

REALISTIC MULTIMEDIA AND ANIMATION

COURSE OUTLINE

1. GENERAL			
SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Electrical and Computer Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0811.9.022.0	SEMESTER	2nd
COURSE TITLE	Realistic Multimedia and Animation		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	WEEKLY TEACHING HOURS	CREDITS
	3	2
	1	1
	1	1
Total	5	4

COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialised general knowledge
PREREQUISITE COURSES	Object-Oriented programming (recommended)
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/ECE200/

2. LEARNING OUTCOMES
Learning outcomes
The aim of the course is the critical application of fundamental engineering and mathematics concepts onto game engine programming environments. Main learning outcomes include: 1. Understanding key features of gaming engines. 2. Practice fundamental mathematics and physics concepts found in game engines. 3. Mathematical transformations and motion of a solid body. 4. Study, prediction and detection of collisions. What follows collisions. 5. Numerical solution of equations of motion in fields of forces under constraints.
General Competences
• Search, analysis and synthesis of data and information, using the necessary technologies • Decision making • Autonomous work • Promoting creative and inductive/deductive thinking

3. SYLLABUS

Theoretical Lecture Units

- Main ingredients in games and game engines.
- Mathematical background relevant to game engines: points and lines: definition of point and line, straight line properties, applications in collision detection - geometry: distances, parabolas, circles and spheres with applications in collision detection - trigonometry: degrees and radians, identities. Scalars - Cartesian and polar coordinates - Vectors: addition/subtraction, internal and external product – arrays.
- Common transformations and applications in game engines: 2D/3D translation, scaling and rotation and their combinations.
- Description of 1D, 2D 3D motion in gaming engines, speed and acceleration, equations of motion, missiles and explosions.
- Description of forces and collisions in game engines: Newton's laws, effect of forces on the motion of bodies - work, kinetic energy, dynamic energy and conservation of energy. Collisions among fixed and moving objects, elastic and inelastic collisions - conservation of energy and momentum, modeling, prediction and detection of collisions. Rotational motion.

Laboratory Exercises

- Programming in a game engine environment to demonstrate theoretical concepts as well as the capabilities and limitations of gaming machines.
- Build games from scratch and / or convert / augment existing games.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	In-Class Face-to-Face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Use of ICTs in lecturing • Use of ICTs for the communication with students via the e-class platform	
TEACHING METHODS The manner and methods of teaching are described in detail.	Activity	Semester workload
	Lectures	39
	Exercises	13
	personal study	68
	Course total	120
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	• Individual laboratory exercises that require completion of concepts and combination of techniques taught (20%) • Written mid-term with short answer questions and problem solving (20%) • Written final exam with short answer questions and problem solving (60 %) Current course assessment details are posted in eclass.	

5. ATTACHED BIBLIOGRAPHY

Relevant English Texts:

- Physics for Game Programmers, G. Palmer, APress, 2005, ISBN: 1-59059-472-X.
- Unity Game Physics (<https://unity3d.com/learn/tutorials/s/physics>).

