Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	**Informacijsko-komunikacijska tehnologija (IKT) v fiziki**
Course title:	**Information and Communication Technologies (ICT) in Physics**

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. 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	Terenske vaje Field work	Samost. delo Individ. work	ECTS
10	5				165	6

Nosilec predmeta / Lecturer: **Marjan Krašna**

Jeziki / Languages:		
	Predavanja / Lectures:	Slovenščina / Slovene
	Vaje / Tutorial:	Slovenščina / Slovene

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

Ni pogojev.

Prerequisits:

None.

Vsebina:

• Fizikalne osnove računalništva. Organizacija in arhitektura sodobnih računalniških sistemov. FI programska oprema.

• Področja in modeli uporabe informacijsko-komunikacijske tehnologije (IKT) pri pouku fizike.

• Teorija in praksa vključevanja IKT v fizikalni eksperiment.

Content (Syllabus outline):

• Physical bases if computing. Organisation and architecture of modern computing systems. Physics software.

• Fields and models of using Information and Communication Technologies (ICT) in Physics education.

• Theory and practice including ICT in physics experiment.

• Konceptualno poučevanje fizike - CoLoS. • Multimedijski sistemi v pouku fizike. Vizualizacija fizikalnih pojavov. • Izobraževalna omrežja. Internet in pouk fizike. Izobraževanje na daljavo. • Planiranje in strokovno ter didaktično vrednotenje uporabe informatike in računalnika pri pouku fizike.	• Connectional learning of physics - CoLoS. • Multimedia systems in physics education. Virtualization of physics phenomena. • Educational internet. Internet and physics education. Distance learning. • Planning and professional and didactic evaluation use of information science and computers in physics education.

Temeljni literatura in viri / Readings:

1) Allison Littlejohn, Chris Pegler, *Preparing for blended e-learning*, Routledge, Taylor & Francis Group, London & NY, 2007, 2011
2) Randy D. Garrison, *E-learning in the 21th century*, Routledge, Taylor & Francis Group, London & NY, 2003, 2011
3) Helen Beetham & Rhona Sharpe, *Rethinking pedagogy for a digital age: Designing for 21st century learning*, Routledge Taylor & Francis Group, London & NY, 2007, 2013
4) *Teaching and learning online: New models of learning for a connected World*, Routledge,Taylor & Francis Group, London & NY, 2014
5) Gerlič, I.: Didaktika pouka fizike v osnovni šoli. PEF MB, 1992.
6) Gerlič, I. Udir, V.: Problemski pouk fizike v osnovni šoli. Zavod RS za šolstvo, Ljubljana, 2006.
7) Gerlič, I.: Sodobna informacijska tehnologija v izobraževanju. DZS, Ljubljana, 2000.
8) KRAŠNA, Marjan. Izobraževanje v digitalnem svetu, (Mednarodna knjižna zbirka Zora, 108). V Mariboru: Mednarodna založba Oddelka za slovanske jezike in književnosti, Filozofska fakulteta, 2015
9) Učbeniki, priročniki, napotki za učitelje, medijska in računalniška programska oprema slovenskih in tujih založb. Revije: Physics Teacher, Physics Education,
10) Technology&Learning, Computers&Education, Educational Technology in slovenske fizikalne, računalniške ter didaktične revije.

Cilji in kompetence:	**Objectives and competences:**
Študent/ka: • analizira, ustvari in presodi možnosti povezovanja informatike in računalništva s poukom fizike; • analizira, oblikuje in presodi didaktične strategije poučevanja fizike z IKT.	A student: • analyse, create, and assess the possibilities of correlations between informatics and computer science and physics education; • analyse, arrange and assemble, and assess the didactical strategies for physics teaching with ICT.

Predvideni študijski rezultati:	**Intended learning outcomes:**

Znanje in razumevanje: • uporaba in primerjava didaktičnih strategij pri fiziki in računalništvu. • priprava in presoja raziskovanja fizikalno-didaktičnih procesov Prenesljive/ključne spretnosti in drugi atributi: • uporaba znanstvenih in strokovnih spoznanj s področja didaktike fizike in presoja izobraževalnih procesov. • Priprava in izvedba samostojnega raziskovanja in oblikovanje poročil.	Knowledge and understanding: • use and compare of didactical strategies of physics and computer science. • design and assess of research in physical and didactical processes. Transferable/Key Skills and other attributes: • use and apply scientific and professional findings from didactics of physics and assessment of learning processes. • plan and conduct of independent research and report preparation.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja in seminar, ki bosta temeljila na obravnavi študijskih primerov, eksperimentalni demonstraciji in multimedijski predstavitvi	• Lectures and seminar that will be based on the case studies, experimental demonstration and multimedia presentation.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
• Projektna naloga	**40%**	• Project
• Ustni izpit	**60%**	• Oral examination

