

**BIOL450\_01: Introduction to Bioinformatics**  
**The Virginia State University**  
**Fall Semester, 2006**

Meets: MWF 12:00 – 12:50 PM in OH 112

Instructor: Dr. Glenn Harris

Office: Owens Hall G-05 (basement)

Office Hours: Mon 2-4 PM, Tues 10-12 AM, Wed 2-4 PM, or by appointment

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**Course description**

This course is designed to introduce students to the field of bioinformatics. I will focus on the close association between genomics and bioinformatics and emphasize the concepts underlying the rapid development of both fields. I will review some fundamental problems in genomics research, common bioinformatics tools and resources used to resolve those problems, and the theory upon which those resources are based. Lectures will cover basic molecular biology, public bioinformatic databases, biological sequence alignment, comparative genomics, gene prediction, genomics and proteomics.

**Course objectives**

By the end of the course, students should be able to:

- Retrieve and analyze data available from several bioinformatic databases
- Use common bioinformatic tools to answer specific biological questions
- Understand the theories used to build those tools
- Critically assess solutions to common bioinformatics problems

**Text**

"Bioinformatics and Functional Genomics", by Jonathan Pevsner. 2003, Wiley & Sons

Additional reading material will be made available by the instructor and placed on Blackboard.

**Course Structure**

Lectures will be presented on Monday and Wednesday each week. Fridays will be reserved for hands-on computer laboratory exercises and the final research project.

**Grading scale**

>90% A  
>80% B  
>70% C  
>60% D  
<60% Come see me...

### Percentage of final grade

25%	Midterm
25%	Non-comprehensive Final Exam
25%	Computer Lab assignments
25%	Final Project

### **Evaluation and assignments**

Each exam is worth 100 points. The exams will consist of a combination of multiple choice, matching, and short answers involving experimental questions.

Each computer lab assignment is worth 20 points. Computer assignments will be due 1 week after they have been assigned, and will include the following exercises:

1. Human Genome Project and bioinformatics
2. Reference and gene searches in online databases
3. Single sequence alignment (BLAST and FASTA)
4. Online database resources for comparative genomics
5. Sequence searches and result interpretation
6. Using a genome browser for gene annotation and prediction
7. Protein phylogeny and evolutionary relatedness
8. Predicting protein structure

### **Final Project: Find-A-Gene**

Students will be broken up into groups of 3-4. Each group will prepare a poster presentation about a novel gene they have discovered. Details and examples about this project will be available in a separate document on Blackboard. Posters will be presented to the class on Poster Day. All students are encouraged to seek the instructor's guidance for help on these projects.

### **COURSE SCHEDULE**

<b>Week starting</b>	<b>TOPIC</b>	<b>Reading</b>
August 21	Course intro and assignments Molecular biology review Computer Lab	Supplemental
August 28	The Human Genome Project Introduction to bioinformatics Computer Lab; Lab #1 assigned	Supplemental Ch.1
September 4	<b>Labor Day 9/04; No lecture on Monday</b> Introduction to bioinformatics Computer Lab; Lab #1 due, Lab #2 assigned	Ch.1, Ch.2
September 11	Bioinformatics research at VSU Pairwise sequence alignment: algorithms and matrices Computer Lab; Lab #2 due, Lab #3 assigned	Ch.3
September 18	Pairwise sequence alignment:	Ch.3, Ch.4

	BLAST and related programs Computer Lab; Lab #3 due, Lab #4 assigned	
September 25	BLAST: Advanced database searching Computer Lab; Lab #4 due, Lab #5 assigned	Ch.4
October 2	BLAST: Advanced database searching Find-A-Gene Project Review Computer Lab; Review, Lab #5 due	Ch.5
October 9	<b>Class Test 1: Monday 9/09</b> No class Friday	
October 16	<b>FALL BREAK: No Lecture on Monday</b> Gene expression and RNA Computer Lab; Lab #6 assigned	Ch.6
October 23	Gene expression: microarray data analysis Computer Lab; Lab #6 due, Lab #7 assigned	Ch.7
October 30	Protein families & proteomics Computer Lab; Lab #7 continued	Ch.8
November 6	Multiple sequence alignment Computer Lab; Lab #7 due, Lab #8 assigned	Ch.10
November 13	Multiple sequence alignment Computer Lab; Lab #8 continued	Ch.10
November 20	Molecular phylogeny Computer Lab; Lab #8 due	Ch.11
November 27	POSTER DAY Monday Nov. 23 <b>Thanksgiving Holiday Thursday and Friday; No lab on Wed 11/23</b>	
December 4	<b>University Final Exams</b> Time and date: To be announced	

