Sarajevo School of Science and Technology

COURSE SPECIFICATION

NAME OF COURSE: COMPUTER GRAPHICS			**COURSE CODE: CS 390**
STATUS: (main,optional, Free Choice) **MAIN**	**LEVEL: (F,A,P,1,2,3,M)**	**UNIT VALUE:** 4	**TERMS TAUGHT:** Fall
Department offering course: **CS**	**Course Co-ordinator:** **Prof. dr Alan Chalmers** **dr Alessandro Artusi** **dr Selma Rizvic**	**Date of course commencement:**	
Degree Programmes in which to be offered: **All**			
Pre-requisites: **Entrance examination**	**Indicate whether a new course or name of course being replaced:** CS/IS 390	**Total Contact Hours: 75**	

AIMS OF THE COURSE:
This course aims to develop skills in computer graphics and provide an understanding to the issues involved in creating and displaying images on a computer. Students will learn advanced computer modeling and animation skills using the Maya software system. and programming using OpenGL

INTENDED LEARNING OUTCOMES	LEARNING AND TEACHING STRATEGIES TO BE USED:	ASSESSMENT CRITERIA (SHOULD LINK EXPLICITLY TO INTENDED LEARNING OUTCOMES):
1. Design and create detailed computer models and graphic applications	1. The course combines learning the theory behind computer graphics with comprehensive practical applications. The practical exercises, including sketching, modeling in VRML and Maya, animation and rendering will help enforce understanding of the theory and provide a broader comprehension of the problems encountered when trying to create and display images on a computer.	Coursework 60%
2. Understand the principles of manipulating and rendering images	2. The students will start with the basic concepts, for example colour and Cartesian co-ordinates and each week build on these until they are capable of creating, rendering and displaying their own models. Furthermore, advanced topics, such as visual perception, will give the students insight into how others may perceive their images and thus help them improve their own creations.	2. Examination 40%

TRANSFERABLE SKILLS AND OTHER ATTRIBUTES	LEARNING AND TEACHING STRATEGIES USED:	ASSESSMENT CRITERIA (SHOULD LINK EXPLICITLY TO INTENDED LEARNING OUTCOMES):
1. Fundamental understanding of how images are created on computer	1. Lectures	1. Examination
2. Create complex models on a computer	2. Learning modeling tools in the labs	2. Assignments
3. Animate objects with physical attributes	3. Learning animation tools in the labs	3. Assignments
4. OpenGL programming	4. Learning OpenGL programing techniques	4. Assignments

COURSE OUTLINE/SYLLABUS:

- Raster Graphics – pixel, picture resolution, color depth, raster image formats, compression with and without loss
- Vector Graphics – Cartesian coordinates, camera coordinate system, pinhole camera, clipping, frustum of the view
- Sketching and visual appreciation
- Basics of the Graphic Design – visual language, color theory, color systems, basic color harmonies, composition and layout, perspective, typography
- Basics of the Film Language – film language grammar, plans, shots, camera moves, shooting angles, interpunction, shot composition
- VRML Basics - file structure, syntax, nodes, scene graph, basic geometry nodes, transformations, anchor nod, events, exposed fields, route, proto, sensor nodes, animation in VRML
- Basic Concepts of TV Production – history of television, mechanical television, electronic television, component and composite video, TV production technology chain
- Modeling Techniques – wireframe model, boundary representation, extruding, ruled surfaces, Bezier surface patches, volume representation, spatial dividing schemes, procedural modeling, fractals, soft objects, procedural manipulation
- Computer Animation – storyboading, lightning techniques, ambient, diffuse and specular reflection, shading techniques – Gouraud, Phong, hidden surfaces techniques
- Maya: Intoduction & Modelling
- Maya: Texturing & Animation
- Ray Tracing – lightning technique, quadtree, ray definition, plane definition, shadow feelers, distributed ray tracing
- Radiance
- Radiosity – calculating radiosity, form factors, Nusselt analogy, full matrix radiosity, progressive radiosity, two passes radiosity
- Visual perception
- Compositing - image layers, matte, multisource operators, keying, image processing operations, color manipulations, spatial filters, geometric transformations
- Walk Animation – biped construction, Physique modifier, freeform and footstep animation, motion capturing
- Speech Animation – phonemes, visemes, Morpher modifier
- Real time graphics: OpenGL programming basics
- Broadcast Design Basics – titles, stills, openings, tv show design, video clip
- Digital TV – digital video, digital sound, advantages of the digital tv upon the analog, interactive television

KEY TEXTS AND/OR OTHER LEARNING MATERIALS:

- James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes. Computer Graphics: Principles and Practice in C (2nd Edition) Addison-Wesley Pub Co; 2nd edition (August 4, 1995)
- G. Ward Larson and R. Shakespeare, Radiance: The art and science of Lighting, Morgan Kaufmann 1998.
- S.Govil-Pai – Principles of CG: Theory and Practice using OpenGL and Maya, Springer 2004.
- J. Vince – 3D Computer Animation, Addison-Wesley Publishers 1992.
- R. Brinkmann – The Art and Science of Digital Compositing, Academic Press 1999.
- B. Edwards – Drawing on the Right Side of the Brain, HarperCollins Publishers, 2001
- VRML97 Functional specification and VRML97 External Authoring Interface (EAI), ISO/IEC 14772-1:1997 and ISO/IEC 14772-2:2002
- A. Mundi, Principles of Graphics Design, Mundi Design Studios
- Ž. Rože – Filmska gramatika, Jugoslovenska kinoteka 1960.
- S. Rizvić, Kompjuterska grafika i multimedia, Arka Press 2004.