ATMOSPHERIC SCIENCES 5020
Environmental Programming
Fall 2014. 1.5 Semester Units. Second Half of Semester
MW 1:25-2:45 PM (M Li 1745)

Instructor: Professor John Horel. INSCC 483. Office (801) 581-7091. Cell (801) 870-9450.
john.horel@utah.edu. Office hours: TH 1:25-2:45 PM or by appointment
Teaching Assistant: TBD. Office hours: by appointment
Online resources: Access through your courses in the Canvas CIS system
Text Book: Final decision on a text has not been made
Prerequisite: MATH 1210
MATLAB: Downloading and installing the student version of MATLAB on your own computer is an option, but the assignments requiring Matlab can be completed using classroom workstations at no cost to you

Course Description:

Learning to program is similar to learning a new language: (1) it is hard to do, (2) it is easier for some people than others, (3) it is difficult to learn how on your own by just reading a book ,and (4) it requires practice, lots of practice. This course focuses on the fundamentals and selected applications of scientific computer programming relevant to environmental fields. Environmental scientists need the ability to acquire and process environmental data and communicate results based on that processing efficiently. While self-contained computer programs such as Excel can be used effectively, they do not develop the best programming practices needed by environmental scientists. Skills necessary to solve physically-based problems using computational resources and methods are stressed. The course relies on the Matlab computing environment with brief introductions to: Linix shell commands and scripts; file system issues; web design; and programming languages (Fortran and Python). Basic Matlab concepts will be introduced in parallel with applications to environmental fields, including analyzing and visualizing environmental data.

At the end of the course, you will be able to:

- Perform basic scientific calculations relevant to environmental fields using MATLAB
- Use best practices to write and debug computer programs including evaluating output for physically plausible results
- Develop confidence to modify example codes to obtain new capabilities for the underlying code (i.e., progress onward from cookbook-style programming)
- Employ techniques to access, process, and visualize environmental data sets
- Apply course concepts to complete a programming project relevant to your interests in an environmental field

Course Format: Teaching and Learning Methods

- This course requires you to begin and complete assignments as they are assigned- you must complete and turn in assignments by the assigned due date. There is no credit for late work without approval in advance to do so.

- Much of the instructional material will be online in the form of reading assignments and short video tutorials. Short on-line and in-class quizzes will be used to insure that students are staying current with the course content
- The class will be held in a Marriott Library computer lab that allows for a mix of instructional styles (e.g., short quizzes, brief lectures, follow along with the instructor, independent lab work). However, you will need additional time beyond the scheduled class hours in the lab or on your own computer to complete assignments.
- You will be expected to complete independently a project that entails accessing an environmental data set of interest to you, processing the data to elucidate some underlying meaning within the data, and communicate your analysis approach and results effectively in a short powerpoint-style file.

Class Policies and Grading

Grades will be determined from class attendance and on-line/ in-class quizzes (15%), assignments (65%), and completion of an independent project (20%). Plagiarizing, copying, or otherwise misrepresenting ones' work will not be tolerated and will be dealt with as harshly as permitted under University Policy. Do not break the scientific code of honor. Final grades are based on the following scale:
> 90 % guarantees an A or A-; > 80 % guarantees a B+, B, or B-
> 70 % guarantees a C+, C, or C-; > 60 % guarantees a D+, D, or D-
< 60% may result in an E
Cutoff points for the specific grades are identified to define reasonable distribution of grades.

Course Outline

- **Week 1. Oct 20.** Course overview, objectives, brief history of computational methods applied to environmental fields. **Oct 22.** Effective programming techniques and steps
- **Week 2. Oct. 27. Due:** *Assignment 1- using the Matlab GUI.* Matlab syntax. **Oct. 29.** Syntax (cont.)
- **Week 3. Nov. 3. Due:** *Assignment 2- syntax.* Vectors and arrays. **Nov. 5.** Cont.
- **Week 4. Nov. 10. Due:** *Assignment 3- arrays.* Input/output operations. **Nov 12. Due:** *Assignment-Project Proposal.* Visualization techniques.
- **Week 5. Nov. 17. Due:** *Assignment 4- IO.* Linux commands. **Nov. 19**. Scripting and job control
- **Week 6. Nov. 24. Due:** *Assignment 5-Shell scripting.* Intro to Python. **Nov. 26.** Python (cont.)
- **Week 7. Dec. 1. Due:** *Assignment 6-Python.* Python (cont.) **Dec. 3.** Intro to Fortran.
- **Week 8. Dec. 8. Due:** *Assignment 7-Python 2.* Fortran (cont.). **Dec 10.** Course Wrap up.
- **Finals Week. Due:** *11:59PM Friday, December 12. Turn in project.*

ADA Accomodations

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.

Additional Information Regarding Faculty and Student Responsibilities.

All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as

detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee.

The syllabus is not a binding legal contract. It may be modified by the instructor when the student is given reasonable notice of the modification.