Introduction to Programming
ATS Short Course

Objectives: Provide a general overview of programming concepts, and specific introduction to Matlab, IDL and FORTRAN.
Scheduling: meet once per week (Tuesday afternoon) from 3-4:30pm (ATS 101)

WEEK	DATE	TOPICS
UNIX / FORTRAN: Kate Thayer-Calder		
1	Aug 25	Introduction to Computer Science How a Computer Actually Works UNIX Introduction: What is an Operating System? UNIX vs LINUX vs MAC OSX vs Windows Getting ready to program: Home directory, environment, text editor Creating and Compiling a FORTRAN program Print is your friend Variables, types, arrays, arithmetic functions, order of operations
2	Sep 1	Everyday UNIX: Man pages, file & directory manipulation, program input & outpu, processes, basics of Emacs and vi More on FORTRAN arrays Logical operators Conditional Statements Looping options Subroutines and functions Discussion of Scientific Computing
3	Sep 8	Using UNIX on a network: Basics of networking, FTP, SSH, tar/zip, mount, network utilities, a little HTML Makefiles Strings, strings, strings Higher dimensional arrays Reading/Writing formatted and unformatted data Basic discussion of modeling
4	Sep 15	Searching on UNIX: grep, awk, pattern matching and regular expressions Some plotting and visualization options Fast math in FORTRAN Modules and organizing big programs User defined data types Reading/writing scientific data Dealing with missing or poor quality data
5	Sep 22	UNIX shell scripting: little programs to do useful things, maybe some Perl or Python Algorithm analysis and program optimization FORTRAN compiler options and flags Debugging, debugging, debugging Class requested topics
IDL: Joe Munchak		
6	Sep 29	*Week 1: Introduction* What is IDL and what it should (and should not) be used for Basic syntax (variable types, loops, program control) Program structure (procedure and subroutines) IDL-specific efficient coding practices Common array operations String manipulation Running other programs from IDL
7	Oct 6	*Week 2: File I/O and data structures*

		ASCII text Binary HDF IDL data structures Techniques for working with large numbers of files
8	Oct 13	*Week 3: Plots and Images* Plot devices (screen, file output, postscript) Basic 2D plots (line, scatter, bar) Contour plots, maps Color tables, colorbars, and legends Image manipulation Font manipulation (size, style, special characters)
9	Oct 20	*Week 4: Statistics/data analysis (built-in functions)* Basic Statistics Probability functions Correlation and curve fitting Eigenvalues and Eigenvectors Time series analysis
10	Oct 27	*Week 5: How do I?* Use this week to answer specific problems that have been submitted via email the previous week. Or used to cover more advanced topics such as: 3D plots , Numerical differentiation and integration, Equation solving
Matlab: Andy Newman		
11	Nov 3	*Week 1: Introduction to Matlab* Starting Matlab Layout of graphical user interface (GUI) Basic program organization Matlab Help
12	Nov 10	*Week 2: Programming* Syntax Arrays Cell arrays Structures Strings Built in functions (i.e. find, mean, max, min, sum, etc) Basic file I/O Debugging
13	Nov 17	*Week 3: Graphics* Line, scatter, bar, surface, contour plots, etc Figure properties (i.e. Axis labels, tick marks) Colormaps Saving your plots 3-D plots Images in Matlab
14	Dec 1	*Week 4: More programming* NetCDF Hdf Making functions Vectorized code Data manipulation in Matlab
15	Dec 8	*Week 5: Toolboxes* Mapping Signal processing Statistics Others...