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		**1**. ali 2.	**2. ali 3.**
PHYSICS		1. or 2.	**2. or 3.**

Vrsta predmeta / Course type

Izbirni z 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	Terenske vaje Field work	Samost. delo Individ. work	ECTS
5	**5**				**290**	**10**

Nosilec predmeta / Lecturer: **Marjan Krašna**

Jeziki / Languages:

Predavanja / Lectures:	slovenski/Slovenian
Vaje / Tutorial:	

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

Ni pogojev.

Prerequisits:

None.

Vsebina:

Content (Syllabus outline):

• Fizikalne osnove računalništva. Organizacija in arhitektura sodobnih računalniških sistemov. FI programska oprema.	• Physical bases if computing. Organisation and architecture of modern computing systems. Physics software.
• Področja in modeli uporabe informacijsko-komunikacijske tehnologije (IKT) pri pouku fizike.	• Fields and models of using Information and Communication Technologies (ICT) in Physics education.
• Teorija in praksa vključevanja IKT v fizikalni eksperiment.	• Theory and practice including ICT in physics experiment.
• Konceptualno poučevanje fizike - CoLoS.	• Connectional learning of physics - CoLoS.
• Multimedijski sistemi v pouku fizike. Vizualizacija fizikalnih pojavov.	• Multimedia systems in physics education. Virtualization of physics phenomena.
• Izobraževalna omrežja. Internet in pouk fizike. Izobraževanje na daljavo.	• Educational internet. Internet and physics education. Distance learning.
• Planiranje in strokovno ter didaktično vrednotenje uporabe informatike in računalnika pri pouku fizike.	• 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.: Računalništvo v izobraževanju. Maribor: PEF Maribor, 1991.
8) Gerlič, I.: Sodobna informacijska tehnologija v izobraževanju. DZS, Ljubljana, 2000.
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: • Poglobi znanja o možnostih povezovanja informatike in računalništva s poukom fizike; • Poglobi znanja o pomembnejših poteh za analiziranje, izboljšanje in moderniziranje metod ter tehnik poučevanja fizike z IKT.	A student: • Deepens knowledge about possibilities of correlations between informatics and computer science and physics education; • Deepens knowledge about important ways for analysis, improvement and modernization methods and physics teaching with ICT.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: • Poglobljeno poznavanje in razumevanje didaktike fizike in računalništva. • Poglobljeno 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. • Sposobnost jasnega informacijskega izražanja.	Knowledge and understanding: • Deeper knowledge and understanding of the subjects of didactics of physics and computer science. • Deeper understanding of research in physical and didactical processes. Transferable/Key Skills and other attributes: • Ability to critically use and apply scientific and professional findings from didactics of physics. • Ability of independent research. • Skills in the use of computers in connection to informatics

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:

1. KRAŠNA, Marjan, BRATINA, Tomaž. Video learning materials for better students' performance. V: 25th Central European Conference on Information and Intelligent Systems, September 197th-19th, 2014, Varaždin, Croatia. Central European Conference on Information and Intelligent Systems CECIIS, 25th international conference, September 17th-19th, 2014, Varaždin, Croatia, (CECIIS, ISSN 1847-2001). Varaždin: Faculty of Organization and

Informatics, 2014, str. 130-137**3.** JESENEK, Dalija, GERLIČ, Ivan, VIŠNIKAR, Anja, REPNIK, Robert, KRALJ, Samo. Thin nematic films : laboratory of physics for topological defects. 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. 153-160, doi: 10.1080/15421406.2011.609461. [COBISS.SI-ID 25534503] tipologija 1.08 -> 1.01

2. DUH, Matjaž, BRATINA, Tomaž, KRAŠNA, Marjan. Elementary teachers competences for multimedia learning materials production = Kompetencije učitelja u osnovnim školama za pripremu materijala za multimedijsko učenje. *Informatologia*, ISSN 1330-0067, 2013, vol. 46, no. 4, str. 333-342, tabele. http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=167068. [COBISS.SI-ID 20275976]

3. KRAŠNA, Marjan, CVETKO, Matej, AMBROŽIČ, Milan. Symmetry breaking and structure of a mixture of nematic liquid crystals and anisotropic nanoparticles. *Beilstein journal of organic chemistry*, 2010, vol. 6, no. 74, str. 1-7, ilustr., doi: 10.3762/bjoc.6.74. [COBISS.SI-ID 17869320]

4. KRAŠNA, Marjan, BRATINA, Tomaž. Designing digital security course in educational sciences. *International journal of knowledge engineering and soft data paradigms*, ISSN 1755-3229. [Online ed.], 2012, vol. 3, no. 3-4, str. 280-293, doi: 10.1504/IJKESDP.2012.050723. [COBISS.SI-ID 19686664]

5. 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]