EE 7000-1 (Fall 2011) Graphics and Visual Computing

Course Webpage: http://www.ece.lsu.edu/xinli/teaching/EE7000Fall2011.htm

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Course Description:

- To cover 3D geometric and graphic computation theories, algorithms, techniques, and their applications in modeling, simulation, and animation.
- An advanced graduate course, but basic/necessary computer graphics knowledge will be briefly covered at the beginning.
- Good math background and programming skills could easily follow it.

Prerequisites:

- Calculus and linear algebra (vectors, matrices, …)
- C/C++ Programming experience: homework and projects require substantial programming effort
  (You are expected to know C/C++ programming and standard data structures)

Tentative Contents:

1. Basic computer graphics pipeline, basic OpenGL programming, Graphics User Interface design, build your own GUI.
2. Basic 3D Representation and Modeling: how to store, represent, and render 3D geometric objects using triangle meshes; half-edge data structure.
3. Analyzing 3D Shapes:
   3.1 Computing topological properties of surfaces: connected components, genus, boundaries, orientability
   3.2 Computing geometric properties of surfaces: areas, curvatures, first and second fundamental forms
4. Multi-resolution Representation (Progressive Meshes), Hierarchical Spatial Representation
5. Enhance your visual effects: Surface Parameterization and Texture mapping, environmental mapping and rendering
7. (Selected) Deformation and Animation: Free-form Deformation, Skeleton-driven Animation, Morphing
8. (Selected) Visual computing applications: meshing; segmentation; shape comparison and recognition

Homework and exams:

1. One warm-up assignment, four regular homework assignments (8+10+10+10+10);
2. One course project: midterm presentation (8), final presentation + demo (16), and final report (8);
3. In-class exams (10) + a final exam (10).

Textbook: (not required, slides will be provided)

Opengl programming: “The OpenGL programming Guide”:
http://www.opengl.org/documentation/red_book/