



BINF 401 – Introduction to Bioinformatics Part 1
Fall 2020 – Full Semester
Credits: 3

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Course Description

Through this course, students will learn about several bioinformatics techniques and tools plus their underlying concepts. It will combine Biology with introductory Computer Science skills that will set you apart. Students will learn about the following topics: the growth of and different fields within bioinformatics, data access, pairwise and multiple sequence alignment, phylogenetic tree building, Bioinformatic resources, survey tools used in the field, analysis of high-throughput DNA and RNA repositories, comparative genomics, etc. Students will learn through a combination of lectures, hands-on computer exercises, a group project, and reading of scientific papers. Students will benefit most from this class by being inquisitive and proactive learners. Involvement improves understanding.

Course Objectives

1. Students learn and then create their own rudimentary bioinformatic tools.
2. Students will learn how the underlying technology handles biological data and methods for storage and retrieval.
3. Students will research, graphically present, communicate their scientific findings in a “poster” presentation.

Course Assignments and Grades

Your grade will be determined by a combination of attendance and participation, plus mastery of the material.

Blackboard

We will use the learning management system Blackboard in this class. Lecture notes, instructions for hands-on exercises, etc. be posted to this site. Log in at <http://mymason.gmu.edu>.

Text book

Bioinformatics and Functional Genomics by J. Pevsner (3rd Edition) It also comes in a Kindle version.

PowerPoints of the Lectures are at:

<http://magik.gmu.edu/cgi-bin/Pwebrecon.cgi?BBID=3821698>

Laptop

You should own a laptop that meets or exceeds the specifications set by the Biology Department and bring the laptop to class. The preferred OS is Mac or Linux.

Graded work

Your final grade is calculated as a percentage out of 100, divided in the following way:

- 35% In-class and homework assignments
- 20% Final examination
- 20% Gene and Protein analysis project
- 15% Mid-Term examination
- 10% Class participation

Gene and Protein analysis project

Each 2 to 3-person team will complete a report and present the results for a selected protein project. For this project, the students will be assigned a protein that they will research, run their programs, and use various websites to analyze. A PowerPoint presentation will be made by the team in front of the class.

Mid-term examination

Students will take an in-class first half cumulative examination at the mid-point of the semester.

Final examination

Students will take an in-class cumulative examination at the end of the semester.

In-class computer exercises and homework

Students need to complete and turn in worksheets at the end of each in-class computer exercise. We will cover databases, Python, Linux Commands, and some common presentation tools. A few scientific papers will be assigned to write a short critique.

Class participation

Students are expected to participate actively during computer sessions and class discussions.

Attendance and Late Work Policy

Regular attendance and participation are expected. Attendance and grades are highly correlated in any class. Except in the very rare case of last-minute emergencies, you should let me know in advance about any absences and make arrangements for making up any missed work.

Unless otherwise announced, homework is due, by submitting to Blackboard, before the beginning of class on the due date. You will not be allowed to make up missed assignments or exams unless you have an excused absence. It is your responsibility to provide **written documentation** from a third party of your emergency or university-excused absence

Covid Impact

Obviously, in-class participation is impacted if you are not in the classroom. If the class or if you are on WebEx, I still want you to interactively participate. I understand it is more difficult to do on WebEx.

Grading

Your final grade will be based on your percent out of 100. See below for grading scale. All inquiries about homework partial credits or potential grading mistakes need to be addressed soon after the homework is returned, not toward the end of semester.

FYI – If you appear every class session you will only get 50% of your attendance score. To get the other 50% of the attendance score you must engage. That means be mentally present and ask a few questions over the course of the semester.

A+	97-100	B	83-86	C-	60-69
A	93-96	B-	80-82	F	59 or less
A-	90-92	C+	77-79		
B+	87-89	C	70-76		

Disability Accommodations

If you have a learning or physical difference that may affect your academic work, you will need to furnish appropriate documentation to the Office of Disability Services. If you qualify for accommodation, the ODS staff will give you a form detailing appropriate accommodations for your instructor. In addition to providing your professors with the appropriate form, please take the initiative to discuss accommodation with them at the beginning of the semester and as needed during the term. Because of the range of learning differences, faculty members need to learn from you the most effective ways to assist you. If you have contacted the Office of Disability Services and are waiting to hear from a counselor, please let your instructor know.

Diversity

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings,

including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.

Canceled and missed class

If for some reason class is canceled, then the following class will cover the material for the missed class. This is particularly important should an exam day be canceled for whatever reason (the exam will take place in our next scheduled class).

If you are having problems: please come and see us. We are here to help you learn this material and master biostatistics. We will do what we can to make sure that you make it successfully. Please don't wait too long if you are having difficulties.

Academic Integrity

The integrity of the University community is affected by the individual choices made by each of us. GMU has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me. For more information about the honor code, please see <http://oai.gmu.edu/>.

Class Etiquette

You will be expected to come to class on time and participate while you are here. You will be in charge of your own progress and must meet the benchmarks specified in the syllabus.

Privacy

Student privacy is governed by the Family Educational Rights and Privacy Act (FERPA) and is an essential aspect of any course. Your instructor cannot discuss your educational record with your parents, your friends, or anyone except for you. Because your GMU email is the only one that we can explicitly identify as belonging to you, your instructor

will only communicate with you via email using your GMU address, and your instructor will not discuss grades via email. **Students must use their MasonLive email account** to receive important University information, including messages related to this class. See <http://masonlive.gmu.edu> for more information.

BINF 401			
FALL 2020	Introduction to Bioinformatics Part 1 of 2		
Week	Day One	Day Two	Homework due
1	Ch1 Introduction	Ch1 Introduction	
2	Set up tools on laptop	Chapter2 Access Information	
3	Linux Command intro	Ch2 Access Information	hw 1
4	Ch3 Pairwise Alignment	Intro to Python	
5	Ch3 Pairwise Alignment	Write Pairwise Alignment tool	hw 2
6	Ch4 BLAST	Ch4 BLAST /Test Prep	
7	test prep	Mid Term Exam	
8	Review Exam and choose Project Protein	MySQL overview	hw 3
9	Mysqlworkbench	Ch5 Advanced Database Search	
10	Ch5 Advanced Database Search	Project Assignments and Discussion	
11	More Python	More MySQL	hw 4
12	Ch6 Multi-Sequence Allignment	Ch6 Multi-Sequence Allignment	
13	Ch6 Multi-Sequence Allignment	Ch7 Phylogeny	
14	Project Presentations	Thanksgiving Break	Project
15	Project Presentations	Review for Final Exam	
	Final Exam		