Syllabus
EPP 622 /LFSC 696 Bioinformatics Applications, Fall 2016
University of Tennessee, Knoxville

Course sections:	EPP 622-50557, LFSC 696-50332
Meeting Time:	MW 1:25-3:20
Meeting Place:	Plant Biotechnology Building, Room 160
Course Credit Hours:	3
Couse website:	http://epp.agbioinfo.utk.edu/

Intructor

Meg Staton	Email: mstaton1@utk.edu
Assistant Professor	Office: PBB 154
Entomology and Plant Pathology	Office hours: MW 3:25-4:30 and by appointment

The instructor reserves the right to revise, alter or amend this syllabus as necessary. Students will be notified by email of any such changes.

Teaching Assistant

Ming Chen	Email: mchen33@vols.utk.edu
Graduate Research Assistant	Office: PBB 153

I. Course Description

Fundamental bioinformatics concepts, principles and techniques with a focus on the application of bioinformatics to problems in agriculture. Laboratory practical will be taught within a LINUX computational environment where students will gain basic skills in bash and python scripting and construct open-source software workflows to analyze genomic data.

II. Value Proposition

The discipline of bioinformatics is one of the most effective and promising tools for generating biological research discoveries, but it requires robust training in order to apply the principles correctly. This course will provide students with bioinformatic skills for processing and understanding of large datasets such as genome and transcriptome sequences, gene and protein expression measurements, and heritable genomic variations. These skills will enhance student's research efficiency and scope and, long-term, will position students to be more effective and competitive in the technology-driven biomedical and agricultural science industries.

III. Student Learning Outcomes/Objectives

A. Students will be able to apply basic bioinformatic theory and tools to analyze biological datasets
B. Students will be able to effectively communicate and critically assess the application of bioinformatic tools to a variety of biological problems
C. Students will have basic competence in the UNIX shell, python scripting, and usage of bioinformatic tools from the command line

IV. Learning Environment

Class meets MW 1:25 - 3:20 and will consist of an hour of lecture/discussion followed by computer laboratory exercises.

A classroom is a collaborative environment, and both the instructor and the students have a shared responsibility to ensure a successful learning experience. Students should be prepared for all classes, be respectful of others, actively contribute to the learning activities in class and abide by the UT Honor Code. The teaching assistants and I will be prepared for all classes, evaluate learners fairly and equally, be respectful of all students, create and facilitate meaningful learning activities and follow University codes of conduct.

V. Course Communication

Outside of class and the website, the instructor and TA will utilize email to communicate course information, such as additional readings, changes to the syllabus, answering questions relevant to all students, etc. All students are responsible for checking their university email accounts and reading all emails regarding the class.

VI. Texts/Resources/Materials

The course website will be used to distribute reading materials, links to references, lecture slides, and laboratory exercises (https://github.com/mestato/epp622/wiki). There is not a required textbook to purchase. Readings for each class period can be found on the course website. Blackboard will be used to turn in homework assignments, keep track of grades, and possibly to distribute a mid-semester survey (http://bblearn.utk.edu).

VII. Required Equipment

Students are required to bring their own laptops (and power cord if needed) to class.

VIII. Course Evaluation

The final grade for each student will be on an A-F scale:

A	93-100 points
B+	88-92 points
B	80-87 points
C+	77-79
C	70-76
F	below 70

Points will be accrued through laboratory homework assignments, three tests and a final project. The final grade will be weighted as follows

Lab Homework	30%
Test 1	20%
Test 2	20%
Final Project	30%

Lab Homework Grading – Laboratory homework assignments will be distributed during each labortory class period (see schedule below). Submissions will be accepted through blackboard until midnight on the due date (http://bblearn.utk.edu). Assignments turned in up to 1 week late will receive a 20% grade reduction. Assignments turned in more than 1 week late will not be graded. The lowest lab grade for the semester will be dropped.

Tests - Tests will be given in class and will review material covered in both lecture and laboratory exercises. Extra credit questions will cover the literature readings provided.

Final Project – Each student will prepare a final project. This project requires that the student identify a bioinformatics research goal and appropriate dataset, execute the project, and prepare a written report with supporting data, analysis methods, code and other

documentation. Each student will give a final oral presentation of 15 minutes or prepare a blackboard wiki page on their work. Final project grades are based on a 100 point scale:

- One page project proposal – 10 points
- Project plan presentation – 10 points
- Final oral presentation – 10 points
- Final written report, inluding quality of data, analysis, code and documentation – 50 points
- Grade from peers – 10 points
- Providing feedback for other student's projects – 10 points

IX. Attendance

Attendance is the responsibility of each student. Presence during lecture and lab is essential for a students to achieve success in the class, but it will not be formally recorded or graded. Absences due to special circumstances should be discussed with the instructor prior to the absence via email or in person. Missed tests may not be made up unless the instructor has previously discussed the absense with the student and made those arrangements.

X. How to Be Successful in This Course

- Do the readings and exercises during the week they are assigned. Many of the concepts and practical exercises build on the material covered in prior lessons, so it is essential to try to attend all classes and to keep up with the subject matter. Getting behind can cause major setbacks for the rest of the semester.
- Get help early with problems. The instructor and TA are there to help and want you to be successful. If something is not making sense or you are unable to complete a lab exercise, seek help immediately through email and/or in-person meetings. This will prevent you from falling behind during this fast-paced class. Requests for help the night before a test or lab are due are not acceptable and may not be answered.
- Use lab time wisely. The hands-on lab time is your opportunity to explore the assigned exercise and ask any questions about it to the instructor and TAs. If you can complete the lab during the time slot, that means you won't have to worry about turning it in later. If not, try to make sure you have the basic concepts down and a plan for completing the work. This will save you time and frustration later.
- Select a final project that is of a proper scope to accomplish in 4-5 weeks and work on it **before** and during dedicated class time. Five class periods are devoted to working on the final project; this time is an opportunity to get help from the instructor and TA on any problems you encounter. The scope of the project should be sufficient to demonstrate mastery of a particular bioinformatic skillset, but should be accomplished in this short time frame. **Starting on the project prior to these classes and then attending the project classes** will ensure that you make regular progress on the project instead of procrastinating, and if roadblocks do arise, you can get help well before the due date.

