1.	Course title	Fundamentals of computer graphics		
2.	Course code			
3.	Study program	Computer Science and Engineering, Professional Informatics Studies		
4.	Unit offering the course	**FCSE**		
5.	Undergraduate/postgraduate/PhD	**Undergraduate**		
6.	Year/semester 2/4/summer/elective	7. ECTS: **6**		
8.	Teacher(s)	Prof. Dragan Mihajlov, Prof. Margita Kon-Popovska, Prof. Suzana Loshkovska		
9.	Course prerequisites	Object and visual programming, Mathematics 2		
10.	Goals (competences): Introduction to the theoretical foundations and concepts of 2D and 3D computer graphics, geometric modelling, transformations, rendering, and generating curves and surfaces using splines. Practical implementation using OpenGL libraries, 3D graphical software packages like Autodesk Maya, 3D Max,.. Upon completion of the course the student is expected to demonstrate knowledge of the theoretical foundations and concepts of 2D and 3D computer graphics, proficient use of the OpenGL library and graphic software packages for practical implementation problems of computer graphics.			
11.	Course content: Historical development of computer graphics (raster based, vector based, black and white, colour). Graphical mechanical devices (printers, painters, 3D modellers). Graphic Standards and libraries. Basic drawing routines. Matrix presentation of objects and transformations. Two-dimensional graphics (transformations, cropping, covering, antialiasing). Three-dimensional graphics (transformations, orthographic, axonometric and perspective projection. Removing invisible lines and surfaces. Generating curves and surfaces (Béziers curves, B-splines, NURBS surfaces). Polygonal modelling of solids (Maya). Models of colours (RGB, HVS, CYMB). Lighting. Visual realism (shading, texturing). Four-dimensional objects.			
12.	Teaching methods: Lectures supported by slide presentations, interactive lectures, trainings (using lab equipment and software packages), team work, case studies, invited guests and lectures, individual practical assignments presentations, seminar paper, e-learning (forums, consultations).			
13.	Total available time	6 ECTS x 30 h = 180 h		
14.	Distribution of the available time	30 + 60 + 50 + 40 = 180 h		
15.	Teaching activities	15.1.	Lectures	30 hours

		15.2.	Training (labs, problem solving), seminar and team work	60 hours
16.	Other activities	16.1.	Self study	40 hours
		16.2.	Home work	50 hours

17.	Grading		
	17.1.	Tests	50 points
	17.2.	Seminar work/project (written or oral presentation)	40 points
	17.3.	Active participation	10 points

18.	Grading criteria	to 50 points	5 (five) (F)
		from 51 to 60 points	6 (six) (E)
		from 61 to 70 points	7 (seven) (D)
		from 71 to 80 points	8 (eight) (C)
		from 81 to 90 points	9 (nine) (B)
		from 91 to 100 points	10 (ten) (A)
19.	Final exam prerequisites	Successful completion of activities 15 and 16	
20.	Course language	Macedonian and English	
21.	Quality assurance methods	Internal evaluation mechanisms supported by student polls	

22. Literature

22.1. Compulsory

No.	Authors	Title	Publisher	Year
1.	Rogers. D. F., Adams, J.A., ,	Mathematical elements for Computer Graphics	McGraw-Hill Publishing Company	1990
2.	J..D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes, R.L. Phillips	Introduction to Computer Graphics,	Addison-Wesley Pub. Company	1997
3.	Alan Wat	3D Computer Graphics	3D Computer Graphics	2000

22.2. Mandatory

No.	Authors	Title	Publisher	Year
1.	Richard S. Wright, Benjamin Liphcak, Nicholaos Haemel	OpenGL SuperBible: Comprehensive Tutorial and Reference	Addison Wesley	2010
2.	Peter Shirley, Steve Marschner at all.,	Fundamental of Computer Graphics	A K Peters LTD	2005
3.	Alan Wat	3D Computer Graphics	Alan Wat, 3D	2000