

# **BINF 401 / BIOL 417**

## **Bioinformatics & Computational Biology I**

Fall 2026

School of Systems Biology  
George Mason University  
Manassas, VA

**Instructor:** Dr. Chris Lockhart

**Email:** [clockha2@gmu.edu](mailto:clockha2@gmu.edu) (preferred)

**Phone:** Microsoft Teams

**Office:** Virtual

**Office Hours:** By appointment ([Microsoft Bookings](#))

**Meeting Place:** Online

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

**Course Website:** Canvas

**Credits:** 3

### **Course Description**

The course covers theoretical approaches, techniques, and computational tools for DNA and protein sequence and structure/function analysis. The topics also include biological databases and internet-based bioinformatics resources. Students will gain practical experience using these tools to conduct bioinformatics analyses.

**Recommended Prerequisites:** [BIOL 213](#), [BIOL 214](#), and [CDS 130](#) with a grade of C or better, its equivalent, or permission of the instructor.

### **Learning Outcomes**

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

1. Discuss common online bioinformatics databases, access biological sequence data available through these databases, and synthesize data from several database sources
2. Describe common algorithms that are used to analyze biological data
3. Perform analyses on biological sequence data using online tools

### **Course Material**

Pevsner, J. (2015) *Bioinformatics and Functional Genomics*. 3<sup>rd</sup> edition. Wiley-Blackwell.

## Tentative Course Topics

| Week | Date    | Topic                                                                                 |
|------|---------|---------------------------------------------------------------------------------------|
| 1    | Aug 24  | Syllabus & expectations<br>Review of biology & information theory                     |
| 2    | Aug 31  | Software & databases<br><b>Problem set #1 assigned</b>                                |
| 3    | Sept 14 | Bioinformatics databases                                                              |
| 4    | Sept 21 | Pairwise sequence alignment<br><b>Problem set #1 due</b>                              |
| 5    | Sept 28 | Global and local alignments                                                           |
| 6    | Oct 5   | <b>Midterm exam</b>                                                                   |
| 7    | Oct 19  | BLAST<br><b>Problem set #2 assigned</b>                                               |
| 8    | Oct 26  | Multiple sequence alignment                                                           |
| 9    | Nov 2   | Molecular phylogeny and evolution<br>Sequence annotation<br><b>Problem set #2 due</b> |
| 10   | Nov 9   | Protein structure basics                                                              |
| 11   | Nov 16  | Protein secondary structure prediction<br><b>Problem set #3 assigned</b>              |
| 12   | Nov 23  | Protein tertiary structure                                                            |
| 13   | Nov 30  | CASP and AlphaFold<br><b>Problem set #3 due</b>                                       |
| 14   | Dec 7   | Molecular modeling<br>Preview of BINF 402                                             |
|      | Dec 14  | <b>Final exam</b>                                                                     |

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

## 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 exam (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.

- Midterm and final exams will be administered in class, and students will have the full class period to complete exams.

**Problem set and exam resubmissions:** Problem sets and exams 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.

**Course recordings:** All synchronous meetings will be recorded for students in this class. Recordings will be stored on Canvas 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.

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