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ELIZABETH CITY STATE UNIVERSITY
FOUNDED 1891

Course Information

Course: BIOL 522 01 Spring 2023 Bioinformatics NGS data analysis.

Credit Hours: 3

Professor: Feseha Abebe-Akele (**Dr. AKELE**)

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Office Location: 404 Jenkins Science Center

Office Hours:

- **In-Person:**

MWTR	11:00AM-12:00 PM
TR	12:00PM-1:00 PM
MWTR	11:00AM-12:00 PM

- **Virtual:**
- [Request zoom session by e-mail.]

Course Format / Location

- Course Format
- **In-person Face-to-face** at ECSU. Class participation is required. Unannounced (surprise) tests will be given – if you miss class and you miss an in class test, there will be no compensation or make up as the purpose is to encourage attendance.

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- Course Location
- Lecture: Jenkins Science Center 325/320

Course Description

Modern biology is data driven. Therefore, the new biologist is required to have skills for dealing with biological data. With the unprecedented progress in biological data acquisition, there is a tremendous need for biologists that can manipulate data they generate or make use of the huge amount of data generated by their peers. The course has four modules that introduce: 1. Linux Command Line Interface (LCLI): the use of the command line in the Linux environment to perform simple to moderate complexity tasks in bioinformatics. 2. Biological Databases – understanding, navigating public databases and creating local databases to handle data generated in-house. 3. Opensource Tools: using their knowledge of the BLAST suite of sequence similarity search tools, students will explore task specific opensource sequence manipulation tools. 4. Basic python programming: students will learn basic computer programming using the python programming language which has emerged as the language of choice in open source bioinformatics tool development and in automating bioinformatics tasks.

Lecture: two hours; laboratory two hours.

Learning Outcomes:

The objective of this course is to develop skills in navigating the Linux OS for bioinformatics work, using basic python scripting for simple task automation and using biological databases to be able to analyze NGS sequence data they generate or acquire from public data sources.

The specific objectives of the course are to give students robust foundations in the four areas of focus:

- Linux command line usage for remote host/database interactions and analysis,
- Python programming for automating bioinformatics tasks,
- databases and database manipulation tools
- higher level bioinformatics analysis such as genomic alignment and introduction to proteomics analysis.

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Course Requirements

Required Text(s) and Materials:

Paul M. Selzer,
Richard J. Marhöfer, and Oliver Koch. **Applied Bioinformatics: An introduction (2nd ed).** Springer. *(PDF resource)

Computer Requirements:

- **Access:** Student will need their own computer and access to an internet connection to participate in the online part of the course.
- **Hardware:** Any computer with webcam, microphone, and speakers to communicate in zoom sessions.
- **Software:** [if the need for a special software arises, it will be announced.]

Course Grading Components

Assignment	Due Date	Number of Points for Assignment	Percent of Final Grade
1. Research Paper			15
2. Homework Assignments			5
3. Discussion Board			10
4. Portfolio			5
5. Attendance and Participation			5
6. Examinations			60

Grading Scale [Insert detailed listing of grading scale]: The Grading Scale is consistent with University policy and is as follows:

90-100 = A 80-89 = B 70-79 = C 60-69 = D below 60 = F

Course Outline

In-Person Class time is for:

1) Explaining and practicing difficult concepts
2) Expanding on the textbook to include newer and more advanced information
3) Getting a overview of major concepts, minor points, and how they fit together
4) Asking and answering questions
5) Guest speakers
6) Taking higher stakes tests

Course Outline:

Course Matrix NOTE: We are operating on the normal plan until further notice; if we go to contingency plan for any day or days, it will be posted in the course announcements in Blackboard and may be emailed to students through Blackboard)

Date	Topic to be Covered	Anything due?	Contingency Plan
1/17/2023	Linux Commands		
1/19/2023	Linux remote host		
1/22/2023	Linux scripting		
2/2/2023	DNA sequencing technologies		
2/9/2023	DNA sequence analysis techniques		
2/16/2023	Spring Recess		
2/23/2023	Genomics, Transcriptomics and proteomics		
3/2/2023	Metagenomics		
3/9/2023	Introduction to python programming		
3/16/2023	Python Variables		
3/23/2023	Python Decision		
3/30/2023	Python Looping		

4/6/2023	Python I/O file read write		
4/13/2023	Automating tasks with python scripts		
4/20/2023	Opensource tools for genomics and proteomics		
4/27/2023	Opensource tools Installation and data analysis		
5/4/2023	FINAL EXAM: 5:00 pm – 6:50 pm		

Course Expectations

- Attendance Policy [Attend **ALL** classes: I will give **surprise quizzes** that will greatly affect your grades]
- Class Discussion Policies [Discussion and participation will be monitored and graded. If you want to sleep, go home or to your dormitories.]

- **NO Cell phone use in class** – I will ask you to leave the class.

