ALBANY STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES
DEPARTMENT OF NATURAL SCIENCES

BIOL3506- Bioinformatics Syllabus

Course: BIOL3506 Bioinformatics   **Instructor:** Dr. Olabisi Ojo, PhD
Semester: Fall 202X   **Email:**olabisi.ojo@asurams.edu
Time: Tue/Thurs 2:00 – 3:10 pm   **Office Room:** XXXXX
Lecture location: XXXXX
Credit Hours: 3   **Office Hours:** Tue: XXXXX
      Wed: XXXXX

COURSE DESCRIPTION:
In this course, students explore the principles underlying the analyses of sequences and biological databases using computational and statistical tools. The course provides students with an understanding of, and practical experience with, the application of these tools in biotechnology and biomedical sciences.

COURSE OBJECTIVES:
- Examine and describe the fundamentals of Bioinformatics;
- Compare and contrast the basic methodologies employed in analysis of biological information using information technologies;
- Identify the available databases and web based tools currently used in Bioinformatics;
- Discuss bioinformatics use in biomedical settings; and
- Develop critical thinking and analytical skills

STUDENT OUTCOMES:
At the completion of the course, students will be able to:
- Define Bioinformatics and explain its applications to biological and biomedical data analysis;
- Integrate and interpret results obtained using bioinformatics approaches, albeit in class or published;
- Assess and critique the ethical and social implications of Bioinformatics; and
- Produce scientific writing, critical topical reports, and effective oral presentations.

INSTRUCTIONAL MODES:
The main instructional mode will be lectures using active learning pedagogic approaches.
The lectures will be supported by
- ASU Online/Blackboard Learning Management System
- Interactive Laboratory Sessions
- Small Group Discussions
- PowerPoint Presentations

COURSE PRE-REQUISITES:
BIOL 3501K (Principles of Genetics)

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REQUIRED MATERIALS:
Bioinformatics and Functional Genomics, 3rd Edition, Jonathan Pevsner, Wiley-Blackwell.
ISBN 978-1-118-58178-0
Other materials such as articles to be discussed, lecture slides etc. will be distributed through Blackboard in advance of the specific class.

Required Technological Materials
Access to a laptop or desktop computer with internet access (also available on campus in the Computational Biology (Natural Sciences) Computer lab in BCB 332), and a dedicated flash drive.

STUDENT REQUIREMENTS AND GUIDELINES
1. **Course Accommodations:** This course complies with Albany State University policies for students with disabilities. Students with disabilities are encouraged to register with Disability Support Services (DSS). Students who suspect that they have a disability but do not have documentation are encouraged to contact DSS for advice on how to obtain appropriate evaluation. A memo from DSS authorizing your accommodation is needed before any accommodation can be made and should be presented to your instructor during the first week of class. Should a student not identify a problem until late in the semester, the instructor is not required to retroactively change grades for tests or assignments already completed.
2. Keep up with studying/reading and assignments from day to day. Trying to "cram" for the exam and/or presentations just before the deadline will not work. It will be most beneficial to you to do all required reading before coming to class. As you read, note areas were you have questions, write them down, and discuss them during class
3. Focus your study. It is important to focus on the key concepts and skills. The amount of information you will receive in this seminar class will sometimes seem overwhelming. Listen intently for what is emphasized in lecture.
4. **ASK QUESTIONS!!! DON'T WAIT UNTIL YOU ARE TOTALLY LOST!!!!** *No matter what, do not feel intimidated or embarrassed to ask questions! Other students probably have the same questions…*
5. You are expected to follow Albany State University attendance guidelines as outlined in the student handbook (https://www.asurams.edu/student-affairs/student_affairs_handbookpg_/index.php). **Attendance will be taken every class. Excessive unexcused absences will result in an automatic *F* grade in the course.** In order to be successful in this course, you should attend and actively participate in every session of the class.
6. ELECTRONIC DEVICE POLICY: **Course related laptop, tablet or smartphone use during class is allowed. However, use for other purposes (texting/music even with headphones, etc.) is NOT allowed.** It is disruptive to your peers and professors. If you choose not to abide by this policy your class participation grade will be adversely affected**.**
7. You are expected to follow the Albany State University Code of Conduct as outlined in the Student). Specifically, behavior that is disruptive to the normal conduct of class, and that undermines the learning of fellow students, is not acceptable, and consequences, and corrective measures as outlined in the Student Code of Conduct will be applied

8. Exams:
    a. *Conduct during exams***:** All exams are individual, and no support materials either written or electronic are allowed. If the exam is "on-line", please be aware that fraud /monitoring detection systems will be in place. **If fraud of any kind is detected the exam will automatically receive a zero.** If the exam is "in person", all book bags, purses, backpacks etc, need to be placed at the front of the classroom, before the exam begins, and are to remain there until the student turns in the exam and leaves the classroom. Additionally, no drinking or eating is allowed during exams. Lastly, if you leave the classroom, you must turn in your exam. You will not be allowed to come back to the classroom and continue to work. No exceptions!
    b. *Make-up exams:* Make–up exams will be offered **up to one week** after the missed exam date. Make up exams will be offered **only** in cases of illness or unavoidable absence (court appearances, verifiable family emergency). A written health care provider note or other official documentation (court summons, etc) **MUST** be presented as soon as possible (no later than one week after the date of the missed exam) in order to be eligible to take the make-up exam. If you know that you will not be present for an exam, it is your responsibility to make arrangements **ahead of time** to take the exam at an alternative time.
    c. *Grading disputes:* If your exam points were added incorrectly, please see me after class or during office hours, and I will be happy to make a correction. All other requests for exam re-grading must be in written form, justifying why your answer should be accepted, and if accepted, the entire exam may be re-graded. **No exam taken in pencil will be re-graded.** All appeals for changes must be made within 5 days after the exam is returned to the students.

