CDS 301
Scientific Information and Data Visualization
Syllabus

Fall 2008

Prerequisites: Introduction to Computational Science (CDS 101), Computer Science II (CS 211), Analytic Geometry and Calculus (Math 113), Discrete Mathematics (Math 125)

Credits: 3

Date: Tuesday and Thursday
Time: 10:30 AM to 11:45 AM
Place: Research Bldg 1, room 202

Instructors: Jie Zhang

Contact Info: (703)993-1998 (phone), jzhang7@gmu.edu (e-mail)

Office Hour: 3:00 PM to 4:00 PM, Thursday, or by appointment

Office: Room 351, Research Bldg 1

Description: The course focuses on visualization of scientific data. Both visualization principles and practical design issues are addressed. The course introduces the visualization pipeline. It covers the visualization of scalar data, vector data, and tensor data. It also covers image visualization, volume visualization and finally information visualization. It discusses the effective use of visualization in various areas of the natural sciences, and examples of application will be drawn from these areas. It emphasizes the importance of visualization in understanding observations, examining theories, and fostering new scientific hypothesis.

Content:

- From Graphics to Visualization
- Human Perception
- Data Presentation
- Visualization Pipeline
- Scalar Visualization
- Vector Visualization
- Tensor Visualization
- Domain-Modeling Techniques
- Image Visualization
- Volume Visualization
- Information Visualization

Software Tools: C/C++, OpenGL, Matlab, IDL

Homework: There will be 6 – 8 small assignments, including data analysis, programming for graphic applications, use of high-level graphics software, and design of graphical displays.
**Project:** The project will be a research paper to analyze data from the student’s area of interest. The research must involve the use of visualization in a significant way, either in the analysis or in the presentation or both.

**Exams:** There will be one midterm and one final exam.

**Grades:** Homework (25%), Project (25%), Midterm (20%), Final Exam (30%)

**Class URL:** http://solar.gmu.edu/teaching/2008_CDS301/


**Supplement Reference Books:**