



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

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|----------------------|------------------------------------|
| Predmet: | Virtualna orodja za urjenje |
| Course title: | Virtual practice tools |

| Študijski program in stopnja Study programme and level | Študijska smer Study field | Letnik Academic year | Semester Semester |
|---|-------------------------------|----------------------------|----------------------|
| Izobraževalno računalništvo | | 1 | 1 |
| | | | |

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

| Predavanja Lectures | Seminar Seminar | Sem. vaje Tutorial | Lab. vaje Laboratory work | Teren. vaje Field work | Samost. delo Individ. work | ECTS |
|------------------------|--------------------|-----------------------|---------------------------------|---------------------------|----------------------------------|------|
| 30 | | | 30 | | 150 | 7 |

Nosilec predmeta / Lecturer:

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

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

- poznavanje multimedijskih orodij,
- osnovno znanje algoritmov in programiranja.

Prerequisites:

- knowledge of multimedia tools,
- basic programming knowledge.

Vsebina:

- Uvod v virtualna in obogatena okolja in orodja.
- Sistemske zahteve (multimodalne vhodne/izhodne naprave, sledilni sistemi, interaktivne metode, modeliranje, avtonomni agenti, omrežja, mobilne naprave in operacijski sistemi (iOS, Android, Windows)).
- Načrtovalni in implementacijski postopki

Content (Syllabus outline):

- Introduction into Virtual and Augmented Environment and Tools.
- System Requirements (Multimodal I/O, Tracking Systems, Interaction Techniques, Modelling, Autonomous Agents, Networks, mobile devices and operating systems (iOS, Android, Windows)).
- Design and Implementation Strategies (Perceptual Illusions, Navigation and

(iluzije, navigacija in iskanje poti, vsebinski razvoj).

- Aplikativna področja (inženirstvo, izobraževanje, medicina, zabava, vizualizacija informacij).
- Uporaba virtualnih in obogatenih okolij v izobraževalnem procesu
- Analiza, oblikovanje in ocenjevanje virtualnih in obogatenih okolij za urjenje
- Uporabniška izkušnja virtualnih in obogatenih okolij (uporabniško usmerjene metode za razvoj virtualnih okolij, ergonomija virtualnih okolij).

Wayfinding, Content Development).

- Application Domains (Engineering, Education, Medical, Entertainment, Information Visualization).
- Use of Virtual and Augmented Environments and Tools in Education.
- Analysis, Development and Evaluation of Virtual and Augmented Environments practice tools.
- User Experience of Virtual and Augmented Environments (Usability Techniques for Virtual and Augmented Environments Systems, Software and Hardware Ergonomics).

Temeljni literatura in viri / Readings:

Osnovno / primary:

- D. Schmalstieg, T. Hollerer, Augmented Reality: Theory and Practice, Addison-Wesley Professional, 2014
- William R. Sherman, Alan B. Craig, Understanding Virtual Reality: Interface, Application, and Design (The Morgan Kaufmann Series in Computer Graphics), Morgan Kaufmann, 2002

Cilji in kompetence:

Predmet o virtualnih in obogatenih orodjih za urjenje je namenjen pridobivanju znanja o virtualnih in obogatenih okoljih na vseh platformah (Windows, iOS, Android) in nudi tudi spoznavanje metod o analizi, oblikovanju in ocenjevanju teh okolij. Predstavljene bodo dosedanje izkušnje, sistemske zahteve in nekatere aplikativne rešitve na različnih področjih. Predmet omogoča študentom, da bolje določijo in ocenijo načrtovalne in implementacijske zahteve za aplikacije virtualnih in obogatenih okolij in jih pripravi za uporabo virtualnih orodij za urjenje z minimizacijo zdravstvenih in varnostnih vidikov.

Objectives and competences:

The lecture on Virtual and Augmented Reality Practice Tools are intended to get a knowledge of Virtual and Augmented Environment technology on all platforms (Windows, iOS, Android) and provides analysis, design and evaluation strategies of Virtual and Augmented Environment. Current efforts, system requirements and some solutions in a number of application domains are reviewed. The course enable students to better specify design and implementation requirements for virtual and augmented applications and prepare them to use Virtual and Augmented Practice Tools with minimizations of health and safety concerns.

