Beyond the Mouse - The geoscientist's computational chest.
(A Short Course on Programming)

"Programming is legitimate and necessary academic endeavor."
Donald E. Knuth

Overview:

In the geosciences -as in many other disciplines- we collect data which need to be analyzed in ways that depend on the problem posed. The ability to adapt your environment to your needs instead of having it dictate how you approach a problem is invaluable in a setting that is supposed to generate fresh knowledge. Also, and this may be even more important, we are lazy people. We do not want to waste time by repeating the same steps again, and again, and ... again. This boredom causes errors. Being bored by such routines is totally legitimate. A computer (the machine, and earlier the person) exists to perform such routines reliably and repetitively: It takes in data, manipulates it following *your* commands (yes, I mean it!), and gives a respective result. The point of writing computer programs is to automate an intellectual challenge that has been solved and make it reusable at all times - for yourself and ideally for others.

What this course is:

The intent is to hand you tools that will allow you to massage data in exactly the way you want it to be. We will start out manipulating your thinking, introduce you to programming in general, and then take off into specific working environments namely Unix and Matlab while teaching you how to map your data using GMT. We will cover many things in a short amount of time which means that we will give you many pointers which you can follow up on depending on your needs.

What it is not:

Complete.

Grading:

The class is pass/fail. The passing is based on weekly homework assignments and a final project. The homework exercises consist of:

- Basic application of methods and practices presented in class
- One complex problem that will contribute directly to your final project / thesis work (that's the goal!)

The final project will be specific to your research project. We want to encourage you to set up an efficient and safe environment in which you apply the methods and tools introduced in class. In the beginning of the semester you will provide us with a snapshot of your project directory (If you don't have one, don't bother). Send rudimentary datafiles - scripts/programs should be executable. You will do the same at the end of the term. Our expectations include (further specification later in the term):

- versioning,
- data backup,
- parametrization
- automation (makefiles, creating documentation from source, ...)
- reuse, efficiency, documentation

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(tentative) Schedule:

- Sep 10 **Thinking Programs**: Ronni Grapenthin
- Sep 17 **Fundamental Programming Principles: Variables and Data Types**: Ronni Grapenthin
- Sep 24 **Fundamental Programming Principles: Control Structures**: Ronni Grapenthin
- Oct 01 **Unix Tools I**: Jeff Freymueller
- Oct 08 **Unix Tools II**: Ronni Grapenthin
- Oct 15 **Generic Mapping Tools I**: Bernard Coakley
- Oct 22 **Generic Mapping Tools II**: Bernard Coakley
- Oct 29 - Nov 26 **Matlab**: Ronni Grapenthin, TBA
- Dec 03 **HTML/CSS**: Ronni Grapenthin
- Dec 10 **Next steps, wrap up**: Ronni Grapenthin, Jeff Freymueller

Prior to each talk you will find handouts, examples, and problem sets here. The problem sets are supposed to get you started poking around on your system and/or change the way you approach problems. The handouts will form some sort of mini-handbook that could be placed next to your computer.

Notes:

If you do not have access to a unix-linux-mac environment you can install cygwin. It is a linux emulation software that runs under Windows. The installation should be straightforward. If you have no rights to do so on your workstation contact Ronni or Jeff.

Contact:

Ronni Grapenthin
Geophysical Institute
University of Alaska Fairbanks
903 Koyukuk Drive, P.O. Box 757320
Fairbanks, Alaska 99775-7320

email: ronni <at> gi <dot> alaska <dot> edu
phone: +1 (907) 474 - 7428