Biology 456 – Computer Skills for Biologists
Course Syllabus for Fall 2016

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Course Summary: This course develops skills to manage and analyze complicated datasets such as those in molecular evolution, systematics, and genomics. Datasets in biology are growing explosively, so computer skills are vital for graduate studies and technical careers in the life sciences. This course will use demonstrations, exercises, and student projects to learn advanced Unix skills, programming skills (such as git and iPython), and Python programming. This course is designed to prepare students for independent research in biological sciences and will also be helpful for those students taking Biol 522 Molecular Evolution; Biol 444, Genomics; Biol 545, Principles of Systematic Biology; and CS 515, Computational Biology.

Course Requirements: Stat 251 and Biology 210, or permission of instructor. Course is limited to 25 students, priority will be given to graduate students.

Class Hours: Tuesday and Thursday, 12.30–13.45, LSS 440 (IBEST Classroom), or as posted.

Resources: Course materials will be available on our github site: *https://github.com/UIdahoCompSkills-F16/ClassInfo*. You are responsible for checking regularly for reading materials, exercises, and exams. The textbook (required) is *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython,* Wes McKinney. O'Reilly Press.

Course Format: 1.5 hour classes with discussion, demonstrations, hands-on exercises on computer workstations, and lectures. There will be regular homework assignments. These assignments are preparation for class, and so are essential. Graduate students will prepare and present a final project, which will demonstrate facility with course materials.

Grading: Grades will be determined by the instructor based on demonstrated mastery of the material as determined by in-class activities, homework, exams, and the final project. My philosophy

is to give you the highest grade that won't embarrass either of us. My decisions are final.

Makeup policy: There is none. All assignments and exams must be completed and turned in on time.

Academic honesty: Anything you turn in must be your own work. I will be very unforgiving of plagiarism. If in doubt, ask me. Use the resources. Feel free to discuss things online (especially on BlackBoard). Meet with the TA. Visit the classroom outside of class. Discuss and help each other learn the material. But any copying of turned in work from other students or elsewhere will be punished harshly, as governed by Article II of the University if Idaho's Student Code of Conduct (http://www.webs.uidaho.edu/fsh/2300.html). All incidents of academic dishonesty will be reported to the dean of students. Individuals guilty of academic dishonesty will receive a failing grade for the course and may face further disciplinary action.

Changes: *This course is under development, so details (including the course schedule) may change periodically. Check the github site* ***regularly*** *(**https://github.com/UIdahoCompSkills-F16/ClassInfo**) for updates and revisions.*

Tentative Topics:

- Using bash and the command line (lectures, webpages)
- Introduction to git version control and Jupyter (aka iPython) interactive notebooks (Ch 3)
- Basic python programming syntax: operators, data objects, control flow, high level functions, function definition (Appendix)
- NumPy: data arrays (Ch 4)
- Pandas: data frame (Ch 5)
- Data wrangling (Ch 6,7)
- Plotting and visualization: Matplotlib (Ch 8)
- Bioinformatics support: biopython (web)
- Techniques for program development (such as abstraction and modularization) and error correction (aka "debugging")
- Other useful packages: re, argparms, sys