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Listed below are the major topics that we will cover, in roughly the order we will cover them. Please consult the course web site for further information. See the *policies* page for guidelines on collaboration, grading, homework submission, and other important information about the class. See the *downloads* page for course notes and useful links. Finally, please visit the class *discussion board* periodically to check for important announcements and to participate in helpful discussions.

1. Basics

- (a) Overview of computer graphics: applications and sub-areas
- (b) Vectors, matrices, transformations, and 3D geometry
- (c) Displays, images, color, and human perception
- (d) Rasterization vs. ray casting
- (e) Induction to OpenGL

2. Transformation, Clipping and Rasterization

- (a) Rasterization of lines and polygons: Bresenham's algorithm
- (b) Clipping of lines and polygons
- (c) Orthographic and perspective viewing transformations
- (d) Homogeneous coordinates

3. Lighting and Shading

- (a) Diffuse and ambient lighting
- (b) Phong lighting and Gouraud shading
- (c) Transformation of normal vectors
- (d) Texture- and Environment-mapping

4. Interactive Graphics

- (a) View-frustum culling and back-face elimination
- (b) Z-buffering
- (c) Bump mapping and normal mapping
- (d) Anti-aliasing, mip-mapping

5. Geometry

- (a) Polygons and piecewise approximation
- (b) Implicit vs. parametric representation

- (c) Modeling hierarchies and transformation

6. Animation and Interaction

- (a) Event-driven programming

- (b) Key framing vs. simulation

- (c) Picking, highlighting, painting