- **Absolutely NO HEADPHONES in class** – I will ask you to leave the class

Student Expectations

You will need to use blackboard shell to post assignments."

- Participation/attendance policy: It is not whether you come to class or not that matters. What counts is whether you come to learn or to goof around – I do not tolerate the use of cellphones and headphones in class.
- Homework/assignment policy: If you skip your homework or assignments, you are likely to earn a D or an F as your grade.
- Online components (discussions, team/group work, etc.): everything counts. The more you do, participate meaningfully, the better your you learn and the higher your grades will be.
- Exams/quizzes (especially if proctored!)
- Late assignment policy: Late assignment means lower grades … assignments and lab reports that are late incur **10% for each week for up to 50%** of assigned grade.

- Time commitment: You need to commit 3-5 hours of reading to be able to participate in class discussion.
- Writing standards: write concisely and submit in time.

1. Students who are unable to attend class for a valid reason can expect the professor to examine their case and accept or reject their claim. In order to receive a reasonable accommodation, the students should communicate with the faculty member within 48 hours of the absence (longer with a doctor's note).
2. For long-term absences from a class, the student needs to address the concerns regarding attending class with Office of Students with Disabilities.
3. Absent exigent circumstances, faculty members will respond to emails, within 24 – 48 hours.

Course Policies

Netiquette Guidelines

- **Write in digestible chunks.** Lengthy paragraphs are difficult for readers to digest. Keep your paragraphs short and your writing concise.
- **NO YELLING.** When you write in uppercase letters in online communication, it is usually
- interpreted as yelling.
- **Add some emotion :-)**. Sometimes it helps communicate the tone of your message when you add an emoticon or emoji. However, only do so as necessary, for it can end up being annoying to readers if you have too many, which is probably the opposite of your intention.
- **Use humor carefully**. Sarcasm, in particular, does not translate well in an online environment. It's best to avoid the potential pitfalls of misunderstood messages.
- **Assume the best intentions.** In an online environment, it is easy to misread someone's tone or intended message. Give your peers and instructor the benefit of the doubt, and ask them to clarify their meaning.
- **We are not the same.** Respect differences, and don't make assumptions.
- **Language matters.** Choose your words carefully; avoid using slang, and be kind.

University Policies

Policy on Academic Honesty:

As members of the academic community, students are expected to recognize and uphold standards of intellectual and academic integrity. The examples and definitions given below are intended to clarify the standards by which academic honesty and academically honorable conduct are to be judged. The following list is merely illustrative and is not intended to be exhaustive.

- PLAGIARISM. Plagiarism is presenting another person's work as one's own. It includes paraphrasing or summarizing the works of another person without acknowledgement, including submitting another student's work as one's own.

- CHEATING. This involves giving or receiving unauthorized assistance before, during or after an examination.

- UNAUTHORIZED COLLABORATION. Submission for academic credit for a work, product or a part thereof, represented as being one's own effort that has been developed in substantial collaboration with or without assistance from another person or source is a violation.

- FALSIFICATION. It is a violation to misrepresent material or fabricate information in an academic exercise or assignment.

- MULTIPLE SUBMISSIONS. It is a violation of academic honesty to submit substantial portions of the same work for credit more than once without the explicit consent of the instructor(s) to whom the material is submitted for additional credit. In cases where there is a natural development of research or knowledge in a sequence of courses, use of prior work may be desirable or even required.

Policy on Limitations of Course Withdrawals (300.1.26)

1. **Maximum Course Withdrawal (Semester Hours):** Students can drop classes without penalty during the schedule change (drop/add) period at the start of the semester. Schedule change deadlines are published in the academic calendar. After the drop/add deadline, students can withdraw from no more than 15 semester hours during their undergraduate career. After a student has exceeded this limit, the student must receive a final grade of A, B, C, D, or F. Incompletes "I" will not be allowed as a substitute for a course withdrawal beyond the course withdrawal limit. The course withdrawal limit applies to first-time college students and follows them until they graduate. Current and returning students are not affected. Any course that a student drops is counted toward the 15 semester hour limit.

2. **Transfer Students:** Regardless of the number of colleges a student may have attended, the number of classes they may have taken, or the number of years they

enroll as undergraduates, the policy limits them to 15 semester hours of course withdrawals. This includes any course a transfer student has dropped at another institution of higher education.

Accommodation Statement:
ECSU is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 - The Rehabilitation Act of 1973 as

amended. With the passage of federal legislation entitled *Americans with Disabilities Act (ADA)*, pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

The university is required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty of their need for accommodation and in providing authorized documentation through designated administrative channels.

Any student in the class who has a disability that may prevent full demonstration of ability should contact the instructor personally before the end of the first week of classes so that a discussion can be held regarding accommodations necessary to ensure full participation and facilitate individual educational opportunities.

COVID-19 Policies and Update

- Please see the ECSU Viking Compass Website for the most updated information (https://www.ecsu.edu/vikingcompass/)

COVID-19 Contingency Planning (if needed)