Scientific Visualization Syllabus

Instructor: Dr. Xiaoqiang Wang (wwang3@fsu.eu)
Office: DSL 495
Office Hours: by appointment.
Room: BEL 243
Days and Times: MWF 11:15am – 12:05pm

Text:
Online and hard copy handouts.
And the following books may also be useful as references.

1. *The Visualization Handbook*, by Charles Hansen and Christopher Johnson, Academic Press, 2005
2. *Information Visualization:An Introduction*, Robert Spence
3. *The Visualization Toolkit: An Object-Oriented Approach to 3D Graphics*, by William Schroeder, Ken Martin, 3rd Edition, 2006

Course description: This course will cover the visualization theory and practice. It will teach students the techniques for creating effective visual representations of 2D and 3D scientific data sets.
The topics include

- Introduction to visualization
- Introduction to OpenGL
- Drawing Geometric Objects
- Viewing, illumination and Shading
- Introduction to Visualization toolkits(VTK)
- Introduction to Amira or VisIt
- Scalar-field visualization in 2D and 3D, Volume rendering
- Visualization of 2D Multivariate Data
- Visualization of Vector-field and Tensor in 2D and 3D
- Volume rendering
- Information Visualization
- Basics of human visual perception
- Evaluating the effectiveness of visualization
- Introduction to use the visualization software VisIt

- Student Project Presentations

Course objectives: After completion of this course, the graduate student should

- be able to write computer codes for visualization using VTK or OpenGL;
- be able to create effective visual representations of 2D and 3D scientific data sets;
- determine the most applicable technique for a specific scientific visualization application;
- be able to use existing visualization software packages;
- be aware of the human visual perception and effectiveness of visualization.

The undergraduate student should

- be familiar with methods and techniques used in scientific visualization;
- be able to create effective visual representations of 2D and 3D scientific data sets;
- be able to analysis and interpret the results of scientific visualization;
- determine the most applicable technique for a specific scientific visualization application;
- be able to use existing visualization software packages;
- be aware of the human visual perception and effectiveness of visualization.

Software Platforms:

C/C++, Matlab, OpenGL, VTK, Amira, VisIt

Prerequisites: All graduate students with some C/C++ programming experience are welcome to this course. Undergraduate students: MAC1105 (College Algebra) and MAC2312 (Caculas with Analytical Geometry)

Assessment and Grading Policy:

- Visualization Exercises
- Paper reading and summarization
- Final Programming Project

American Disability Act:

Students with disabilities needing academic accommodation should:
(1) register with and provide documentation to the Student Disability Resource Center; and
(2) bring a letter to the instructor indicating the need for accommodation and what type.
This should be done during the first week of class.

Academic Honor Code:

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at http://dof.fsu.edu/honorpolicy.htm.)