

CDS 301
Scientific Information and Data Visualization
Syllabus

Fall 2009

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: Enterprise Hall, room 176

Instructors: Jie Zhang

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

Office Hour: 2:00 PM to 3:30 PM, Tuesday, or by appointment

Office: Room 351, Research Bldg 1

Description: The course focuses on visualization of scientific data and information. 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, IDL, Matlab

Homework: There will be 5– 7 small homework assignments to reinforce the understanding of the visualization principles.

Projects: There will be two or three small projects and one comprehensive project. These projects are intended for realistic visualization applications, involving analysis, design, programming and presentation.

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

Grades: Homework (20%), Project (35%), Midterm (20%), Final Exam (25%)

Class URL: http://solar.gmu.edu/teaching/2009_CDS301/

Text Book (required): “Data Visualization: Principles and Practice”, by Alexandru C. Telea, A K Peters Ltd, ISBN-13: 978-1-56881-306-6, 2008

Supplement Reference Books (not required):

1. “Information Visualization: Perception for Design”, second edition, by Colin Ware, Morgan Kaufmann Publishers, ISBN-13 978-1-55860-819-2, 2004