Course Information

Course Code	3550477
Course Section	1
Course Title	INTRODUCTION TO COMPUTER GRAPHICS
Course Credit	3
Course ECTS	6.0
Course Catalog Description	Hardware and software components of graphics systems. Output and filled-data primitives. Forrier analysis, convolution, sampling, quantization, aliasing, 2D and 3D geometric transformations. Two-dimentional viewing. Three-dimentional viewing: Viewing pipeline, viewing parameters, projections, viewing transformations, clipping. Visible surface detection. Introduction to illumination models and surface rendering.
Prerequisites	Students must complete one of the following sets to take this course.

Set	Prerequisites
1	3550213

Schedule	Not available

Instructor Information

Name/Title	Assoc.Prof.Dr. TOLGA CAN
Office Address	TBD
Email	ctolga@metu.edu.tr tcantr@gmail.com
Personal Website	www.ceng.metu.edu.tr/~tcan
Office Phone	
Office Hours	Fridays 13:00-14:30

Course Objectives

CNG 477 Introduction to Computer Graphics introduces the basic concepts of computer graphics and raster based methods. It also provides the necessary theoretical background for introductory computer graphics and demonstrates the application of computer science to graphics. It also offers an opportunity for students to formulate and implement applications of computer graphics. This course further allows students to develop programming skills in computer graphics by programming assignments.

Course Learning Outcomes

At the end of this course, students will be able to:

1. Understand basic properties of images and display devices.

2. Understand the steps involved in generating a 2D image of a 3D virtual scene.

3. Understand and implement the ray tracing algorithm.

4. Understand and implement the mathematical modeling of curves and surfaces.

5. Apply composite modeling**,** viewing, projection, and viewport transformations.

6. Apply 2D texture images to 3D models.

7. Understand and implement basic lighting and surface shading models.

8.Understand the fixed function forward rendering pipeline.

9. Understand the basics of the programmable forward rendering pipeline.

10. Understand and **implement** hidden surface removal and shadowing algorithms.

11. Design computer graphics programs using OpenGL

Program Outcomes Matrix

Undergraduate

		Level of Contribution			
	Program Outcomes	**0**	**1**	**2**	**3**
1	Employ knowledge of mathematics, science and engineering to formulate solution to real life computing problems			X	
2	Design and conduct experiments, as well as analyze, evaluate and interpret data	X			
3	Design systems, components, and/or processes by specifying the requirements and determining the realistic constraints such as ethical and environmental		X		
4	Judge professional and ethical principles and integrate them in the working environment	X			
5	Have the ability to communicate effectively	X			
6	Recognize the need for, and an ability to engage in life-long learning		X		

0: No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Instructional Methods

Lectures. In class programming. Programming assignments.

Tentative Weekly Outline

Week	Topic	Relevant Reading	Assignments
1	Introduction, images, displays, and human vision		
2	Ray tracing: Ray generation.		
3	Ray tracing: ray object intersection, basic illumination model, shadows		
4	Forward rendering pipeline overview.		
5	Modeling transformations.		
6	Viewing, projection, and viewport transformations.		
7	Curves and surfaces: Natural cubic splines, Hermite curves, Bezier curves and surfaces.		
8	Basic Illumination Model in OpenGL and Surface Rendering Techniques.		
9	Rasterization.		
10	Texture mapping.		
11	Clipping and culling.		

Week	Topic	Relevant Reading	Assignments
12	Introduction to Programmable Shaders and the GLSL language.		
13	Shadow mapping.		
14	Introduction to Blender and Unity.		

Course Textbook(s)

Donald D. Hearn and M. Pauline Baker, "Computer Graphics with OpenGL", 3rd Edition, Prentice Hall, 2004, ISBN 978-0130153906.

Course Material(s) and Reading(s)

Material(s)

OpenGL Red Book.

Reading(s)

1. Peter Shirley and Steve Marschner, "Fundamentals of Computer Graphics", 3rd Edition, A K Peters, 2009, ISBN 978-1568814698.

2. Mike Bailey and Steve Cunningham, "Graphics Shaders", A K Peters, 2009, ISBN 978-1568813349.

3. Peter Shirley and R. Keith Morley, "Realistic Ray Tracing", 2nd Edition, A K Peters, 2003, ISBN 978-1568814612.

Supplementary Readings / Resources / E-Resources

Readings

OpenGL Red Book.

Resources

www.opengl.org

Assessment of Student Learning

Assessment	Dates or deadlines
Programming assignments	
Midterm Exam	
Final exam	

Course Grading

Deliverable	Grade Points
Programming assignments (3)	30
Midterm exam	35
Final exam	35
Total	100

Course Policies

Class Attendance

Attendance is strongly advised.

Late Submission of Assignments

Assignments can be submitted with 20 pts per day late submission penalty.

Make up for Exams and Assignments

If you have a medical excuse you may take make-up exams for the midterm and final exams.

Information for Students with Disabilities

To obtain disability related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the ODTÜ Disability Support Office as soon as possible. If you need any accommodation for this course because of your disabling condition, please contact me. For detailed information, please visit the websie of Disability Support Office: http://engelsiz.metu.edu.tr/

Academic Honesty

The METU Honour Code is as follows: *"Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."*