## CS 4250: COMPUTER GRAPHICS

<table>
<thead>
<tr>
<th>Semester Hours:</th>
<th>3.0</th>
<th>Contact Hours: 3</th>
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<tbody>
<tr>
<td>Coordinator:</td>
<td>Jong Kwan &quot;Jake&quot; Lee</td>
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<tr>
<td>Text:</td>
<td>Computer Graphics with OpenGL</td>
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<tr>
<td>Author(s):</td>
<td>HEARN, BAKER, AND CARITHERS</td>
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<td>Year:</td>
<td>2010</td>
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### SPECIFIC COURSE INFORMATION

**Catalog Description:**

Graphic I-O devices; two-dimensional and three-dimensional display techniques; display processors; clipping and windowing; hidden-line removal; data structures for graphics. Prerequisites: CS 3350 and one of MATH 2220, MATH 3220, MATH 3320. Approved for distance education.

**Course type:** ELECTIVE

### SPECIFIC COURSE GOALS

- I know how to draw the basic primitives (e.g., point, line, polygons) using OpenGL.
- I can explain how the Bresenham line scan conversion algorithm works.
- I am able to produce simple animation using OpenGL.
- I know how 2D transformations (e.g., 2D translation, 2D rotations, 2D scaling) work in graphics.
- I know how 3D transformation (e.g., 3D translation, 3D rotations, 3D scaling) work in graphics.
- I understand how simple line and polygon clipping algorithms work.
- I know how spline-based modeling works in graphics.

### LIST OF TOPICS COVERED

- Introduction
  - Graphics applications
  - Languages for CG
• Graphics hardware
  o Color and color lookup tables

• Raster Graphics & Raster Graphics Toolkits
  o Standard primitives
  o Primitive generation, e.g., Bresenham
  o Filling algorithms
  o Drawing styles
  o BitBlt

• Interactive Graphics
  o User interface considerations
  o Input devices
  o Interactive programming techniques

• 2D & 3D Graphics
  o Modeling transformation
  o Coordinate systems
  o Clipping
  o Windows and Viewports
  o Wireframe models
  o Animation Techniques

• 3D Realism Techniques
  o Back face removal
  o Viewing issues
  o Shading and smoothing techniques
  o Lighting issues
  o Introduction to Ray Tracing

• Additional Topics as time permits