EAS 2900  Computer Programming and Meteorology Software
Spring 2011
Time: Lecture 1:25-2:40 TR (Brad. 1101)
3 Credits
N. Mahowald & B. Belcher

Office hours:
Mahowald/Belcher: TBA
TA office hours: TBA

Course Description:
Introduction to Fortran computer programming and visual software packages specifically tailored for meteorological application usage. Topics include basic Fortran 90 programming (this includes problem analysis, algorithm development, and program writing and execution), data manipulation, and instruction in the use of GrADS, GEMPAK and python visual display tools. The goal is for students to develop a basic foundation of important computer tools available for diagnostic meteorological applications to aid in weather forecasting and research.

Course audience:
This course is intended for meteorology or earth science students who want a basic introduction to computer programming. Students familiar with computer programming, with strong quantative skills or who think they may want to take additional courses in computer programming should take a class from the computer science department instead.

Prerequisites:
Math 1910 or equivalent

Objectives:
Course will be divided up into two parts. The first part will involve the students learning the basic principles of Fortran programming. Students will learn how to write their own simple programs and how to manipulate data input/output files. The second part of the course the students will learn how to visually display and calculate diagnostic fields using GrADS, GEMPAK and python software.

Learning outcomes. The student should be able to:
- Design, write, compile and run simple fortran and python codes
- Use flow control structures, modular programs and arrays
- Be able to understand and use programs written by others
- Be able to create graphs to display data

Grades:
For homeworks each student should only turn in their own work, although discussing homework problems together is encouraged. No collaboration allowed on prelims or the final project.
Grades will be determined as follows:

Homework 25%
Prelim I (March 17) 25%
Prelim II (May 5) 25%
Final Project 25%
(due at scheduled exam time)

Outline:

1. Introduction to Linux accounts, text editors, terminal windows
2. Introduction to Fortran language
3. Basic Fortran programming principles
4. Fortran Programming
   a. problem analysis
   b. algorithm development
   c. code writing and execution
5. Fortran Input/Output Data manipulation
6. Example Fortran from WRF
7. GrADS visual Software Display
   a. basic concepts/operation
   b. generating/creating control data files
   c. script writing and diagnostic calculations
   d. reading/viewing common meteorological formats
   e. station and gridded datasets
8. GEMPAK
   a. basic concepts/operation
   b. satellite image overlays
9. Python programming
   a. interactive Python
   b. basics/operators & expressions
   c. control flow
   d. functions
   e. modules
   f. data structures
   g. input/output
   h. graphing in Python
   i. Python standard library