Week 1: Introduction

- History of computer graphics

- Overview of graphics architectures and software

- Overview of modeling and rendering

- Graphics pipeline

Week 2: Introduction to 2D and 3D Graphics

- Curves

- Conversion

- Surface Representation

- Meshes

Week 3: Mathematics of Computer Graphics

- Vectors

- Matrices

- Coordinate systems

- Interception of Lines

- Triangles

- Polygons

Week 4: Transformation in 2D and 3D

- Translation

- Rotation

- Sheer

Week 5: Camera and Viewing

- Perspective specifications

Week 6: Colour and Lighting

- Colour models

- Lighting models

Week 7: Shading and Ray Tracing

- Shading models

- Material models

- Ray tracing

Week 8: Texture Mapping

- Mapping methods

- Texture coordinates

Week 9: Real-time Shadows

- Projective shadows

- Depth maps

- Shadow test

Week 10: Introduction to Computer Games

- Single player games

- Multiplayer games

- Virtual reality

Week 11: Collision Detection

- Primitive Collision Detection

- Bounding boxes

- Continues Collision Detection

Week 12: Spatial Data Structures

- Grid

- Octree

- BSP Tree

- K-D Tree

Week 13: Presentation of Projects

Week 14: Special Topics in Computer Graphics I – Industrial Talk

Week 15: Special Topics in Computer Graphics II – Industrial Talk

Week 16: Revision

Lab topics:

1. Linear Algebra warmup
2. OpenGL introduction and setup
3. Curves and Surfaces
4. Transformation in 2D and 3D
5. Set camera
6. Lighting and color
7. Ray tracing and shading (ray trader) sample code, objects on the table, 640\*480, 2 light source, shadow, reflection
8. Texture mapping
9. Real time shadows
10. Unity3D introduction and setup
11. Collision detection,
12. Acceleration structures
13. Final Project tutorial
14. Final Project presentation
15. Revision