9. **ACADEMIC INTEGRITY: Plagiarism or any form of cheating or document fabrication/falsification is unacceptable under any circumstances. Students found cheating will receive a grade of zero for that particular assignment, and may be the subject to further institutional disciplinary actions as outlined in the Albany State University Code of Conduct.**

GRADING/EVALUATION PROCEDURES:
The Final Grade will be determined as follows:

Exams I - III	30%
Project	20%
Homework	15%
Quizzes	10%
Class Participation	10%
Final Exam	15%

GRADING:

The standard Albany State University grading system will be utilized. Your grade will be calculated using the weighted system outlined below. All of your grades will be recorded in Blackboard and your current course grade will be updated accordingly and timely

A	B	C	D	F
90-100%	80-89%	70-79%	60-69%	<60%

Keep up with your grades, NO EXTRA credit activities will be offered!
The grade you earn is the grade you get!!!

BIBLIOGRAPHY:
Lesk, Artur M. (2019) "*Introduction to Bioinformatics*" Fifth edition. Oxford, England. Oxford University Press.

Bioinformatics and Functional Genomics, 3rd Edition, Jonathan Pevsner, Wiley-Blackwell. Helms, Volkhard (2019) "Principles of Computational Cell Biology" Second Edition, Weinehim, Germany, Wiley-VCH

Important Dates:

IMPORTANT DATES:	
August 28	First day of class
September 4	Labor day holiday (no classes)
September 8	**Last Day to Add/Drop, or Register for Classes**
September 13	Fall convocation
October 8	Last day to apply for Fall graduation
October 25	Midterm grades due
November 3	**Last day to withdraw (W) or change from credit to audit**
November 6-10	Academic Advisement week
November 23, 24	Thanksgivings break
December 12	**Last day of classes**
December 13	Reading day
December 14-20	Final Exams

A full Albany State University Academic Calendar can be found on the website and by following the link below: https://www.asurams.edu/enrollment-management/office_of_the_registrar/academic-calendar/index.php

The Class Project will be evaluated using the following rubric:

Assessment Areas	5 Rating (A)	4 Rating (B)	3 Rating (C)	2 Rating (D)	1 Rating (F)
Introduction	Background information is complete and correct	Background information mostly complete and correct	Background information is partially complete and correct	Background information is mostly incomplete and incorrect	Background information is incomplete and incorrect
Objective	Subject to be analyzed is stated succinctly and correctly	Subject to be analyzed is mostly stated clearly	Subject to be analyzed is partially stated clearly	Subject to be analyzed is stated unclearly	Subject to be analyzed is not stated
Analytical Approach	Describes all of tools and methodologies used clearly and with precision.	Describes most of tools and methodologies used. Mostly accurate and precise.	Describes some of tools and methodologies used; somewhat accurate	Describes few tools and methodologies used	Analytical approach description missing
Results	Presents results in a accurate and appropriate format	Presents most results in a accurate and appropriate format	Presents some results in a accurate and appropriate format	Few results presented a accurately or in appropriate format	No results presented
Discussion	Carefully and fully analyses and interprets the results	Result analysis is mostly complete	Result analysis is somewhat complete	Result analysis is incomplete or flawed	No result analysis
Conclusion	Conclusion is based on available knowledge and results	Conclusion is based mostly available knowledge and results	Conclusion is based on some available knowledge and experimental results	Conclusion is not based on the available knowledge and results.	No or flawed conclusion.

COURSE OUTLINE
Please note: This outline is intended to provide guidance and will be followed as close as possible. However, the professor reserves the right to modify, supplement and make changes, based on class progress and needs. Chapter numbers are based on "Bioinformatics and Functional Genomics" by Jonathan Pevsner, 3rd edition.

Week No.	Week of	Class Topic	Assignments
1	8/28/23	Course overview and expectations, and Introduction to Bioinformatics	• Read Chapter 1 • Read Material • Complete Assignments
2	9/4/23	Introduction of Biological Databases	• Read Chapter 2 • Read Material • Complete Assignments
3	9/11/23	Access to Sequence Data and Information	• Read Chapter 2 • Read Material • Complete Assignments
4	9/18/23	Pairwise Sequence Alignment Alignment Algorithms	• Read Chapter 3 • Read Material • Complete Assignments
5	9/25/23	BLAST Principles of BLAST searching	• Read Chapter 4 • Read Material • Complete Assignments • Exam 1 (Chapter 1-3)
6	10/2/23	Advanced Database Searching	• Read Chapter 5 • Read Material • Complete Assignments
7	10/9/23	Multiple Sequence Alignment	• Read Chapter 6 • Read Material • Complete Assignments
8	10/16/23	Phylogenetic Analysis CURE Project Overview	• Read Chapter 7 • Read Material • Complete Assignments • Exam 2 (Chapter 4-7)
9	10/23/23	Introduction to Bioinformatics Programming -CURE	• Read Material • Complete Assignments
10	10/30/23	Machine Learning/Artificial Intelligence (AI) in Bioinformatics	• Read Material • Complete Assignments

		-CURE	
11	11/6/23	Deep Learning in Bioinformatics -CURE	• Read Material • Complete Assignments
12	11/13/23	AI in Drug Discovery -CURE	• Read Material • Complete Assignments
13	11/20/23	AlphaFold -CURE	• Read Material • Complete Assignments
14	11/27/23	Cure Project Review	CURE Presentation
15	12/4/23	Bioinformatics Ethics	• Exam 3
16	12/11/23	Final Exam	Final Exam