Univerza v Mariboru

Fakulteta za naravoslovje in matematiko

UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION	
Predmet:	**INFORMACIJSKO KOMUNIKACIJSKE TEHNOLOGIJE PRI POUČEVANJU TEHNIKE**
Subject Title:	**INFORMATION AND COMMUNICATION TECHNOLOGIES IN EDUCATION OF ENGINEERING**

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Tehnika – področje izobraževanja		1	poletni
		ali	
		2	zimski
Education in Engineering		1	summer
		or	
		2	winter

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
10	5				75	**3**

Nosilec predmeta / Lecturer: Igor Pesek

Jeziki / Languages:
Predavanja / Lecture: slovenščina / Slovene
Vaje / Tutorial:

Pogoji za opravljanje študijskih obveznosti:
Obvladovanje računalnika, osnovni multimedijski sistemi.

Prerequisites:
Work with the computer, base multimedia systems.

Vsebina:

Predavanja:
- Teoretične osnove e-učenja.
- Modeli uporabe IKT v izobraževanju.
- Strategije uporabe IKT pri poučevanju tehnike.
- CAD-sistemi pri poučevanju tehnike.
- Računalniške meritve in krmilno-regulacijski sistemi pri poučevanju tehnike.
- Možnosti elektronske komunikacije učitelj – učeči
- Izobraževanje na daljavo.
- Sistemi za vodenje e-učenja – LMS.
- Strokovno-didaktični pristopi v pripravi in izdelavi e-učnih gradiv za poučevanje tehnike.

Seminar:
Seminar aplikativno dopolnjuje vsebino predavanj z reševanjem razvojno-raziskovalnih in praktičnih problemov.

Content (Syllabus outline):

Lectures:
- Base theories of E-education.
- Models of using ICT in education.
- Strategies of using ICT in education of engineering.
- CAD systems in education of engineering.
- Computer measure and control-regulating systems in education of engineering.
- Possibilities of e-communication teacher – student.
- Distance learning.
- Learning Management System (LMS).
- Novel didactic approaches to prepare and make e-teaching materials in education of engineering.

Seminar:
Application of lectures in practical cases and real research problems.

Temeljni literatura in viri / Textbooks:

- O naravi učenja, Uporaba raziskav za navdih prakse, Pariz in Ljubljana, OECD in ZRSŠ, 2013
- R. Clark, R. Mayer, E-learning and the science of instruction: proven guidelines fo consumers and designers of multimedia learnintg, John Wiley & Sons, 2011.

William Horton, E-learning by design, 2nd edition, John Wiley & Sons, 2011.

- G.W. Rocha Fernandes, A. M. Rodrigues, C.A. Rosa Ferreira, Using ICT in Inquiry-Based Science Education, Springer, 2019
- M.D. Roblyer, J.E. Hughes, Integrating Educational Technology into Teaching (8th Edition), Pearson, 2018
- E. Carre, P. Griffin, M. Wilson, Assessment and Teaching of 21st Century Skills: Research and Applications, Springer, 2018
- M. Weller, The Digital Scholar: How Technology Is Transforming Scholarly Practice. Basingstoke: Bloomsbury Academic, 2011
- Innovating Pedagogy 2020 (oz. zadnja možna izdaja), Open University Innovation, 2020

Cilji:

poglobljeno ovrednotiti uporabo IKT v poučevanju tehnike,
poglobljeno analizirati IKT standarde in specialno didaktična vprašanja poučevanja tehnike z IKT,
ustvariti poglobljeno razvojno-raziskovalne probleme na področju uporabe IKT pri poučevanju tehnike
razviti sposobnosti študentov za samostojno in kreativno reševanje razvojno – raziskovalnih in praktičnih problemov uporabe IKT v izobraževanju tehnike.

Objectives:

In-depth evaluation of use of ICT in engineering education
In-depth analysis of ICT standards and didactics questions on use of ICT in engineering education
Create research problems on using ICT in engineering education
Develop students abilities to creatively solve problems in practice and research using ICT in engineering education.

