

## Incoming student mobility

Name of UNIOS University Unit: SCHOOL OF APPLIED MATHEMATICS AND  
INFORMATICS

COURSES OFFERED IN FOREIGN LANGUAGE  
FOR ERASMUS+ INDIVIDUAL INCOMING STUDENTS

Department or Chair within the UNIOS Unit	School of Applied Mathematics and Informatics
Study program	Undergraduate university study programme in Mathematics and Computer Science
Study level	Undergraduate (Bachelor)
Course title	3D Computer Graphics
Course code	I059
Language of instruction	English
Brief course description	<p>Syllabus.</p> <ol style="list-style-type: none"> <li>1. Introduction. Basic concepts of computer graphics, drawing points, lines, and polygons; modeling with polygons; animation; introduction to OpenGL programming; GPU capabilities.</li> <li>2. Transformations and viewing. Rendering pipeline, linear and affine transformations: translations and rotations, homogeneous coordinates, transformations in OpenGL. Viewing with orthographic and perspective transformations, projective geometry, pixelization.</li> <li>3. Lightning, illuminations and shading. Phong lightning model. Lights and material properties in OpenGL. Cook-Torrance model.</li> <li>4. Interpolations: linear, bilinear, spherical and hyperbolic interpolations.</li> <li>5. Texture mappings. Texture coordinates, supersampling and jitter. Texture maps in OpenGL.</li> <li>6. Color and its perception. Color representations: RGB and HSL.</li> <li>7. Drawing curves: Bezier curves, B-Splines. Curves in OpenGL.</li> <li>8. Ray Tracing: recursive ray tracing, reflection and transmission, distributed ray tracing, backwards ray tracing. Light intersections with geometric solids.</li> <li>9. Animations and Kinetics. Representations of orientation, quaternions. Forward and inverse kinematics.</li> </ol>

## ERASMUS+

EU programme for education, training, youth and sport

Form of teaching	Consultative teaching.
Form of assessment	During lectures students will be introduced to basic mathematical concepts in 3D computer graphics image synthesis. Different shading models for light interaction with geometric solids and scene rendering techniques for rasterization and ray tracing respectively will be demonstrated. Exercises will be held in specialized computer-based laboratories where students will learn how to model and draw simple 3D models using OpenGL graphical library. The final exam will be held after completion of lectures and exercises and it will contain a practical and an oral part. Successful participation in mid-term exams (or homework) replaces obligatory participation in the practical part of the exam. Students can influence their final grade if they actively participate in homework assignments during the semester. The oral part of the exam consists of public seminar presentation of graphical application programming project.
Number of ECTS	7
Class hours per week	2+2+1
Minimum number of students	
Period of realization	Winter semester
Lecturer	Domagoj Ševerdija