Beyond the Mouse (2010) - 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 modify your environment according to your needs instead of having it dictate how you approach a problem is invaluable. This is especially true 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. Such boredom causes errors. And 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 (YEAH!), and gives the 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/Linux 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. Passing is based on mostly 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 (hopefully) 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

(tentative) Schedule:

The class meets: Mondays 1-2 pm (REIC 237), Friday 10:30-11:30 am (REIC 316).

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Fri	Sep 10	**Introduction**	Jeff Freymueller
Mon	Sep 13	**Thinking Programs**	Ronni Grapenthin
Fri	Sep 17, Lab 1	**Organizing your ideas**	Ronni Grapenthin
Mon	Sep 20	**Fundamental Programming Principles I: Variables and Data Types**	Ronni Grapenthin
Fri	Sep 24, Lab 2	**Math and the Matlab IDE**	Ronni Grapenthin
Mon	Sep 27	**Matlab I: Variables and functions**	Jeff Freymueller
Fri	Oct 01, Lab 3	**Writing first Matlab scripts**	Ronni Grapenthin
Mon	Oct 04	**Fundamental Programming Principles II: Control Structures**	Ronni Grapenthin
Fri	Oct 08, Lab 4	**More advanced Matlab programming, Debugging**	Ronni Grapenthin
Mon	Oct 11	**Matlab I/O**	Ronni Grapenthin
Fri	Oct 15, Lab 5	**Matlab I/O**	Ronni Grapenthin
Mon	Oct 18	**A complex example**	Ronni Grapenthin
Fri	Oct 22, Lab 6	**TBA**	Ronni Grapenthin
Mon	Oct 25	**HTML/CSS**	Ronni Grapenthin
Fri	Oct 29, Lab 7	**Create your website**	Ronni Grapenthin
Mon	Nov 01	**Unix Tools I**	Jeff Freymueller
Fri	Nov 05, Lab 8	**Unix Tools**	Ronni Grapenthin
Mon	Nov 08	**Unix Tools II**	Ronni Grapenthin
Fri	Nov 12, Lab 9	**Unix Tools**	Ronni Grapenthin
Mon	Nov 15	**TBA (More Unix)**	Ronni Grapenthin
Fri	Nov 19, Lab 10	**Matlab based student project presentation / Unix**	Ronni Grapenthin
Mon	Nov 22	**TBA**	Ronni Grapenthin
Fri	Nov 26	**THANKSGIVING - No Lab**	
Mon	Nov 29	**GMT I**	Bernie Coakley
Fri	Dec 03, Lab 11	**Using GMT**	Bernie Coakley
Mon	Dec 06	**GMT II**	Bernie Coakley
Fri	Dec 10	**Missing student projects / GMT**	Ronni Grapenthin

Prior to each lecture 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:

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If you do not have access to a unix-linux-mac environment, I recommend a similar setup as we'll have in the lab. We will use virtualbox as a virtualization software which allows to run, say, a linux distribution within a running Windows (no rebooting required). Once virtualbox is installed you need to put a linux distribution of your choice (maybe ubuntu) on top of this. See Ronni (ronni <at> gi <dot> alaska <dot> edu) if you need help with that.

Contact:

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