Reference nosilca / Lecturer's references:

KRAŠNA, Marjan, KLEMENČIČ, Eva, KUTNJAK, Zdravko, KRALJ, Samo. Phase-changing materials for thermal stabilization and thermal transport. Energy, ISSN 0360-5442. [Print ed.], 2018, vol. 162, str. 554-563, ilustr. [COBISS.SI-ID 24002824]

SLAVINEC, Mitja, KLEMENČIČ, Eva, AMBROŽIČ, Milan, KRAŠNA, Marjan. Impact of nanoparticles on nematic ordering in square wells. *Advances in condensed matter physics*, ISSN 1687-8108, 2015, vol. 2015, art. ID 532745, str. 1-11, ilustr., doi: 10.1155/2015/532745. [COBISS.SI-ID21186312]

KRAŠNA, Marjan, KORŽE, Danilo, KAUČIČ, Branko. Searching for the reasons why ICT is not adequately used in schools. 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,

KRAŠNA, Marjan. Quality of students' work in the field of general pedagogy. V: HUNJAK, Tihomir (ur.). CECIIS : Central European Conference on Information and Intelligent Systems : 27th international conference, September 21st-23rd, 2016, Varaždin, Croatia, (Central European

Conference on Information and Intelligent Systems (Print), ISSN 1847-2001), (Central European Conference on Information and Intelligent Systems (Online), ISSN 1848-2295). Varaždin: Faculty of Organization and Informatics. 2016

KRAŠNA, Marjan. Project based learning (PBL) in the teachers' education. V: BILJANOVIĆ, Petar (ur.). Mipro proceedings, MIPRO 2016, 39th International Convention, May 30-June 3, 2016, Opatija, Croatia, (MIPRO ... (Tisak), ISSN 1847-3938). Rijeka: Croatian Society for Information and Communication Technology, Electronics and Microelectronics - MIPRO. cop. 2016

PUKŠIČ, Dejan, KRAŠNA, Marjan. M-learning in practice : language learning mobile application. V: HUNJAK, Tihomir (ur.), KIRINIĆ, Valentina (ur.), KONECKI, Mario (ur.). Central European Conference on Information and Intelligent Systems CECIIS, 26th international conference [and] appendix 10th International Doctoral Seminar (IDS), September 23rd-25th, 2015, Varaždin, Croatia

KRAŠNA, Marjan, BRATINA, Tomaž. E-learning materials for social science students. V: LAMANAUSKAS, Vincentas (ur.). *Philosophy of mind and cognitive modelling in education - 2014*, (Problems of education in the 21st century, ISSN 1822-7864, vol. 61). Siauliai: Scientific Methodological Center Scientia Educologica, 2014, str. 77-87, ilustr. [COBISS.SI-ID 20948232]

KRAŠNA, Marjan, BRATINA, Tomaž, KAUČIČ, Branko. Smart e-testing : future trend of e-learning or gentle deviation. V: LAMANAUSKAS, Vincentas (ur.). *Philosophy of mind and cognitive modelling in education - 2012*, (Problems of education in the 21st century, ISSN 1822-7864, vol. 46). Siauliai: Scientific Methodological Center Scientia Educologica, 2012, str. 85-92, ilustr. [COBISS.SI-ID 20433672]

MILFELNER, Maja, AMBROŽIČ, Milan, KRAŠNA, Marjan, CVETKO, Matej, ZIDANŠEK, Aleksander, REPNIK, Robert. Visualization of nematic director field with the RGB color system. V: REPNIK, Robert (ur.). *Proceedings od the 11th European Conference on Liquid Crystals, ECLC 2011, 6-11 February 2011, Maribor, Slovenia*, (Molecular crystals and liquid crystals, ISSN 1542-1406, vol. 553, no. 1, 2012). Philadelphia: Taylor and Francis, 2012, vol. 553, no. 1, str. 50-57, doi: 10.1080/15421406.2011.609370. [COBISS.SI-ID 18901000]