CDS 130 - 001
Computing for Scientists

Syllabus

Fall 2011
Prerequisites: Math 104 (Trigonometry and Transcendental Functions), or Math 105 (Precalculus Mathematics), or specified score on Math Placement Test
Credits: 3

Date: Tuesday and Thursday
Time: 10:30 AM to 11:45 AM
Place: Innovation Hall 330

Instructors: Prof. Jie Zhang
Contact Info: jzhang7@gmu.edu (email), (703)993-1998 (office phone)
Office Hour: 1:00 PM to 3:00 PM, Thursday, or by appointment
Office: Room 351, Research Bldg 1

Teaching Assistant: Puviharan Harendra
Contact info: pharendr@gmu.edu (email)
Office Hour: by appointment
The TA will assist the in-class MATLAB sessions, grade homework and answer questions.

Description: This course fulfills the GMU General Education Requirement for Information Technology with Ethics. Students will learn how to use computers to solve practical scientific problems. Topics will include the computer fundamentals of data representation and manipulation, basic scientific models and simulations, concept of scientific method, basic concepts and tools of scientific visualization, methods of data analysis, and computational ethics. The MATLAB is introduced and used as the computational platform. This course will equip students with the knowledge and confidence they need to make productive use of future hardware and software both as students and throughout their career

Content:

- Computer Fundamentals - Binary Representation of Data, Binary Addition and Subtraction, Data Storage, Logic Circuits and Tables
- Scientific Model and Simulation - Mathematical Models, Iteration, Differentiation, Integration, Scientific Method
- Scientific Visualization –height plot, 2D array, image, RGB color system
- Data analysis - statistical measures, histogram, regression
- Computational Ethics – ethical use of publications, data, and code, ethical issues in scientific data and computing.

Software Tools: MATLAB. During class, each student will be seated at a computer workstation with MATLAB installed. Outside of class, MATLAB is available on workstations on campus (Johnson Center, Innovation Hall, and some residence halls). It can also be accessed via online remote connection through the Virtual Computing Laboratory (VCL) at "https://www.vcl.gmu.edu/index.php?mode=selectauth". A $109-dollar student version of MATLAB may be purchased at Patriot Computers.

Homework: There will be a weekly homework. Homework will usually consist of multiple choice questions, short answer questions and short projects. Unless otherwise specified, homework will be assigned on each Thursday and due in the beginning of the class in the following Thursday. Only paper copies are acceptable.

Project: There will be one comprehensive project toward the end of the semester, which synthesizes the knowledge and program skills students have learned throughout the semester.

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

Grading: Homework (30%), Project (15%), Midterm (20%), Final Exam (30%), Class Participation (5%)

Class URL: http://blackboard.gmu.edu/ (for posting homework and grades)
http://solar.gmu.edu/teaching/2011_CDS130 (for posting lecture notes and supplement materials).

Text Book: None - no suitable textbook exists for this course. Course material consists of class presentations (PowerPoint Slides, whiteboard lectures, handouts and in-class exercises). They are supplemented by web-based content. PowerPoint Slides will be posted online.

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.