Predvideni študijski rezultati:

Znanje in razumevanje:

Študentje bodo po predavanjih sposobni

- spoznati in definirati virtualna in obogatena okolja in njihove sistemske zahteve,
- razlikovati in analizirati komponente, kot tudi definirati različne tipe virtualnih in obogatenih okolij in orodij za urjenje,

Intended learning outcomes:

Knowledge and Understanding:

On completion of this course the student will be able to

- recognize and define "Virtual and Augmented Environment" and their system requirements,
- distinguish and analyse components, as

- razumeti vlogo in pomen uporabniško prijazne analize, razvoja in ocenjevanja virtualnih okolij,
- uporabiti programska orodja za razvoj virtualnih aplikacij,
- organizirati vse potrebne korake za implementacijo uporabniško prijaznih okolij in orodij za urjenje,
- povzeti in dokazovati zdravstvene vidike za virtualna in obogatena okolja,
- skupinskega dela v virtualnih programskih okoljih.

Prenesljive/ključne spretnosti in drugi atributi:

- *Spretnosti komuniciranja:* pisno izražanje v forumih, seminarskih delih, ustni in pisni zagovor laboratorijskih vaj.
- *Uporaba informacijske tehnologije:* uporaba orodij za programiranje in oblikovanje virtualnih okolij.
- *Reševanje problemov:* ocenjevanje obstoječih in lastnih programskih rešitev.

well as define different types of Virtual and Augmented Environment and Practice Tools,

- comprehend the role and meaning of user friendly analysis, development and evaluation of Virtual Environments,
- use programming tools for development of Virtual and Augmented Environments applications,
- organize all needed steps for implementation of user friendly Virtual and Augmented Environments and Practice Tools,
- summarize and argue health and safety issues for Virtual and Augmented Environments,
- use tools for computer-supported collaborative work.

Transferable/Key Skills and other attributes:

- *Communication skills:* manner at expression in e-forums and seminar works, oral and written lab work defence.
- *Use of information technology:* use of programming and development tools for Virtual Environments.
- *Problem solving:* evaluation of current and self-made software applications.

Metode poučevanja in učenja:

- predavanja,
- domače naloge,
- laboratorijske vaje,
- diskusije v elektronskem forumu,
- e-učenje.

Learning and teaching methods:

- lectures,
- homeworks,
- lab work,
- discussion in electronic forum,
- e-learning.

| Načini ocenjevanja: | Delež (v %) / Weight (in %) | Assessment: |
|------------------------|--------------------------------|-----------------------------|
| • domače naloge, | 10% | • home works, |
| • projektna naloga, | 40% | • project work, |
| • laboratorijske vaje, | 25% | • lab work, |
| • pisni/ustni izpit. | 25% | • written/oral examination. |

Reference nosilca / Lecturer's references:

DEBEVC, Matjaž, KOSEC, Primož, HOLZINGER, Andreas. Improving multimodal web accessibility for deaf people : sign language interpreter module. Multimedia tools and applications, 2011, vol. 54, no. 1, str. 181-199

DEBEVC, Matjaž, ŠAFARIČ, Riko, GOLOB, Marjan. Hypervideo application on an experimental control system as an approach to education. Comput. appl. eng. educ., May 2008, vol. 16, no. 1, str. 31-44

DEBEVC, Matjaž, VERLIČ, Mateja, KOSEC, Primož, STJEPANOVIĆ, Zoran. How can HCI factors improve accessibility of m-learning for persons with special needs?. Lect. notes comput. sci., 2007, vol. 4556, str. 539-548

DEBEVC, Matjaž, STJEPANOVIĆ, Zoran, POVALEJ, Petra, VERLIČ, Mateja, KOKOL, Peter. Accessible and adaptive e-learning materials: considerations for design and development. Lect. notes comput. sci., 2007, vol. 4556, str. 549-558

DEBEVC, Matjaž. Uporaba tehnologij v izobraževanju na daljavo. Uporab. inform. (Ljubl.), 2001, let. 9, št. 3, str. 140-147