

BINF 402 / BIOL 418

Bioinformatics & Computational Biology II

Spring 2026

School of Systems Biology
George Mason University
Manassas, VA

Instructor: Dr. Chris Lockhart

Email: clockha2@gmu.edu

Phone: Microsoft Teams

Office: Virtual

Office Hours: Over Zoom by appointment ([Microsoft Bookings](#))

Meeting Place: Online (Zoom)

Meeting Time: Mondays, 4:30-7:10pm

Course Website: Canvas

Credits: 3

Course Description

Continuation of BINF401 and studies in-depth several algorithms and methods used in bioinformatics and computational biology. Students will learn sequence alignment and assembly algorithms, hidden Markov models, classification and prediction methods, and genome annotation. These techniques will then be applied to current bioinformatics problems. Programming assignments are incorporated in the course program.

Recommended Prerequisites: [BINF 401](#)

Learning Outcomes

By the end of this course, students will be able to:

1. Perform common bioinformatics analyses using Python
2. Use and discuss next-generation sequencing pipelines
3. Develop clustering & predictive models for bioinformatics datasets, including datasets of biological sequences
4. Implement mathematical modeling frameworks for systems biology

Course Material

[Hasija, Y. & Chakraborty, R. \(2021\) Hands on data science for biologists using Python.](#)
Available from GMU library.

Tentative Schedule

Week	Date	Topic
1	Jan 26	Syllabus & expectations Review of biological principles
2	Feb 2	Introduction to Python Problem set #1 assigned
3	Feb 9	Introduction to Python II
4	Feb 16	Introduction to Biopython Problem set #1 due
5	Feb 23	Manipulation of biological sequences, part 2
6	Mar 2	Midterm exam
7	Mar 16	Next-generation sequencing & computational pipelines Problem set #2 assigned
8	Mar 23	Next-generation sequencing data analysis
9	Mar 30	Annotating sequences with Hidden Markov models Problem set #2 due
10	Apr 6	Introduction to machine learning
11	Apr 13	Classification algorithms Problem set #3 assigned
12	Apr 20	Classification with biological sequences
13	Apr 27	Clustering algorithms Problem set #3 due Final project assigned
14	May 4	Systems biology & compartmental models

Each lecture is a 2½ hour presentation with a 10-minute break.

The final project is due on May 11th.

Course Policies

Grading scale (points): A+ (≥100), A (94-99), A- (90-93), B+ (87-89), B (84-86), B- (80-83), C+ (77-79), C (74-76), C- (70-73), D (60-69), F (<60). Final grades will be rounded to the nearest whole number to assign letter grades.

Grading policy: Students will be graded on participation (10%), problem sets (45%), a midterm exam (20%), and a final project (25%).

- Class participation will be met by attending class and/or completing weekly in-class quizzes/exercises. To earn a full participation grade, you must satisfy this requirement for 10 out of 13 classes (participation will not be assessed the week of the midterm exam).
- Problem sets will be equally weighted (15% each) and assigned according to the course schedule. Problem sets are due two weeks from when they are assigned.
- The midterm exam will be administered in class, and students will have the full class period to complete the exam.
- In place of a final exam, there will be a final project due on the university-scheduled final exam day. There will be 3 project topics to choose from. You will submit your Python source code and a report. A project rubric will be provided.

Assignment resubmissions: Assignments cannot be revised or resubmitted after grading.

Late assignments: Late assignments will be penalized based on the number of days late but will not be accepted after assignments have been reviewed in class or after answers have been posted online. Extensions may be granted due to emergency, illness, quarantine, work-related, or other documented reasons. Except in emergency situations, extension requests should be made before the assignment due date. Late submissions of the final project will not be accepted.

Course recordings: All synchronous meetings in this class will be recorded to provide necessary information for students in this class. Recordings will be stored on Zoom and will only be accessible to students taking this course during this semester.

Other considerations: If there are any schedule issues related to religious holidays, please inform me the first week of class.

Course Logistics

Content distribution: The course uses Canvas for distributing lecture materials, submission of homework, and grading. Canvas can be accessed by visiting <https://canvas.gmu.edu/> and logging in with your MasonID and password.

Virtual classroom and office hours: Zoom will be used for online lectures and office hours. Zoom lecture links will be distributed by the instructor.

Communication: I will use Mason email to distribute class updates and communicate with students (see Email section in Student Responsibilities). If you wish, please share your name and gender pronouns with me and how best to address you in class and via email. Communication over email is largely preferred, and I will respond to student emails promptly within 24 hours on weekdays. I do not typically respond to emails after 8pm or on weekends.

Course Technology Requirements

Software and hardware: This course uses Canvas as a learning management system available at <https://canvas.gmu.edu/>. Students are required to have regular, reliable access to a computer with an updated operating system (recommended: Windows 10 or Mac OS X 10.15 or higher) and a stable broadband Internet connection (cable modem, DSL, satellite broadband, etc., with a consistent 1.5 Mbps download speed or higher). Activities and assignments in this course will use web-conferencing software (Zoom). In addition to the requirements above, students are required to have a device with a functional camera and microphone.

This course also requires students to produce Python code. My recommendation is to download Python3 through the Anaconda distribution (<https://www.anaconda.com/>). We will discuss installing Python in class.

Technical help: If you have difficulty with accessing Canvas, please contact the ITS Support Center at (703) 993-8870 or support@gmu.edu. If you have trouble with using the features in Canvas, email courses@gmu.edu.

Student Responsibilities

Email: Students must use their Mason email account to receive important University information, including communications related to this class. Per University policy, I will not respond to messages sent from or send messages to a non-Mason email address.

Academic standards: Some kinds of participation in online study sites violate GMU's Academic Standards: these include accessing exam or quiz questions for this class; accessing exam, quiz, or assignment answers for this class; uploading of any of the instructor's materials or exams; and uploading any of your own answers or finished work. Always consult your syllabus and your professor before using these sites. See <https://academicstandards.gmu.edu/> for additional information.

Use of AI tools: Use of generative AI (e.g., ChatGPT) is strongly discouraged because these tools do not have access to the specific data used in this course. If students use these tools, they must follow GMU's academic standards. This includes being honest about the use of generative AI for submitted work and giving credit through accurate citations.

Course Materials and Student Privacy

Video recordings of class meetings that are shared only with the instructors and students officially enrolled in a class do not violate FERPA or any other privacy expectation. Video recordings that only include the instructor (no student names, images, voices, or identifiable texts) may be shared without violating FERPA (but see University Policies:

Privacy, for some qualifications and recommendations). All course materials posted to Blackboard or other course site are private to this class; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class.

Video conferencing or recordings: Video recordings – whether made by instructors or students — of class meetings that include audio, visual, or textual information from other students are private and must not be shared outside the class. Live video conference meetings (e.g., Zoom) that include audio, textual, or visual information from other students must be viewed privately and not shared with others in your household or recorded and shared outside the class.

Common Course Policies

This course adheres to the common course policies set by George Mason University, which includes policies about Academic Standards, Accommodations for Students with Disabilities, FERPA, and Title IX. These policies are described in more detail at the following link: <https://stearnscenter.gmu.edu/home/gmu-common-course-policies/>.