

Computer Science 4308 –Computer Graphics Student Learning Outcomes

1. Students will demonstrate an understanding of contemporary graphics hardware.
2. Students will create interactive graphics applications in C++ using one or more graphics application programming interfaces.
3. Students will write program functions to implement graphics primitives.
4. Students will write programs that demonstrate geometrical transformations.
5. Students will demonstrate an understanding of the use of object hierarchy in graphics applications.
6. Students will write program functions to implement visibility detection.
7. Students will write programs that demonstrate computer graphics animation.
8. Students will write programs that demonstrate 2D image processing techniques.

Course Content

Textbook: *Computer Graphics: Principles and Practice*, Second Edition in C, by Foley, et al. The following chapters are covered (See textbook “Contents”).

1. **Introduction.** Uses of computer graphics, classification of applications, hardware and software, application frameworks.
2. **Basic Raster Graphics Algorithms for Drawing 2D Primitives.** Scan conversion, lines, circles, ellipses, rectangles, polygons, arcs, pattern fill, clipping, antialiasing.
3. **Graphics Hardware.** Display technologies, raster systems.
4. **Geometrical Transformations.** 2D Transformations, matrix representation of transformations, composite transformations, window-viewport transformations.
5. **Viewing in 3D.** Projections, 3D viewing, coordinate systems.
6. **Object Hierarchy.** Geometric modeling, retained-mode graphics systems, matrix composition in display traversal, appearance-attribute handling in hierarchy, interaction, optimization.
7. **Input Devices, Interaction Techniques, and Interaction Tasks.** Hardware, programming techniques, user interfaces.
8. **Visible-Surface Determination.** Algorithms, z-buffers, scan-line methods, octrees, ray-tracing.
9. **Image Manipulation and Storage.** Filtering, image processing, multipass techniques, file formats.
10. **Animation.**