

INTRODUCTION TO PROGRAMMING FOR ASTRONOMICAL APPLICATIONS

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Astronomy and Physics Building (PAB) C338

Office Hours: Email me to set up a time.

Website: Canvas

Class Meetings: Mon and Wed from 2:00 - 3:20 in PAB B360.

Background: This course offers an introduction to exploring, manipulating, and displaying astronomical data using modern programming languages. Python will be our primary language, but other topics such as the AWK, the L^AT_EX scientific publishing package, and regular expressions will be covered.

Recommended for astronomy majors planning to take 400-level astronomy courses, to peruse individual research projects, or to apply for Research Experience for Undergraduate appointments (REUs). The examples used in class and assigned as homework will be specific to the field of astronomy.

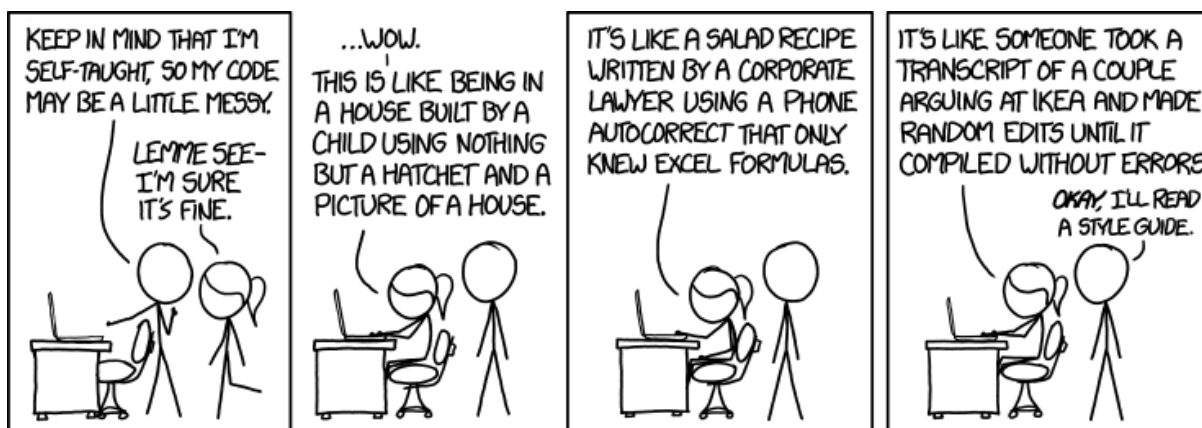
Assignments: There will be assignments handed out in class. Some weeks will have two assignments, some only one. The due dates will depend on the assignment. No late work will be accepted.

In-Class Quizzes: There will be ~4 in-classes quizzes. They will be short (15 min) and unannounced. Missed quizzes cannot be made up.

Grading: Grades for the class will be based on the homework assignments (85%) and in-class quizzes (15%). Here are no exams in the course, final or otherwise, but there is a midterm and final in-class project.

Passing: Since this is a required class for Astronomy majors, you need a 2.0 to pass this class. For this class, that translates to a 75% class percentage. You can always see your current percentage in the Canvas grade book.

Course texts: All the course materials will either be online or handed-out in class. There is no textbook for the class.



File Commands

ls - directory listing
ls -al - formatted listing with hidden files
cd dir - change directory to *dir*
cd - change to home
pwd - show current directory
mkdir dir - create a directory *dir*
rm file - delete *file*
rm -r dir - delete directory *dir*
rm -f file - force remove *file*
rm -rf dir - force remove directory *dir* *
cp file1 file2 - copy *file1* to *file2*
cp -r dir1 dir2 - copy *dir1* to *dir2*; create *dir2* if it doesn't exist
mv file1 file2 - rename or move *file1* to *file2*
 if *file2* is an existing directory, moves *file1* into directory *file2*
ln -s file link - create symbolic link *link* to *file*
touch file - create or update *file*
cat > file - places standard input into *file*
more file - output the contents of *file*
head file - output the first 10 lines of *file*
tail file - output the last 10 lines of *file*
tail -f file - output the contents of *file* as it grows, starting with the last 10 lines

Process Management

ps - display your currently active processes
top - display all running processes
kill pid - kill process id *pid*
killall proc - kill all processes named *proc* *
bg - lists stopped or background jobs; resume a stopped job in the background
fg - brings the most recent job to foreground
fg n - brings job *n* to the foreground

File Permissions

chmod octal file - change the permissions of *file* to *octal*, which can be found separately for user, group, and world by adding:

- 4 - read (r)
- 2 - write (w)
- 1 - execute (x)

Examples:

chmod 777 - read, write, execute for all
chmod 755 - rwx for owner, rx for group and world
 For more options, see **man chmod**.

SSH

ssh user@host - connect to *host* as *user*
ssh -p port user@host - connect to *host* on port *port* as *user*
ssh-copy-id user@host - add your key to *host* for *user* to enable a keyed or passwordless login

Searching

grep pattern files - search for *pattern* in *files*
grep -r pattern dir - search recursively for *pattern* in *dir*
command | grep pattern - search for *pattern* in the output of *command*
locate file - find all instances of *file*

System Info

date - show the current date and time
cal - show this month's calendar
uptime - show current uptime
w - display who is online
whoami - who you are logged in as
finger user - display information about *user*
uname -a - show kernel information
cat /proc/cpuinfo - cpu information
cat /proc/meminfo - memory information
man command - show the manual for *command*
df - show disk usage
du - show directory space usage
free - show memory and swap usage
whereis app - show possible locations of *app*
which app - show which *app* will be run by default

Compression

tar cf file.tar files - create a tar named *file.tar* containing *files*
tar xf file.tar - extract the files from *file.tar*
tar czf file.tar.gz files - create a tar with Gzip compression
tar xzf file.tar.gz - extract a tar using Gzip
tar cjf file.tar.bz2 - create a tar with Bzip2 compression
tar xjf file.tar.bz2 - extract a tar using Bzip2
gzip file - compresses *file* and renames it to *file.gz*
gzip -d file.gz - decompresses *file.gz* back to *file*

Network

ping host - ping *host* and output results
whois domain - get whois information for *domain*
dig domain - get DNS information for *domain*
dig -x host - reverse lookup *host*
wget file - download *file*
wget -c file - continue a stopped download

Installation

Install from source:

./configure
make
make install
dpkg -i pkg.deb - install a package (Debian)
rpm -Uvh pkg.rpm - install a package (RPM)

Shortcuts

Ctrl+C - halts the current command
Ctrl+Z - stops the current command, resume with **fg** in the foreground or **bg** in the background
Ctrl+D - log out of current session, similar to **exit**
Ctrl+W - erases one word in the current line
Ctrl+U - erases the whole line
Ctrl+R - type to bring up a recent command
!! - repeats the last command
exit - log out of current session

* use with extreme caution.

