Lecture #1: Wednesday, 1 April 2009
Topics: Course Outline
Lecturer: Leonidas Guibas

Course Outline

- *Moving things around in 2D and 3D* [1 week]

  2D & 3D transformations and matrices; applications to viewing, modeling and kinematics.

- *Smooth shape representations and algorithms* [2 weeks]

  Basic differential geometry; parametric curves and surfaces (polygons, quadratics, cubics); spline basics.

- *Shape analysis* [1 week]

  Shape features, segmentation; shape matching (ICP); simplification and approximation; symmetry detection .

- *Triangulations and other complexes, space partitions* [2 weeks]

  Simplicial complexes and their topology; quad trees, *k-d* trees, etc.; Voronoi/Delaunay diagrams; elementary computational topology.

- *Shape reconstruction* [1 week]

  Crust and related algorithms; marching cubes.

- *Geometric search and optimization* [1 week]

  Visibility and shortest paths, localization.

- *Motion analysis* [1 week]

  Collision detection; motion planning.