XI. Course Feedback

A committee of 3 faculty members other than the instructor will be attending some classes and will be surveying the students in person at some point during the semester. You will receive more information about this during class. The instructor will leave the room while students fill out any surveys or answer questions. A final course evaluation will be provided to each student at the end of the course through the Student Assessment of Instruction System (SAIS). Each student will receive an email toward the end of the semester providing a link to the survey.

Course Schedule

Class Num.	Day	Date	Lecture Topic	Lab Topic
1	W	August 17th	Syllabus and Introduction to Linux	Shell Lab I
2	M	August 22nd	Bioinformatics	Shell Lab II (HW1 assigned)
3	W	August 24th	HPC Resources and Newton	Shell Lab III
4	M	August 29th	Unix Shell IV	Programming with Python I (HW2 assigned, HW1 due)
5	W	August 31st	Online resources and databases	Programming with Python II
	M	September 5th	Labor Day Holiday	
6	W	September 7th	Overview of high-throughput sequencing	Programming with Python III (HW3 assigned, HW2 due)
7	M	September 12th	Pairwise sequence alignments & BLAST	BLAST
8	W	September 14th	Applications of DNA sequencing	Programming with Python IV (HW4 assigned, HW3 due)
9	M	September 19th	Short Read QC and Mapping	DNASeq Lab I
10	W	September 21st	Short Read Mapping and Visualization	DNASeq Lab II (HW5 assigned, HW4 due)
11	M	September 26th	Test 1 (all material through 9/19 included)	
12	W	September 28th	Genome Assembly	DNASeq Lab III
13	M	October 3rd	Genome Annotation	Biopython (HW6 assigned, HW5 due)
14	W	October 5th	RNAseq Intro	RNASeq Lab I – Mapping and Visualization
15	M	October 10th	Differential Expression Statistics	RNASeq Lab II – Counting and DE analysis (HW7 assigned, HW6 due)

16	W	October 12th	Transcriptome Assembly	RNASeq Lab III – Transcriptome Assembly
17	M	October 17th	Project Proposal Presentations	
18	W	October 19th	HMMs and Gene Networks	RNASeq Lab IV – ORF finding, functional annotation (HW8 assigned, HW7 due)
19	M	October 24th	Metagenomics and 16S Amplicon Sequencing	16S Lab I
20	W	October 26th	Version Control with Github	16S Lab II (HW8 due)
21	M	October 31st	Work on Project	Work on Project
22	W	November 2nd	Test 2 (all material through 10/26 included)	
23	M	November 7th	Work on Project	Work on Project
24	W	November 9th	Work on Project	Work on Project
25	M	November 14th	Work on Project	Work on Project
26	W	November 16th	Work on Project	Work on Project
27	M	November 21st	Project Final Presentations	Project Final Presentations
28	W	November 23rd	Project Final Presentations	Project Final Presentations
29	M	November 28th	Project Final Presentations	Project Final Presentations

UNIVERSITY POLICIES

Dear Student,

The purpose of this Campus Syllabus is to provide you with important information that is common across courses at UT. Please observe the following policies and familiarize yourself with the university resources listed below. At UT, we are committed to providing you with a high quality learning experience.

I wish you the best for a successful and productive semester.

Provost Susan Martin

Academic Integrity:
"An essential feature of the University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."

University Civility Statement:
Civility is genuine respect and regard for others: politeness, consideration, tact, good manners, graciousness, cordiality, affability, amiability and courteousness. Civility enhances academic freedom and integrity, and is a prerequisite to the free exchange of ideas and knowledge in the learning community. Our community consists of students, faculty, staff, alumni, and campus visitors. Community members affect each other's well-being and have a shared interest in creating and sustaining an environment where all community members and their points of view are valued and respected. Affirming the value of each member of the university community, the campus asks that all its members adhere to the principles of civility and community adopted by the campus: http://civility.utk.edu/.

Disability Services:
"Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Disability Services (ODS) at 865-974-6087 in 2227 Dunford Hall to document their eligibility for services. ODS will work with students and faculty to coordinate reasonable accommodations for students with documented disabilities."

Your Role in Improving Teaching and Learning Through Course Assessment:
At UT, it is our collective responsibility to improve the state of teaching and learning. During the semester, you may be requested to assess aspects of this course either during class or at the completion of the class. You are encouraged to respond to these various forms of assessment as a means of continuing to improve the quality of the UT learning experience.

Key Campus Resources For Students:
- Undergraduate Catalog: (Listing of academic programs, courses, and policies)
- Graduate Catalog
- Hilltopics: (Campus and academic policies, procedures and standards of conduct)
- Course Timetable: (Schedule of classes)
- Academic Planning: (Advising resources, course requirements, and major guides)
- Student Success Center: (Academic support resources)
- Library: (Access to library resources, databases, course reserves, and services)
- Career Services: (Career counseling and resources; HIRE-A-VOL job search system)