UCF Physics: PHZ 3150 Introduction to Numerical Computing

Keeping a Work Log

"We are all scientists" isn't quite true. Science is not just random trial and error. It is methodical and thorough, which requires keeping and analyzing records. To facilitate this, and also for many other reasons, we log our work, every work session.

The purpose of a lab log is to make a record of what you did. Mostly, this is useful to you and your supervisor. Logs are also the main items scrutinized by Federal research audits. In commercial research, they establish priority for patents and other forms of intellectual property (who made the key discovery first?). If you are in such a field, you will likely have detailed procedures to follow, e.g., handing in paper log pages each day to your employer's attorney, for notarization and archiving.

Our logs are online, so they are searchable. You can date-match notes to email (don't insert the email in the log, just keep it and don't delete it). The log will save you time in the future.

The log has dated entries for all work sessions. Record summaries of what you hear and do, whom you meet, and what was said and agreed in meetings. Keep to-do lists there. Record links to online resources, snippets of code, pointers to screen shots and plots, etc.

This enables you to...

- Go back later and restart work

- Figure out what went wrong and fix it

- Manage a large number of trials

- Recall your thinking

- Prove/report your activities to others

- Track time

The most important thing is that you **never change anything above the current entry!**
To make a log:

1. Edit the file with a text editor like emacs or notepad. Do not use a word processor, like Word. Save as ASCII text.

2. Name the file `0-<topic>-<username>.log`. For example, my log for teaching the class AST 1234 would be `0-ast1234-jh.log`. Keep it in the top level of that topic's directory structure. The `0-` makes it list first in alphabetical listings.

3. At the very top, state the purpose of the file, as in:

   ```
   Joseph Harrington's log for teaching
   AST 1234 Introduction to the Universe
   ```

4. Leave a blank line below the purpose

5. Start new entry at bottom with "***** IN: " and output of the Unix `date` command, like this:

```
***** IN:  Wed Jun 12 11:13:53 EDT 2019
```

6. Leave a blank line below that. **The date lines should always be surrounded by blank lines.** The single space before and two spaces after `IN:` are important, too.

7. Work in your lab log, taking notes and using cut-and-paste of important computer commands, such as the commands starting long analysis runs. Always start a computer work entry with the location in which you are working, as in:

```
I coded up the solution to homework 6 today.

cd /home/jh/teaching/ast1234/hw/hw6/hw6_sol/
./hw6_sol.py > hw6_sol.out 2>&1

The solution integrates the equations of motion using two
different integrators and compares the results.  See comments
in hw6_sol.py.  I'm not sure about the best timestep to use.
Shorter is better, but some student laptops are slow and
short timesteps take more iterations to complete the run.

DO:
   try hw6_sol.py on a slow laptop with a short dt
```

8. **Never change anything above the current date line.** This can get you fired! In cases of Federally funded research, it is illegal and can wind you up in jail or with a heavy fine for you or your employer for falsifying research. Don't do it! If anyone ever asks you to, report them to your supervisor. If your supervisor asked you to, tell their boss. Falsifying research is no joke. We never "clean up" our logs, but see below for correcting errors.

9. For task lists, just copy the old list to the current date and mark tasks done or remove them. As your task list gets done, this helps to document when you added and completed the tasks, or how you changed them.

10. **To fix an error:** Never edit a prior entry! Instead, record **in the current entry** a row of XXXXX and the date of the entry you are fixing, and state the change.

11. To record plots and other files:

    (a) Make a directory named like your log, but with `.d` rather than `.log`.

    (b) Make subdirectories in that directory with the ISO-format date, e.g., `2019-06-12`

    (c) Put files in there

(d) Refer to them in your log on that date. Be sure every saved file is mentioned in the log. But, if you make a mistake and forget, follow the error-correction procedure, above.

12. If you are tracking work time, end with:

```
***** OUT: Wed Jun 12 11:17:53 EDT 2019
```

13. Note that there is just one space after `OUT:`. The row of stars and the exact form of the date lines allow you to use a program like `grep` on your log to print just these lines, and the dates will line up nicely. This is useful when you fill in your timecard or otherwise need to track the time spent on your project. The row of stars makes it easy to search for date entries, either visually or with your editor's search function.

14. Do not put a row of 5 or more stars anywhere else in your log!

The value of a log to you today is modest. You likely remember much more detail about your recent work than is recorded in your log. However, its value rises as memory fades. As you build a body of work, people will ask you about work done years or even decades ago, and you will be able to tell them exactly what you did, when, why, and how. This can earn many benefits, such as co-authoring papers by locating and sharing your old data or model runs, saving time hunting for things, and moving guesswork into the realm of the factual. If you become famous, historians and biographers will love your logs!