Predvideni študijski rezultati:

Znanje in razumevanje:

Strokovno-teoretično ozadje s področja IKT v poučevanju tehnike
Prednosti in slabosti uporabe IKT v poučevanju tehnike
Organizacija distribucije in prenosa znanja

Prenesljive/ključne spretnosti in drugi atributi:

Uporaba znanj pri izdelavi kakovostnih e-učnih gradiv
Organiziranje in vodenje projektov za izdelavo e-učnih gradiv

Intended learning outcomes:

Knowledge and understanding:

Theoretical background of ICT equipment in engineering education.
Advantages and disadvantages of using ICT in engineering education.
Organization of knowledge distributions and knowledge transmission.

Transferable/Key Skills and other attributes:

Development of quality e-teaching materials.
Organizing and manage projects for produce e-learning materials.

Metode poučevanja in učenja:

eksperimentalna predavanja,
izdelava seminarske naloge.

Teaching and learning methods:

experimental lectures,
seminar work.

Načini ocenjevanja:	Delež (v %)/ Weight (in %)	**Assessment methods:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (examination, oral, coursework, project):
seminarska naloga, ustni izpit.	**50 %** **50 %**	seminar work, oral examination.

Reference nosilca / Lecturer's references:

1. FLOGIE, Andrej, ABERŠEK, Boris, KORDIGEL ABERŠEK, Metka, SÍK LÁNYI, Cecília, PESEK, Igor. Development and evaluation of intelligent serious games for children with learning difficulties : observational study. *JMIR serious games : Elektronski vir*. 2020, vol. 8, no. 2, str. 1-16, ilustr. ISSN 2291-9279. DOI: 10.2196/13190. [COBISS.SI-ID 13487363], [JCR]

2. TOMIĆ, Maja Katarina, ABERŠEK, Boris, PESEK, Igor. GeoGebra as a spatial skills training tool among science, technology engineering and mathematics students. *Computer applications in engineering education*. [Online ed.]. 2019, vol. 27, iss. 6, str. 1506-1517. ISSN 1099-0542. DOI: 10.1002/cae.22165. [COBISS.SI-ID 24744712], [JCR, SNIP]

3. WEIGEND, Michael, VANÍČEK, Jiři, PLUHÁR, Zsuzsa, PESEK, Igor. Computational thinking education through creative unplugged activities. *Olympiads in informatics*. 2019, vol. 13, str. 171-192. ISSN 1822-7732. DOI: 10.15388/ioi.2019.11. [COBISS.SI-ID 24747016]

4. FLOGIE, Andrej, ABERŠEK, Boris, PESEK, Igor. The impact of innovative learning environments on social competences of youth. *Research in learning technology*. 2019, vol. 27, str. 1-14. ISSN 2156-7069. DOI: 10.25304/rlt.v27.2214. [COBISS.SI-ID 24743944], [SNIP]

5. 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*. Dec. 2018, vol. 55, iss. 10, str. 1448-1468, ilustr. ISSN 0022-4308. DOI: 10.1002/tea.21462. [COBISS.SI-ID 23839240], [JCR, SNIP, WoS do 10. 5. 2020: št. citatov (TC): 2, čistih citatov (CI): 0, Scopus do 3. 12. 2019: št. citatov (TC): 1, čistih citatov (CI): 0] financer: ARRS, Programi, P2-0057 (B), SI, Informacijski sistemi

6. ŠVERC, Alenka, PESEK, Igor, FLOGIE, Andrej. The challenges of complete informatization of education. V: LAMANAUSKAS, Vincentas (ur.). *Philosophy of mind and cognitive modelling in education - 2014*. Siauliai: Scientific Methodological Center Scientia Educologica, 2014. Str. 121-131, ilustr. Problems of education in the 21st century, vol. 61. ISSN 1822-7864. http://www.scientiasocialis.lt/pec/node/files/pdf/vol61/121-131.Sverc_Vol.61.pdf. [COBISS.SI-ID 21570824]

7. REPNIK, Robert, ROBIČ, Dominik, PESEK, Igor. Physics learning in primary and secondary schools with computer games : an example - Angry birds. V: GRADINAROVA, Boyka (ur.). *E-learning : instructional design, organizational strategy and management*. Rijeka: InTech, 2015. Str. 203-225, ilustr. ISBN 978-953-51-2188-6. [COBISS.SI-ID 21939720]