

**Grove City College**  
**Fall Semester 2025**  
**CHEM 451: Biochemistry: Data and Analysis**

**Instructor**

Instructor Kevin Shaw  
Email [klshaw@gcc.edu](mailto:klshaw@gcc.edu)  
Phone Office 724-450-4043  
Home 724-974-9381  
Campus Mail #3097  
Office STEM 340C  
Office Hours M, 12-2; T, 12:30-2; R, 10-11; F, 9-11, 12-1

**Meeting Hours**

Section A TR 11:00-12:15, STEM 050

**Course Objectives(●), Assessments(○) and (Departmental Outcomes)**

Upon completion of this course, the student will be able to:

- Understand the unix philosophy, work with common shell programs and perform biochemical workflows using common shell and domain specific programs.
  - Problem Sets and Examinations (1, 3 and 4)
- Perform reproducible computation experiments in the biochemical sciences
  - Problem Sets and Examinations (1, 2, 3, 4 and 5)
- Identify, describe and illustrate protein structures, both detailed and schematic views
  - Problem Sets and Examinations (1, 6 and 7)
- Understand, analyze and interpret a variety of common bioinformatics data
  - Problem Sets and Examinations (1, 2, 3, 4 and 6)

**Required Materials**

<https://biochemistry.prof/451/>

Account @ [bioinfo.gcc.edu](mailto:bioinfo.gcc.edu)

username:

passwd:

**Grading**

*Course Grade*

Problem Sets	65%
Midterm Exam	15%
Final Exam	15%
Seminar	5%

*Grading Scale*

The grading scale is ten percent to the letter grade with appropriate  $\pm$  distinctions. Thus, the lowest “A-” is ninety percent, the lowest “B-” is eighty percent, the lowest “C-” is seventy percent, and the lowest passing grade for the course is sixty percent.

**Problem Sets**

The major learning focus of this course is on the completion of problem set which represent both learning exercises and solutions to typical laboratory investigations. Several problem sets are distributed throughout the semester. The solutions to these problems will depend on topics and techniques covered during lecture. It is advisable to review a problem set when first available and begin to solve those problems as the content and techniques are covered in lecture; it is not advisable, or even, in some cases, possible, to wait until the night before the problem set is due to begin work.

Problem set due dates are listed on the course website. Problem sets are due by 23:59 on the due date. Problem sets uploaded after the due date will be penalized five percent for each twenty-four hour period, or fraction thereof, tardy.

## Seminar

The Department of Chemistry operates a seminar series during the fall semester. The seminar series draws speakers from professionals in the chemical industries, academic faculty and current graduate students. The series attempts to cover a wide variety of topics from scientific discovery through career advancement. Seminars are held at various times (afternoons and evenings) throughout the fall semester. Your attendance is required at two departmental seminars during the fall semester. Please see the course website for dates, times and other information about the seminar speakers and schedule.

## Examinations

There are two scheduled examinations in this course. The final exam will be given at the time and location listed in course sequence.

You are required to bring your computer to use as a terminal to access *bioinfo.gcc.edu*. You are free to use any resource on *bioinfo.gcc.edu*, the course website, any paper or tool linked from the course website or any other materials. You may not, however, reference your classmates by any means of communication.

The examinations are designed to test your competency with particular tools, problems or data sets. The exams are designed to illustrate what you can do, not what you know. Certainly being well versed in what you have learned in lecture and while working problem sets will help, but you will be analyzing data and working with examples which you have not seen before. The examinations are designed to demonstrate how well you can work with these novel systems.

## Course Policies

### Readings

Readings are drawn from the primary literature and will be provided on the course website. These articles will typically highlight the theory or practice of an idea discussed in a lecture. These readings are supplements to connect discussion to the literature and provide background context—they do not need to be memorized in detail.

### Accessibility and Accommodation

Any required learning accommodations will be provided in this course. See page 39 of the *2025-2026 Grove City College Bulletin* for information on requesting services from the Disability Services Coordinator.

### Final Examination

Grove City College requires each faculty member to give a rigorous, comprehensive, faculty-proctored final examination in each course. It is the student's responsibility to review the final exam schedule (<http://www2.gcc.edu/registrar/>) at the beginning of the semester and make work and travel plans accordingly. See pages 53–54 of the *2025-2026 Grove City College Bulletin* for the Grove City College final examination policy.

### Attendance

As adopted by the Grove City College faculty, three (3) unexcused lecture absences are permitted without grade penalty. Unexcused absences are not permitted for laboratories or examinations. If you must miss your scheduled laboratory section, you may attend another laboratory section during the same week. Make-up laboratories and examinations will be given for excused absences; formats and requirements may be different for make-up work. See pages 54–55 of the *2025-2026 Grove City College Bulletin* for Grove City College attendance expectations.

### Academic Integrity

All work submitted in this course must be the student's own scholarly work prepared originally for this course. See pages 56–59 of the *2025-2026 Grove City College Bulletin* for Grove City College policies and procedures related to academic integrity.

Any use of artificial intelligence tools to generate content for an assignment, while crediting the output as your own work, constitutes an act of plagiarism and a violation of the colleges academic integrity policy.

Students are not permitted to collaborate with their classmates during either the midterm or final examination.

**Lecture Schedule<sup>†</sup>**

Lecture	Date	Topic
1	26 August	Course Introduction
2	28 August	Unix, not Eunuchs
3	02 September	Shell Games
4	04 September	Shell Games ( <i>cont'd</i> )
5	09 September	Computational Experimentation
6	11 September	Protein Data Bank
7	16 September	Protein Folds
8	18 September	Presentation Graphics
9	23 September	Presentation Graphics ( <i>cont'd</i> )
10	25 September	Solvent Accessibility
11	30 September	Hydrogen Bonding
12	02 October	Secondary Structure
13	07 October	Midterm Exam
14	09 October	Sequence Alignment (Global)
15	14 October	Secondary Structure Prediction
16	16 October	No Class—Fall Recess
17	21 October	Tertiary Structure Prediction
18	23 October	Tertiary Structure Prediction ( <i>cont'd</i> )
19	28 October	Molecular Dynamics
20	30 October	Docking
21	04 November	Sequence Alignment (Local)
22	06 November	Sequence Alignment (Local) ( <i>cont'd</i> )
23	11 November	Phylogeny
24	13 November	High-Throughput Sequencing
25	18 November	Alignment to a Reference Sequence
26	20 November	Variant/SNP Calling
27	25 November	No Class—Thanksgiving Recess
28	27 November	No Class—Thanksgiving Recess
29	02 December	Various and Sundry Tools
30	04 December	Various and Sundry Tools ( <i>cont'd</i> )
31	09 December	Using the Literature
32	16 December	Final Exam—18

<sup>†</sup>The lecture schedule may be changed at anytime to better meet the needs of the course.