By **never** changing anything above the current date line, you can know, swearing under oath in court, if necessary, what you did, when you did it, why, and how.

Here is a sample log. It is derived from the start of my actual log for an offering of a course, but, for privacy purposes, I have had to change the names of students. I also used a slightly different format for the date lines in the original log.

```
PHZ 3150 Introduction to Numerical Computing
Spring 2019
[Sample of actual log, edited for pedagogical purposes.]

***** IN:  Fri May 18 08:58:19 EDT 2018

The class is scheduled against Faculty Senate and Compliance meetings.
Moving the time.  From Enrique del Barco:

AST6938    PLANETARY SEMINAR           TR 10:30AM - 11:50AM MSB 306 COLWELL
AST5937ST ASTROBIOLOGY                 T  12:00PM - 01:20PM TA  222 BENNET
GLY2038    ENVIRONMENTAL GEOSCIENCE    TR 01:30PM - 02:50PM MSB 306 DONOGHUE?
AST3110    SOLAR SYSTEM ASTRONOMY      TR 01:30PM - 02:50PM TA  222 DOVE
PHZ3150    INTRO TO NUMERICAL COMPUTING TR  3:00PM -  4:15PM BA1 110 HARRINGTON

There are several problems here:
Astrobio -> PPP
Astrobio T -> TR
Seminar/Colwell -> Geophysics/Britt
```

Campins, Fernandez, Colwell, Karalidi?, Donaldson-Hannah?

TR 8 - 9:20
Smith
Jones

TR 8:30 - 9:50
Smith

TR 9 - 10:20

TR 10:30 - 11:50
Kowalski
Himes conflict unless swap

TR 12 - 1:20
Kowalski
Himes conflict unless swap

TR 1:30 - 2:50
Smith
Himes

Hon Gen Physics Calc III TR 11-12:20
Intermed. Lab TR 9-11:45
Lasers TR 12-1:15
Adv Lab TR 1:30-4:20

***** OUT: Fri May 18 09:38:15 EDT 2018

***** IN: Mon May 21 12:27:19 EDT 2018

Maria Williams says this is available:

9:00 - 10:15; BA1 110 (47)
10:30 - 11:50; ENG1 227 (45)
12:00 - 1:20; HPA1 117 (50)

Grabbing the 9am slot. Poor students, and Michael. Or lucky, depending.

***** OUT: Mon May 21 12:35:32 EDT 2018

***** IN: Thu Jan 3 17:48:22 EST 2019

Met with Michael (TA) and Zaccy (LA).

Zaccy - update and test software install instructions, video script
Michael - look at hw assignments and see what we can update/change
Joe - syllabus, handouts, lectures

Machine learning lecture/demo - Michael

Group project:

1. Each component is written by a separate person and graded.
2. Assign groups.
3. They use git collaboration to integrate the components.

We should put the assignments on gitlab...
Convert all docs to latex.

Meeting again Fri 11am.

***** OUT: Thu Jan 3 18:52:42 EST 2019

***** IN: Fri Jan 4 11:55:25 EST 2019

jh
Michael
Zaccy

Numerical Recipes is now numerical.recipes, not nr.com. They offer
2nd ed PDFs there via Flash or password-protected PDFs. We could have
students use this, or just find alternative texts like at wikipedia
and wikibooks. Michael is working this.

Zaccy will have software installs ready for a meeting 10:30 am Monday.

Zaccy DO:
  update and test software install instructions
    1 file per OS, in LaTeX
    BASH on Ubuntu on Windows
    emacs
    Git
    conda
  video script
  X11 on Ubuntu on Windows (getting Matplotlib)

Michael DO:
  alternate NR readings
  access to NR
  look at hw assignments and see what we can update/change

Joe DO:
  syllabus in latex
  handouts
  lectures

***** OUT: Fri Jan 4 13:27:03 EST 2019

***** IN: Mon Jan 7 10:38:52 EST 2019

jh
Zaccy
Michael

Discussed miniconda environment on Win10. The environments:

```
Linux: either native or Virtualbox
Mac: native command-line
Win10: miniconda and emacs in Windows, git and tar in BASH on Ubuntu on Windows

Michael found that NR2 ch 1 is different from NR3 ch 1.  He's looking
for equivalent assignments for NR3 now.

DO:
  syllabus
    grading scheme and proportions
    break out HW instructions
    schedule review
  hw1
  hw2
  sw install instructions
  reading for precision, etc.

***** OUT: Mon Jan  7 11:44:32 EST 2019
```