

CDS 301 - 001

Scientific Information and Data Visualization

Syllabus

Spring 2013

Prerequisites: Introduction to Computational Science (CDS 101) or Computing for Scientists (CDS130)

Credits: 3

Date: Tuesday and Thursday

Time: 1:30 PM to 2:45 PM

Place: Robinson Hall A249

Instructors: Jie Zhang

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

Office Hour: 3:00 PM to 5:00 PM, Thursday, or by appointment

Office: Room 351, Research Hall

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: Matlab, Paraview, C/C++, OpenGL

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

Projects: There will be two 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 (25%), Project (25%), Midterm (20%), Final Exam (30%)

Class URL: http://spaceweather.gmu.edu/jzhang/teaching/2013_CDS301_Spring/

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):

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

Honor Code: As in any class, you are allowed to study with other students. However, tests and homework assignments must be completed on your own unless stated specifically in the assignment guidelines. In some assignments, you will be directed toward on-line sources for papers, data and code. If these data, code, or papers are used for a project, then you **MUST** cite where it came from. Specifically, you may not copy any text, computer code, image, data or any other material from the Internet or any other source and represent it as your own. Any material that is taken in whole or in part from any other source (including web-pages) that is not properly cited will be treated as a violation of Mason's academic honor code and will be submitted to the honor committee for adjudication, as will other violations of the honor code.