology • Finding and creating interdisciplinary connections in related curricula from natural sciences and technology

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja (razlaga, razgovor, demonstracija) • Seminar(metoda dela s tekstom, metoda pisnih in grafičnih del, diskusija v majhnih skupinah, študija primera. Poučevanje in učenje potekata z didaktično uporabo informacijsko-komunikacijske tehnologije	• Lectures (explanation, discussion, demonstration) • Seminar (work with text, work with graphic elements, discussion in small group, case studies) Teaching and learning are done through the didactic use of ICT.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt) • ustni izpit • seminarska naloga Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno. Pozitivna ocena iz seminarske naloge je pogoj za pristop k izpitu.	**60%** **40%**	Type (examination, oral, coursework, project): • Oral exam • Seminar work Each of the mentioned commitments must be assessed with a passing grade. Positive grade of seminar work is prerequisite for access to the exam.

Reference nosilca / Lecturer's references:

- ŠORGO, Andrej, DOJER, Brina, GOLOB, Nika, REPNIK, Robert, REPOLUSK, Samo, PESEK, Igor, PLOJ VIRTIČ, Mateja, ŠPERNJAK, Andreja, ŠPUR, Natalija. Opinions about STEM content and classroom experiences as predictors of upper secondary school students' career aspirations to become researchers or teachers. *Journal of research in science teaching*, ISSN 0022-4308, 2018, str. 1-21, ilustr., doi: doi.org/10.1002/tea.21462.
- ÜLEN, Simon, GERLIČ, Ivan, SLAVINEC, Mitja, REPNIK, Robert. Evaluating the effectiveness of physlet-based materials in supporting conceptual learning about electricity. *Journal of science education and technology*, ISSN 1059-0145, 2017, vol. 26, iss. 2, str. 151-160, tabele, doi: 10.1007/s10956-016-9661-1. [COBISS.SI-ID 22803208]
- REPNIK, Robert. Using physics simulation environment for better student's performance. V: SKALA, Karolj (ur.). *MIPRO 2018 : 41st International Convention, May 21 -25, 2018, Opatija, Croatia : proceedings*. Rijeka: Croatian Society for Information and Communication Technology, Electronics and Microelectronics - MIPRO. 2018, str. 819
  824. https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8400151. [COBISS.SI-ID 24373000]