Course Number and Title

Zoo4926/6927: Practical Computational Biology: Basic Research Computing Skills

Catalog Description

As with most disciplines, information technology has dramatically transformed how biological research is conducted. How we are able to leverage new tools and resources changes the types of scientific questions asked, and the scale and integration across multiple scientific fields. Increasingly, knowledge of scripting, database management, and computing is critical across multiple fields of biology. This course will survey areas of biology where high performance computing, large-scale data access and integration, informatics tools and software, and multi-disciplinary collaboration have had high impact on research as a foundation for computational biology.

Topics will address a gap in how biological research has advanced—and become increasingly computational— while training in the use of computational tools in many areas of biology has lagged. The course will cover basic concepts that will provide the ability for students to apply new technologies to a wide array of research questions. A foundation in information management concepts opens doors for well-trained scientists and allows them to work in multidisciplinary research domains that are becoming increasingly essential. The course will meet three hours each week. One hour of lecture each week will be used to cover topical subjects and to survey the tools and resources available to computational biologists. Two hours each week will be devoted to hands-on development of computational skills.

This is the first of three 5-week modules, which can be taken independently provided the student has a firm grasp of the concepts presented in previous modules. Students wishing to skip a module should make arrangements to take the placement tests.

This section of the course focuses on the basics of the Linux command line, Bash scripting, version control and using high-performance computing resources.

Credit Hours

1 credit (3 hours per week, 5-week module 1 of 3)

Pre-requisites and Co-requisites

None

Course Objectives

By the end of the course, the student will:

- Understand how technology infrastructure can improve biological research and open new avenues of investigation.
- Competently navigate the Unix/Linux command line interfaces.
- Effectively and efficiently manipulate text files, performing complex regular expression replacements, reformatting and merging files in various ways.
- Raise and address current issues in computational biology through class participation and discussion.

- Use High Performance Computing resources such as the UF Research Computing for cluster-based analyses. Including batch scripting and running multi-processor applications (threaded and MPI).

Instructor Information

Name:	Matt Gitzendanner	**TA:** TBD
Office location:	Dickinson 301c	
Telephone:	273-1960	
E-mail address:	magitz@ufl.edu	
Office hours:	Tuesdays, 10-11	

Course Meeting Time(s)
MWF 4^(th) Period

Course Meeting Location(s)
M,W: Rinker Hall room 210
F: Rinker Hall room 225

Course Website
Course materials and related information will be posted on the course E-Learning (Canvas) website at http://lss.at.ufl.edu. You are responsible for all announcements made in class and/or posted on the course website for this course.

Fees
None

Required Materials
Textbooks or Other Readings
Haddock, S.H.D. and Dunn, C. W. Practical computing for biologists. 2010. Sinaur (http://practicalcomputing.org/)

Software and hardware
Participants will be required to have a laptop with ability to connect to the internet. As access to power during course time may be limited, students should ensure their laptop is charged and able to function for the 50 minute class period.

Several free/open source software packages will be used throughout the course, and students will be required to install some of these.

Students will be required to apply for a (free) Research Computing account to access HiPerGator for course work.

Course Outline

Week	Monday's date	Topic
1	8/22/16	Introduction and course objectives.
	8/24/16	UF Research Computing Intro & getting started
	8/26/16	Linux Basics: Text files, regular expressions
2	8/29/16	Linux Basics: Command line
	8/31/16	Common computational tools for biologists
	9/2/16	Shell Scripts
3	9/5/16	**Labor Day Holiday—No Class**
	9/7/16	Shell Scripts, Version Control: git and GitHub
	9/9/16	Shell Scripts, Version Control: git and GitHub
4	9/12/16	Using UF Research Computing resources
	9/14/16	Running batch jobs, Compiling source code
	9/16/16	Data management
5	9/19/14	Advanced command line skills
	9/21/14	Web services
	9/23/14	Wrap-up

Attendance Policy

Attendance is not required, but a significant portion of grading is based on class participation. Penalties for absence or tardiness will be handled on a case-by-case basis.

Conduct in Class

- Please be courteous and do not talk during lecture. This can be distracting to other students and the instructor.
- Only approved electronic devices may be used in class. Approved electronic devices are laptop computers (when used to take notes or otherwise participate in classroom activities) and voice recording devices. Unapproved electronic devices include cell phones, video recorders, digital cameras and MP3 players.

Grading

- Quizzes: 3 @ 20 points each (40% of final grade)
- Problem sets: 3 @ 20 points each per module (40% of final grade)
- Class Participation: 30 points (20% of final grade)

Additional Graduate student requirements: There will be 1-2 extra questions on each quiz and problem set that will be required only for graduate students.

Grading Scale

Point Range (%)	Letter Grade	GPA equivalent
≥ 90.00	A	4.0
86.7 – 89.9	A-	3.67
83.3 – 86.6	B+	3.33
80.0 – 83.2	B	3.0
76.7 – 79.9	B-	2.67
73.3 – 76.6	C+	2.33
70.0 – 73.2	C	2.0
66.7 – 69.9	C-	1.67
63.3 – 66.6	D+	1.33
60.0 – 36.2	D	1.0
56.7 – 59.9	D-	0.67
< 56.7	E	0

Note that a "C-" will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html

Grade Curve Policy

The instructor may use a curve to adjust grades, if necessary.

UF Counseling Services

- Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
    - UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
    - Career Resource Center, Reitz Union, 392-1601, career and job search services.
- Many students experience test anxiety and other stress related problems. "A Self Help Guide for Students" is available through the Counseling Center (301 Peabody Hall, 392-1575) and at their web site: http://www.counsel.ufl.edu/.

Honesty Policy

- All students registered at the University of Florida have agreed to comply with the following statement: "I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University."
- In addition, on all work submitted for credit the following pledge is either required or implied: "*On my honor I have neither given nor received unauthorized aid in doing this assignment*."
- If you witness any instances of academic dishonesty in this class, please notify the instructor or contact the Student Honor Court (392-1631) or Cheating Hotline (392-6999). For additional information on Academic Honesty, please refer to the University of Florida Academic Honesty Guidelines at: http://www.dso.ufl.edu/judicial/procedures/academicguide.html.

Accommodation for Students with Disabilities

- Students who will require a classroom accommodation for a disability must contact the Dean of Students Office of Disability Resources, in Peabody 202 (phone: 352-392-1261). Please see the University of Florida Disability Resources website for more information at: http://www.dso.ufl.edu/drp/services/.
- It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed. Once notification is complete, the Dean of Students Office of Disability Resources will work with the instructor to accommodate the student.

Software Use

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.