

## Computer Science 3371 Computer Game Development I

### Student Learning Outcomes

1. Students will create textured 3D models for use in games using 3D modeling software.
2. Students will manipulate textures for use in 3D modeling.
3. Students will edit sound effects using sound editing software.
4. Students will create interactive 3D graphics programs.
5. Students will write software demonstrating rigid body transformations in a 3D graphics application.
6. Students will write software demonstrating collision detection and response in a 3D graphics application.
7. Students will integrate interactive audio in a 3D graphics application.
8. Students will write software demonstrating level of detail rendering in a 3D graphics application.
9. Students will write software demonstrating scene management object culling in a 3D graphics application.
10. Students will write software to read data from a file containing 3D object data.

### Course Content

**Textbook:** *Real-Time Rendering*, Second Edition, by Moller & Haines. The following chapters are covered (See textbook "Contents").

1. **The Graphics Rendering Pipeline.** Hardware and software architecture for 3D graphics applications, pipeline stages, application stage, geometry stage, rasterizer stage.
2. **Transforms.** Matrix representation for transformations, basic transforms, composite transforms, view projections.
3. **Visual Appearance.** Material properties for 3D objects, scene lighting, point lights, directional lights, spot lights, encoding transparency, specular highlighting.
4. **Texturing.** Rendering 3D objects with textures, texture placement, texture scaling, texture animation, multitexturing.
5. **Image-Based Rendering.** Billboarding, particle systems, image-based algorithms.
6. **Acceleration Algorithms.** Spatial data structures, culling techniques including object culling, level of detail, scene management, portal culling, frustum culling.
7. **Polygonal Techniques.** 3D object representation, 3D file formats, level of detail techniques.
8. **Intersection Test Methods.** Bounding volumes, intersection testing, collision testing.