# CTIS 489

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|---|---|---|
| Instructor | : | Dr. Serkan Genç |
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# Objectives

The objective of this course is to provide basic concepts and practice to develop interactive 2D and 3D graphics softwares without using any game engines. This course gives you the understanding of how game engine works, and 3D Graphics Pipeline. To demonsrate those concept, the students will use fixed and shader-based OpenGL and GLUT libraries.

# Resources

Text book : Lecture notes
References :
- OpenGL Programming Guide, 7th Edition, Mason Woo, Addison Wesley.
- OpenGL SuperBible 5th Edition, Richard S. Wright, et al. 2010, Addison-Wesley
- Interactive Computer Graphics, Edward Angel, 6th Edition, Addison-Wesley

# Grading

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|---|---|---|---|---|---|
| Midterm #1 | : | 30% | Attendance | : | 5% |
| Midterm #2 | : | 30% | | | |
| Final | : | 35% | | | |

**Grading Policy:** Missing **21** lecture hours leads to FZ grade.

**Grades:**

| Lower Boundary | Letter |
|---|---|
| 45 | D |
| 50 | D+ |
| 55 | C- |
| 60 | C |
| 65 | C+ |
| 70 | B- |
| 75 | B |
| 80 | B+ |
| 85 | A- |
| 90 | A |

**Attendance Grade:**

| Missign Hours | Grade |
|---|---|
| 0-3 | 5 Pts |
| 4-6 | 4 Pts |
| 7-9 | 3 Pts |
| 10-12 | 2 Pts |
| 13-15 | 1 Pt |

Computer Technology and Information Systems
Bilkent University, Ankara, Turkey.
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## Outline

| Date | Lecture |
|---|---|
| **Week 01** | a: Introduction to Computer Graphics, its purpose and usage areas<br>b: Event-based Programming, GLUT interface |
| **Week 02** | a: GLUT properties, functions, programming, Introduction to OpenGL, Cartesian Coordinate System, Drawing primitives (point, line, triangle, polygon, fonts)<br>b: GLUT, : 2D Drawing examples, 2D chart drawing. |
| **Week 03** | a: Basics of Trigonometry<br>b: Vectors and Matrices |
| **Week 04** | a: Geometric Transformations and Matrix Operations using OpenGL, Basics of Animation, Display Properties, Double Buffering, Triple Buffering<br>b: 2D Affine Transformation and Animation Example. |
| **Week 05** | a: 3D Drawing: 3D Coordinate System, Modeling<br>b: 3D Viewing, Orthographic and Perspective Camera Models in OpenGL |
| **Week 06** | a: 3D Modeling, GLUT 3D Primitives, 2D and 3D cameras in the same scene.<br>b: Walkthrough in a  3D Environment, |
| **Week 07** | *Midterm #1* |
| **Week 08** | a: Texture Mapping, SkyBox<br>b: Example for Texture Mapping using OpenGL |
| **Week 09** | a: Color, Perception, Shading Models, Surface Normals, Lighting in Opengl |
| **Week 10** | b: Use cases about Lighting. |
| **Week 11** | *Midterm #2* |
| **Week 12** | a: 3D Model Loading, animated characters (MD2 file format, OBJ file format)<br>b: Use case |
| **Week 13** | a: Blending and Transparency, Reflections<br>b: Use case |
| **Week 14** | a: Fogging<br>b: Future Directions |