

COURSE INFORMATION					
Course Title	Code	Semester	L+P Hour	Credits	ECTS
Advanced Computer Graphics	CSE583	1	3	3	10

Prerequisites	
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Language of Instruction	English
Course Level	Graduate Degree
Course Type	Elective
Course Coordinator	
Instructors	Assist.Prof. Esin Onbaşıoğlu
Assistants	
Goals	The aim of this course is to provide a graduate-level introduction to the methods and techniques in modern computer graphics. The course prepares students to effectively solve complex problems in the field of computer graphics. The course is intended to bring students up to the research frontier, and prepare them for further work in the field.
Content	Basic concepts of 3D computer graphics, local and global illumination, 3D modeling, mesh representation, surface and volume modeling, kinematics, rigid-body dynamics, particle systems, spring-mass systems, hands-on experience in modern computer graphics hardware/software systems.

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
Knowledge in advanced computer graphics systems and applications	1,3,5	1	A
Ability to design a complex software under realistic constraints and conditions; ability to apply modern computer graphics design methodologies for this purpose	1,3,5	1,3	A,C,D
Ability to select and use modern techniques and tools to design and develop software on modern computer graphics systems	1,3,5	1,3	A,C,D

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Lab
Assessment Methods:	A: Testing, B: Experiment, C: Homework, D: Term Project

COURSE CONTENT		
Week	Topics	Study Materials
1	Introduction	
2	Overview of basic concepts of 3D computer graphics	
3	Illumination: local illumination, ray tracing	
4	Illumination: radiosity, photon-mapping	
5	Visibility and texture	
6	3D Modeling	
7	Mesh representation and processing	
8	MIDTERM EXAM	
9	Surface modeling	
10	Volumetric modeling	
11	Inverse kinematics	
12	Rigid-body dynamics	
13	Particle systems	
14	Spring-mass systems	

RECOMMENDED SOURCES	
Textbook	R. Parent, "Computer Animation: Algorithms and Techniques", Morgan Kaufmann T. Akenine-Moller, E. Haines, N. Hoffman, "Real-Time Rendering", AK Peters
Additional Resources	A.Watt, M. Watt, "Advanced Animation and Rendering Techniques", ACM Press Lab material: http://cse.yeditepe.edu.tr/v2/en/academic/course-pages

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT

IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms	1	40
Quizzes		
Assignment	5	20
Term Project	1	40
Total		100
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		100

COURSE CATEGORY	Expertise/Field Courses
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COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution					
		0	1	2	3	4	5
1	Ability to reach wide and deep knowledge through scientific research in the field of Computer Science and Engineering, evaluate, interpret and apply.						X
2	Ability to use scientific methods to cover and apply limited or missing knowledge, and to integrate the knowledge of different disciplines.						
3	Ability to construct Computer Science and Engineering problems, develop methods to solve the problems and use innovative methods in the solution.						X
4	Ability to develop new and/or original ideas and algorithm; develop innovative solutions in the design of system, component or process.						
5	Ability to have extensive knowledge about current techniques and methods applied in Computer Engineering and their constraints.						X
6	Ability to design and implement analytical modeling and experimental research, solve and interpret complex situations encountered in the process.						

7	Ability to use a foreign language (English) at least at the level of European Language Portfolio B2 in verbal and written communication.						
8	Ability to lead in multidisciplinary teams, develop solutions to complex situations and take responsibility.						
9	Ability to communicate process and the results in the Computer Science and Engineering field, in national and international platforms in or outside of the field, systematically and clearly in written or oral form.						
10	Awareness of the social, legal, ethical and moral values, and the ability to conduct research and implementation work within the framework of these values.						
11	Awareness of the new and emerging applications in Computer Science and Engineering field, and the ability to examine them and learn if necessary.						
12	Ability to describe the social and environmental dimensions of Computer Science and Engineering applications.						

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	13	8	104
Mid-terms	1	2	2
Homework	5	10	50
Term Project	1	50	50
Final examination	1	3	3
Total Work Load			251
Total Work Load / 25 (h)			10,04
ECTS Credit of the Course			10