Environmental Programming
Atmospheric Sciences 6910-007
Fall Semester 2018; second half
MWF, 9:40AM-10:30AM; WBB711

Instructor	Sally Benson	Chris Galli
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Office Hours	by appointment	by appointment
Office Location	603 WBB	482 INSCC

Course Description

Environmental scientists need the ability to acquire, process and display environmental data, imagery, and gridded fields. This course is designed to develop the skills necessary to solve physically-based problems relating to atmospheric science data sets. After a review of basic programming concepts, students will develop code to solve problems using programming languages and data sources relevant to their ongoing or future research. The course is particularly relevant for first-year graduate students as they begin research leading towards their thesis proposal.

It is assumed students have exposure and practical experience working with a common programming language used within physical sciences, such as Python, MatLab, or IDL. There is no requirement for using one language over another. It is important the student is comfortable working in a language that has available module/API bindings to common data libraries; specifically, NetCDF4, HDF, and CSV parsing.

Course Outcomes

By the end of this course, you will be able to:

- Write computer programs for analyzing data.
- Acquire and use data in multiple file formats.
- Create custom ways to display data.

Teaching and Learning Methods

The course will meet 3 times a week. The class time will be used for lecture, interactive class computer programing, and research advising. The students will become familiar with the research process by working on a project that is directly related to their research interest.

Grading Policy (Evaluation Methods & Criteria)

The grade will be determined by attendance, participation, and effort on the final project.

- Attendance = 1/3
- Participation = 1/3
- Final Project = 1/3 The project will be graded based on the student's growth in research ability, not on the final results of the research.

Presenting instructor: C = Chris, S = Sally

Course Schedule

Date	**Topic/Discussion**
Week 1:	
Mon Oct 15	Introduction (C/S)
Wed Oct 17	Variables and Data Types (S)
Fri Oct 19	Basic Programs and Arrays (C)
Week 2:	
Mon Oct 22	Basic I/O and Demos (data formats: CSV, JSON) (C)
Wed Oct 24	Scientific Data Types I (data formats: NetCDF, HDF) (S)
Fri Oct 26	Scientific Data Types II (data formats: Grib, binary) (C)
Week 3:	
Mon Oct 29	Introduction to Projects (C/S)
Wed Oct 31	Basic Control Structures (S)
Fri Nov 2	Arrays & Matrices (C)
Week 4:	
Mon Nov 5	Functions and Code Design (C)
Wed Nov 7	Project Milestone (C)
Fri Nov 9	Arrays II (C)
Week 5:	
Mon Nov 12	Optimization, Code Design and Organization (C)
Wed Nov 14	Numerical Applications (S)
Fri Nov 16	Debugging (C)
Week 6:	
Mon Nov 19	How to Present Data, Figures and Basic Plots (S)
Wed Nov 21	Project Milestone, Show off prototype (S)
Week 7:	
Mon Nov 26	Line plots (S)
Wed Nov 28	Color tables, visualizations (S)
Fri Nov 30	Plotting Images (S)

Week 8:

Mon Dec 3	Plotting Data on Maps (C/S)
Wed Dec 5	Present projects :)

Course Policies

Attendance & Punctuality: Attendance will be part of the grade. This course has a lot of lecture time that the students should be present for.

Participation: Participation will be part of the grade. It is important for the students to participate in the programming exercises during class time.

Electronic Devices in Class: If these interfere with class participation, the participation grade will be lowered.

University Policies

1. ***The Americans with Disabilities Act***. 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 this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.
2. ***Addressing Sexual Misconduct***. Title IX makes it clear that violence and harassment based on sex and gender (which Includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Note: This syllabus is meant to serve as an outline and guide for our course. Please note that I may modify it with reasonable notice to you. I may also modify the Course Schedule to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas under Announcements.