UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Interaktivne 3D-vsebine za svetovni splet
Course title:	Interactive 3D Environments on Internet

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalno računalništvo 2. stopnja		1.	poletni
Educational computer science 2nd level		1.	Spring

Vrsta predmeta / Course type

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		45			105	6

Nosilec predmeta / Lecturer: Matjaž Debevc

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

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

Poznavanje osnov geometrijskega modeliranja, računalniške grafike in načrtovanja spletnih strani.

Prerequisits:

Basic knowledge of geometric modelling, computer graphics and web design.

Vsebina:

Content (Syllabus outline):

• Uvod: interaktivnost v 3D navideznem prostoru, navigacija v prostoru in manipulacija objektov, navidezna in obogatena resničnost, uporaba interaktivnih 3D svetov na spletu, pregled obstoječih tehnologij.	• Introduction: interactivity in 3D virtual space, spatial navigation and object manipulation, virtual and augmented reality, applications of interactive 3D worlds on web, overview of existing technologies.
• Priprava grafičnih podatkov za svetovni splet: priprava tekstur, optimizacija modelov, zmanjševanje prostorske zahtevnosti.	• Preparation of graphic data for internet applications: texture preparation, model optimisation, reducing space complexity.
• VRML – Virtual Reality Modelling Language: uporaba, struktura datoteke VRML, osnovni gradniki – objekti, osnovne operacije, lastnosti objektov, združevanje in večkratna uporaba objektov, točke pogleda, navigacijske informacije, zahtevnejši objekti (luči, zvok), interaktivnost in dogodki, ponovna uporaba kode, posebne funkcije s pomočjo skript.	• VRML – Virtual Reality Modelling Language: use, VRML file structure, basic primitives – objects, main functions, object characteristics, grouping and multiple use of objects, viewpoints, navigation information, advanced objects (lights, sound), interactivity and events, code reusability, special script-based functions.
• X3D – eXtensible 3D: razlike med VRML in X3D, osnovni zapis X3D, pretvorba iz VRML v X3D.	• X3D – eXtensible 3D: differences between VRML and X3D, basic format X3D, conversion from VRML to X3D.
• HTML5 in WebGL – uporaba standarda HTML5 v kombinaciji s standardom WebGL za izdelavo interaktvinih 3D svetov na spletu, osnovni gradniki, koordinatni sistemi, transformacije, predstavitev objektov, animacija, napredni učinki.	• HTML5 and WebGL – usage of HTML5 in combination with WebGL for development of interactive 3D worlds on the web, main elements, coordinate systems, transformations, representations of objects, animations, advanced effects.
• Predstavitev smernic za izdelavo večuporabniških 3D svetov: predstavitev drugih uporabnikov, dodatne funkcionalnosti, večuporabniški svetovi za velike množice uporabnikov.	• Guidelines for development of multi-user 3D worlds: presentation of other users, additional functionalities, massively multi-user online environments.

Temeljni literatura in viri / Readings:

- G. Klajnšek in B. Žalik: Standard VRML, Univerza v Mariboru, Fakulteta za elektrotehniko, računalništvo in informatiko, Maribor, 2002.
- V. Geroimenko in C. Chen: *Visualizing Information Using SVG and X3D*, Springer-Verlag, Singapore, 2005.
- D. Brutzman in L. Daly: X3D: Extensible 3D Graphics for Web Authors, Morgan Kaufman/Elsevier, San Francisco, 2007.
- A. Freeman: The Definitive Guide to HTML5, Apress, New York, 2011.
- T. Parisi: WebGL: Up and running, O'Reilly Media, Inc, Sebastopol, 2012.
- R. A. Bartle: Designing Virtual Worlds, New Riders Press, 2003.

Cilji in kompetence:	**Objectives and competences:**
Cilj tega predmeta je naučiti študente pripraviti in uporabiti interaktivne 3D navidezne svetove na svetovnem spletu.	The objective of this course is to acquaint students with preparation an use of interactive 3D virtual worlds on internet.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje:	Knowledge and understanding:

Po zaključku tega predmeta bo študent sposoben	On completion of this course the student will be able to
• navesti in povzeti sodobne standarde načrtovanja interaktivnih 3D vsebin na spletu,	• list and summarise present standards for design of interactive 3D environments on internet,
• načrtovati, uporabiti in presojati interaktivne 3D navidezne svetove na spletu,	• design, use and criticise interactive 3D virtual worlds on internet,
• izkazati razumevanje konceptov navidezne in obogatene resničnosti,	• demonstrate understanding of concepts of virtual and augnmented reality,
• razlikovati med navigacijo in manipulacijo,	• differentiate between navigation and manipulation,
• izbrati optimalnejše 3D modele in teksture, upoštevaje čim višjo želeno hitrost prenosa in vizualizacije na eni strani ter čim nižjo prostorsko zahtevnost in čim boljšo stopnjo podrobnosti ter realizma na drugi strani,	• select more optimal 3D models and textures to achieve higher transmission and visualisation speed and, simultaneously, lower spatial complexity and better level of detail and realism,
• izkazati poznavanje smernic, pomembnih pri načrtovanju in izdelavi večuporabniških 3D svetov.	• demonstrate knowledge of guidelines for design and development of multi-user 3D worlds.
Prenosljive/ključne spretnosti in drugi atributi:	Transferable/Key skills and other attributes:
• Spretnosti komuniciranja: ustno izražanje pri ustnem izpitu in zagovoru laboratorijskih vaj, pisanje poročila o opravljenem projektu.	• Communication skills: oral manner of expression at oral exemination and lab work defense, writing report about completed project.
• Uporaba informacijske tehnologije: uporaba naprednih orodij za izdelavo interaktivnih 3D navideznih svetov in panoram na svetovnem spletu.	• Use of information technology: use of advanced tools for development of interactive 3D virtual worlds and panoramas on internet.
• Reševanje problemov: samostojno delo na projektu.	• Problem solving: individual project work.

Metode poučevanja in učenja:

- predavanja,
- seminarske vaje,
- laboratorijske vaje,
- projekt.

Learning and teaching methods:

- lectures,
- tutorial,
- lab work,
- project.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
• laboratorijske vaje,	35 %	• lab work,
• opravljen projekt,	15 %	• completed project,
• ustni izpit.	50 %	• oral examination.

Reference nosilca / Lecturer's references:

- DEBEVC, Matjaž, STJEPANOVIĆ, Zoran, HOLZINGER, Andreas. Development and evaluation of an e-learning course for deaf and hard of hearing based on the advanced Adapted Pedagogical Index method. Interactive learning environments, vol. 22, iss. 1, str. 35-50
- DEBEVC, Matjaž, KOŽUH, Ines, MEIER, Hilmar. A usability requirements analysis for wireless interaction and connectivity for elderly hearing aid users. Lecture notes in computer science, vol.

7946, 2013, str. 260-271

- 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

- TESSENDORF, Bernd, DEBEVC, Matjaž, DERLETH, Peter, FEILNER, Manuela, GRAVENHORST, Franz, ROGGEN, Daniel, STIEFMEIER, Thomas, TRÖSTER, Gerhard. Design of a multimodal hearing system. Computer Science and Information Systems, 2013, vol. 10, no. 1, str. 483-501

- KOŽUH, Ines, JEREMIĆ, Zoran, SARJAŠ, Andrej, LAPUH BELE, Julija, DEVEDŽIĆ, Vladan, DEBEVC, Matjaž. Social presence and interaction in learning environments : the effect on student success. Journal of educational technology & society, 2014, str. 1-4