

COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	ELECTRICAL AND COMPUTER ENGINEERING DEPT.		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ECE_INF961	SEMESTER	9
COURSE TITLE	Computer Graphics		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	WEEKLY TEACHING HOURS	CREDITS	
Lectures	3		
Seminars / Practice exercises			
Laboratory	1		
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (4).</i>	4	5	
COURSE TYPE <i>general background, special background, specialised, general knowledge, skills development</i>	Specialised		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek and English for Erasmus		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://www.ece.uop.gr/		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i> <p>The course is the main course for the theoretical concepts and related technologies of Computer Graphics and Image Synthesis.</p> <p>The course material aims at:</p> <p>(a) on the one hand, students' familiarity with basic theoretical concepts and their role in the graphics pipeline production; the relevant linear algebra, transformation, projection and 3D modeling themes, the basic algorithms of design, anti-aliasing, cutting, removal of hidden surfaces and triangulation, the basic algorithms for drawing parametric curved lines and surfaces, and basic texture and lighting management algorithms.</p> <p>(b) on the other hand, in their practical familiarity, through laboratory exercises and tasks, with the development of graphics applications where they are invited to implement versions of the above concepts in modern technological platforms understanding the latter, both at the level of basic hardware architecture, as well as in terms of software and the different degrees of abstraction and efficiency they offer.</p>
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Upon successful completion of the course the student:

- is aware of the basic theoretical concepts of Computer Graphics and their place in the overall intubation of computational graphics and image synthesis
- has the ability to design and implement professional graphics applications utilizing modern technology platforms
- Understands the differences, advantages and disadvantages of the capabilities of available computer-related technology solutions and can play an advisory role in their selection
- has the ability to monitor developments and understand and appreciate the new possibilities offered by technological and theoretical progress in the field of graphics
- has sufficient background to take courses with content related to advanced graphic concepts at both theoretical and technological level.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>
<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>
<i>Decision-making</i>	<i>Respect for the natural environment</i>
<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Team work</i>	<i>Criticism and self-criticism</i>
<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment</i>	<i>.....</i>
<i>Production of new research ideas</i>	<i>Others...</i>
	<i>.....</i>

- Search, analysis and synthesis of data and information, using the necessary technologies
- Decision-making, autonomous and teamwork
- Respect for diversity and multiculturalism
- Working in an interdisciplinary environment
- Criticism and self-criticism
- Promoting free, creative and inductive thinking

(3) SYLLABUS

The course aims to familiarize students with basic theoretical concepts and their role in the overall graphics pipeline production. But also in their practical familiarity, with the development of graphics applications where they are invited to implement versions of the above concepts in modern technology platforms understanding the latest, both in terms of basic hardware architecture, software and the different degrees of abstraction and efficiency they offer.

The course is developed into 13 sections. Presentation Links at:

https://openeclasse.teimes.gr/modules/course_description/?course=CIED163

Section Title	Literature
1. Introduction to graphics	Theocharis Th., Platis N., Papaioannou G., Patrikalakis N. "Graphics and Visualization", Publications S. Athanasopoulos & CO O.E, 2010, ISBN: 978-960-266-296-0
2. Raster, scan-conversion lines and curve algorithms	Theocharis Th., Platis N., Papaioannou G., Patrikalakis N. "Graphics and Visualization", Publications S. Athanasopoulos & CO O.E, 2010, ISBN: 978-960-266-296-0
3. Two-dimensional graphic: area fill, polygon scan-conversion, line clipping	Theocharis Th., Platis N., Papaioannou G., Patrikalakis N. "Graphics and Visualization", Publications S. Athanasopoulos & CO O.E, 2010, ISBN: 978-960-266-296-0

4. Antialiasing, geometric transformations, homogeneous coordinates	Styliadis Athanasios D" Computer Graphics", Ziti Pelagia & Co. Publications, 1999 ISBN: 960-431-510-2.
5. Three-dimensional graphics: 3D faces, mouldrepresentation of three-dimensional transformations, transformation composition,	Styliadis Athanasios D" Computer Graphics", Ziti Pelagia & Co. Publications, 1999 ISBN: 960-431-510-2.
6. Multi-center trimming, geometric projections, image transformations	Theocharis Th., Platis N., Papaioannou G., Patrikalakis N. "Graphics and Visualization", Publications S. Athanasopoulos & CO O.E, 2010, ISBN: 978-960-266-296-0
7. Virtual worlds, entity hierarchy and VRML programming, lighting,	Theocharis Th., Platis N., Papaioannou G., Patrikalakis N. "Graphics and Visualization", Publications S. Athanasopoulos & CO O.E, 2010, ISBN: 978-960-266-296-0
8. Texture,	Styliadis Athanasios D" Computer Graphics", Ziti Pelagia & Co. Publications, 1999 ISBN: 960-431-510-2.
9. User Interaction	Helen Sharp, Jennifer Preece, et al. (2019). "Interaction Design: Beyond Human-Computer Interaction" 5 edition, Wiley.
10. Modeling and implementing animations, morphing.	Styliadis Athanasios D" Computer Graphics", Ziti Pelagia & Co. Publications, 1999 ISBN: 960-431-510-2.
11. Representation of curves and surfaces, polygonal grids, parametric polygonal curves, parametric bicubic surfaces.	Theocharis Th., Platis N., Papaioannou G., Patrikalakis N. "Graphics and Visualization", Publications S. Athanasopoulos & CO O.E, 2010, ISBN: 978-960-266-296-0
12. Clear hidden surfaces, find visible lines, z-buffer algorithm	Theocharis Th., Platis N., Papaioannou G., Patrikalakis N. "Graphics and Visualization", Publications S. Athanasopoulos & CO O.E, 2010, ISBN: 978-960-266-296-0
13. Lighting and shading, transparency, object shadows, lighting models based on physical properties of objects, ray tracing.	Styliadis Athanasios D" Computer Graphics", Ziti Pelagia & Co. Publications, 1999 ISBN: 960-431-510-2.

The numbering refers to the corresponding week of the course.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	ICT is used to communicate with students and make available educational material, mainly through the eclass platform (announcements, lecture slides and other educational material, posting and submitting papers, user

	groups, discussions, emails, exercises, glossary, multimedia), as well as conventional e-mail.	
<p>TEACHING METHODS</p> <p><i>The manner and methods of teaching are described in detail.</i></p> <p><i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i></p>	<p>Activity</p>	<p>Semester Workload</p>
	Lectures	39
	Laboratory exercises	13
	Preparation of laboratory exercises	26
	Unguided study	47
	<p>Course Total</p> <p>(25 hours of workload per credit unit)</p>	125
<p>STUDENT PERFORMANCE EVALUATION</p> <p><i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Written examination(60% of the final grade) including:</p> <ul style="list-style-type: none"> ▪ Exercises ▪ Multiple choice questions ▪ Short answer questions <p>Laboratory (40% of final grade)</p> <p>The examination material and the evaluation process are communicated to the students in the lecture hall and in the e-class.</p>	

(5) ATTACHED BIBLIOGRAPHY

- Theocharis Th., Platis N., Papaioannou G., Patrikalakis N. "Graphics and Visualization", Publications S. Athanasopoulos & CO O.E, 2010, ISBN: 978-960-266-296-0
- Styliadis Athanasios D" Computer Graphics", Ziti Pelagia & Co. Publications, 1999 ISBN: 960-431-510-2.
- Helen Sharp, Jennifer Preece, et al. (2019). "Interaction Design: Beyond Human-Computer Interaction" 5 edition, Wiley.

The bibliography will be updated on a bi-monthly basis with new resources on internet