GEOG 8901, Basic Skills in Scientific Programming

Autumn 2015, 3 units, call number: 31930

Monday 5:20 PM – 8:05 PM, Derby Hall, Rm. 0140

Instructor: Prof. Jialin Lin
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Office: 1128 Derby Hall
Office Hours: Monday and Wednesday 10:45-11:45AM, or by appointment

Textbook: "Practical IDL Programming" by Liam E. Gumley, Morgan Kaufmann Publishers (Academic Press), 2002.

Course Objectives:

Computer programming skill is very important for graduate students in Atmospheric Sciences, Geography, Earth Sciences and Environmental Sciences. It plays a key role in their research, job-hunting, and future career. This course covers the fundamental principles and skills of scientific programming. We'll focus on (1) how to write a computer program with clear structure; (2) how to do data analysis using the various available subroutines; and (3) how to make nice plots for publications. We'll use the Interactive Data Language (IDL) as an example, which is a widely used language in physical sciences for interactive processing of large amounts of data. But the basic principles and skills also apply to other languages used for scientific programming.

The class will meet in Derby Hall 0140 on Mondays at 5:20-8:05pm. In each class I will lecture for about one hour. Then the students will do the assignments to practice what was taught in the lecture. The classroom (Derby Hall 0140) is a computer lab with the IDL software installed on all computers.

Materials to be covered:

Week	
1	Syllabus, Fundamentals of IDL syntax
2	Variables and operators
3	Labor Day (NO CLASS)
4	Arrays
5	Control statements: loops
6	Control statements: branches
7	Functions and procedures
8	Plotting data: line, bar and scatter plots
9	Plotting data: contours and maps
10	Data input and output: ascii, binary, netcdf, and hdf files
11	Data processing: interpolation and re-gridding
12	Data analysis: correlation and regression

13 Data analysis: Fourier analysis, smoothing and filtering
14 Data analysis: EOF and principle component analysis
15 Final review (No final exam)

The objectives of the course will be accomplished through the lectures and in-class assignments. The lectures will include some material not covered in the textbook and may incorporate math to the level of algebra. Determination of your grade will be as follows:

In-class assignments (one per week – 14 total – will drop your worst score)	90%
Attendance, professionalism, and active participation	10%

The grading scale is as follows: 100-93% A, 92-90% A-, 89-87% B+, 86-83% B, 82-80% B-, 79-77% C+, 76-73% C, 72-70% C-, 69-67% D+, 66-63% D, 62-60% D-, 59% and below E.

Academic Misconduct It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/info_for_students/csc.asp).

Disability Services Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.

Cell Phones Like on airplanes, interfere with navigation of the course, therefore, cell phones and pagers must be turned *OFF* during class as they interfere with the navigation of the course.

Final Exam: <u>There will be no final exam.</u>

<u>The schedule may change</u>, probably only slightly, as the class evolves. Instructor will alert students if/when schedule changes.