1. Course number and name: CSCI 5437 Computer Graphics

2. Credits and contact hours: 3 credit, 3 contact

3. Instructor's or course coordinator's name: Hong Zhang, PhD


   a. Other supplemental materials: None

5. Specific course information
   a. Brief description of the content of the course (Catalog Description)
      Course covers fundamentals of the theory of computer graphics, including raster systems, 3D viewing, illumination, shading and solid modeling. A standard computer graphics language is introduced.
   b. Prerequisites: A minimum grade of “C” in CSCI 3230 and CSCI 3236
   c. Indicate whether a required, elective, or selected elective course in the program
      Elective course for BS-CS.

6. Specific goals for the course
   a. Specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

<table>
<thead>
<tr>
<th>Course Learning Outcomes</th>
<th>Student Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>compare computer graphics programming standards</td>
<td>1a, 1i, 2a</td>
</tr>
<tr>
<td>give an in-depth description of 2D and 3D rendering pipelines</td>
<td>1a, 1b</td>
</tr>
<tr>
<td>construct advanced geometric models, transformations, and views</td>
<td>1b, 1c, 1i</td>
</tr>
<tr>
<td>apply shading and lighting models</td>
<td>1a, 1b, 1c, 1i</td>
</tr>
<tr>
<td>implement interactions and animations</td>
<td>1a, 1b, 1c, 1i</td>
</tr>
<tr>
<td>build a comprehensive graphics application</td>
<td>1c, 1d, 1i, 2a</td>
</tr>
</tbody>
</table>

   b. Student outcomes
      • 1a: An ability to apply knowledge of computing and mathematics appropriate to the discipline
      • 1b: An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
      • 1c: An ability to design, implement and evaluate a computer-based
system, process, component, or program to meet desired needs

- 1d: An ability to function effectively on teams to accomplish a common goal
- 1i: An ability to use current techniques, skills, and tools necessary for computing practice
- 2a: An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices

7. Brief list of topics to be covered

- Graphics APIs
- 2D Graphics
- Affine Transformations
- Homogeneous Coordinates
- Images
- 3D Graphics
- Scene Graphs
- Geometry
- Transformations
- Quaternions
- Views
- Illumination Models
- Texture mapping
- Behavior
- Animation