## BIOL 450: Student Expectations

1. *Attendance* – Class and laboratory attendance and punctuality is **Mandatory**. First tardiness of 5 or more minutes, will place the student on **probation alert**. Second tardiness to class and/or first absence from class will place the student on **probation status**. Third tardiness to class and/or second absence from class, the student will receive **UNSATISFACTORY** for the class or laboratory session.
2. *Preparedness* – You are expected to have prepared thoroughly for each class and laboratory session. Preparation includes reading the assigned materials prior to class, summarizing the content and being prepared to discuss it; listing questions or reactions to the material; and making connections between concepts in current reading and earlier readings. **Students should plan on at least three (3) hours of studying outside of class for every hour of lecture and at least two (2) hours of studying outside of laboratory for each hour of lab.**
3. *Active Participation* – Being alert, engaged, and constructively contributing in all class and group settings. Informed disagreement is both anticipated and welcomed. Student is responsible for setting up a meeting with faculty advisor **once a month** [minimum] to discuss areas in need and to ensure successful course achievement.
4. *Accountability & Professionalism* – Student will demonstrate respect for peers and instructors, and, appropriately monitor and adjust their behavior and emotions/attitudes toward subject material. You are expected to be respectful of the opinions of others and to show courtesy in interactions with fellow students and the instructor. **Disruptive behavior will not be tolerated!**
5. **Absolutely no pagers or cell phones** during class or laboratory sessions. If you are anticipating a call, let the instructor know before the class and have your ringer turned off. Assessment of the student's accountability, personal and professional development will be evaluated by student and faculty at midterm and end of each semester.

**Written work** should show thoroughness, accuracy, clarity and professionalism. Such writing generally requires first writing, then review, then editing and rewriting.

- All work should be carefully proofread and corrected. Papers should be free of errors in spelling, grammar, and punctuation.
- All papers written from sources must include citations following the style requirements of the *Publication Manual of the American Psychological Association* (2001, 5<sup>th</sup> edition). This reference text provides excellent information on the organization and writing of papers.
- All work must be typed, double-spaced, with numbered pages unless the professor instructs otherwise. Each assignment should be titled, dated, annotated with your name, and stapled or placed in a binder. [No paperclips]
- Papers should be standard margins. The Microsoft Word default setting for margins is 1" top, 1" bottom, and 1.25" each left and right. The header and footer default setting is 0.5" from the edge.
- Papers should use standard fonts. Use either New Times Roman 12 point.

- **Academic Misconduct:** Plagiarism, cheating, and all other forms of academic misconduct are not only considered a violation of university regulations, but also a serious breach of the ethical code of conduct for the nursing profession. Students are expected to abide by the ethical standards of the profession. See Student Handbook for Academic Honesty Procedure and Classroom Decorum/Conduct.
6. **In the event of illness or emergency, contact the course professor to acquire missed classroom material. It is the student's responsibility to obtain class notes for a missed class session.**
  7. Faculty has the right to **dismiss** a student from any class session if the student demonstrates a lack of preparedness (e.g., incompleteness of assigned readings and other assignments) or, exhibiting inappropriate, unprofessional behavior. If a student is dismissed from a class session, an **UNSATISFACTORY** will be given for that session.

### ***Missed Exams***

Students who miss an exam due to emergencies, **must** contact the faculty member or leave a *timed* message on the faculty's phone mail. Failure to notify the faculty 24 hours ahead of time will result in a grade of **zero (0)** for the test. (Mitigating circumstances preventing notification will be handled individually.)

All tests will be on Blackboard and given in a proctored format. If a student arrives late for a test, the time remaining will be used to complete the test. No additional time will be granted. All tests will be open for individual review (by appointment only) for three days after the tests.

Make-up Tests- will be scheduled with the appropriate faculty member. The format is at the discretion of the faculty. Tests must be made up before the next modular test is given.

### ***Test Format***

**Students will need an exam grade sheet for tests given in class.** As you take the test, record your answer on the grade sheet. You will need to show your math calculations on the back of this sheet. The sheet will be collected at the end of the exam and kept on file.

All exams will be timed. If a student has an individual concern about a test item it should be discussed later with the instructor on an individual basis.

**Testing environment:** For online testing, it is important that you **thoroughly** understand the following:

1. All exams are timed.
2. Access to the exam will be through a password provided by the instructor.
3. When you access the exam, this is the 'start' time for the exam.
4. When the student submits the exam, a grade will be posted for review.
5. Students will have 1 week to review their individual exam. Schedule an appointment with the instructor during office hours for the exam review. Exams will not be reviewed using classroom time.

6. During exams students will exercise respect and consideration for their classmates by being quiet and keeping movement to a minimum.
7. Cheating will result in a score of zero (0) for a test and will be reported.