CS 67301/77301    SCIENTIFIC VISUALIZATION    3 Credit Hours

Instructor’s Name: ________ Ye Zhao________________________________________

(Textbook Title, Author, Year)
No single specific textbook required.

(Other Supplemental Material)

Course Content:
(Cross-listed with CS 77301) Discusses the visualization of scientific, engineering and medical data sets. Introduces mechanisms to acquire sampled or computed data and points out methods to transform these data into the visual system.

Prerequisites or co-requisites: Graduate standing
Required, elective, or selected elective

Topics to be Covered: Total 45 hours

Graphics and visualization system (5 hours)
  Structure and pipeline
  Programming language
  Graphics hardware and software model

Visual perception (5 hours)
  Eye model and basic perception concept
  Color system

Data model (4 hours)
  1D, 2D and 3D data
  Scalar and vector field
  Data acquisition techniques

2D image/vector data (6 hours)
  Histogram and Image processing basics
  Vector and flow visualization

3D volume data (10 hours)
  Spatial transformation
  Ray-casting
  Transfer function
  Illumination and shading
  Isovalue, isosurfaces and surface visualization

GIS Science Data (10 hours)
  GIS Point Data
  GIS Trajectory Data
System and Applications (5 hours)

**Learning Outcomes:**
The objectives of the course are to learn techniques, algorithms, design, and visual systems, which promote human understanding and analysis of critical data sets. A group of visualization techniques recently discovered and widely used in scientific, medical, and information data sets will be discussed.

**Learning Outcomes Assessment:**
1. Reading and presentation: Students are required to read technical papers related to class topics. Each student will be required to give a presentation of your reading of technical papers during the semester. The presentation can use the given paper or other technical paper upon the lecturer’s permission.
2. Paper examinations: Two paper-based exams will be given during the semester. Students are asked to answer questions of general knowledge we studied on class and on your readings.
3. Projects: Programming projects will be evaluated by project design, work load, and results, as well as the presentation students give on class.