

Chemistry 1880 – Chemical Biology for Chemical Engineers Syllabus · Fall 2025 · University of Pittsburgh

Instructor: W. Seth Childers

Office Hours: W12-1 or by appointment via Zoom/In-person

Office: Chevron Science Center 801

<https://pitt.zoom.us/j/2992892661>

E-mail: wschild@pitt.edu

Class meetings

TTH 4:00-5:15

G24 Cathedral of Learning

Course Description

This course is designed to teach biochemistry from a chemical and molecular perspective. Revolutionary transformations in chemistry and biology have led to a merging at the boundary of these disciplines where contributions from both fields impact our molecular and quantitative understanding of biology. Our course will consider biochemistry of the COVID-19 pandemic and consider how the pharmaceutical industry has leveraged biocatalysis.

Text

David Nelson and Michael Cox, *Lehninger Principles of Biochemistry* 8th edition*

*older versions of the textbook can be used. If using an older version, search for the same section titles for reading assignments

Some course material will consist of advanced topics from published journal articles. Students can acquire these references online through the university library.

Class Format:

Our class will utilize a blend of lecture, in-class activities where you can work in groups or alone to investigate material during class time, and creative outlets to showcase your knowledge, such as the chemical biology infographic project. Our class time will be a balance of lecture and tophat questions.

Attendance

A key aspect of our learning will be tophat review questions. Therefore, you are encouraged to attend class face-to-face. All in-class materials will be made available for asynchronous learning experiences. This includes previously recorded lecture videos that will enable you to catch up on class if you were sick or have a job interview. The videos may also help you review and study for the exam.

Canvas

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Materials presented in class will be posted on Canvas typically at least two days before each class period. In addition, materials (e.g., reading assignments and videos) and other activities will also be posted on the Canvas to help you prepare for each class.

Academic Integrity

Students in this course will be expected to comply with the [University of Pittsburgh's Policy on Academic Integrity](#). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the [Academic Integrity Guide](#) for an overview of the topic. For hands-on practice, complete the [Understanding and Avoiding Plagiarism tutorial](#).

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and [Disability Resources and Services](#) (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Equity, Diversity, and Inclusion

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, visit the [Civil Rights & Title IX Compliance web page](#).

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-7860, or e-mailing titleixcoordinator@pitt.edu. Reports can also be [filed online](#). You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion.

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If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

Religious Observances

The observance of religious holidays (activities observed by a religious group of which a student is a member) and cultural practices are an essential reflection of diversity. As your instructor, I am committed to providing equivalent educational opportunities to students of all belief systems. At the beginning of the semester, you should review the course requirements to identify foreseeable conflicts with assignments, exams, or other required attendance. If possible, please get in touch with me (your course coordinator/s) within the first two weeks of the first-class meeting to allow time for us to discuss and make fair and reasonable adjustments to the schedule and tasks.

Copyright Notice:

Course materials may be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to university policy and procedures, prohibits unauthorized duplication or retransmission of course materials. See the Library of Congress Copyright Office (<http://www.copyright.gov/>) and the University Copyright Policy (<http://oscp.library.pitt.edu/intellectual-property/copyright/pitt-policies-on-copyright/>).

Statement on Classroom Recording:

Classes will be recorded via Zoom for asynchronous viewing of the class.

Grading

The overall course grade will be based on the following distribution (dates subject to change). I will not accept late group assignments. There will be no final exam for this course. No make-up exams will be offered for this course.

Component	Tentative Dates	
Exam 1: Introduction to biology, Amino acids and Protein Structure	Sep 25, 2025	22%
Exam 2: Enzyme function, kinetics	Oct 28, 2025	22%
Exam 3: DNA/RNA Structure and Function	Dec 4, 2025	22%
Chemical Biology Infographic Initial Draft	Nov 6, 2025	5%
Chemical Biology Infographic Peer Review	Nov 13, 2025	5%
Final Infographic	Nov 20, 2025	12%

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Homework and in-class assignments	Cumulative	12%
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Assignment due dates

Assignment	Due Date
HW # 1	Sep 4
HW # 2	Sep 11
HW # 3	Sep 18
HW # 4	Sep 23
HW # 5	Oct 16
HW # 6	Oct 23
Initial Chembio Infographic	Nov 6
HW # 7	Nov 13
Chembio Infographic Peer Review	Nov 13
Chembio Infographic final submission	Nov 20

Exam Format:

- Each test will have two sections: multiple-choice questions and short-answer questions.

Homework and In-class assignments:

- These will be graded for completeness only (0%, 100%). To receive full credit, each question should be submitted with reasonable answers based on the course content.
- Assignments must be submitted via Canvas.
- HW can be completed as groups, but each person should submit an HW submission and note the group you worked with.
- No late homework will be accepted.

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Grading Scale:

The following represents the tentative grading scale for this course based on historical student performance in the class. However, this grading scale is subject to change.

Numerical Grade	Letter Grade
97.0-100.0	A+
93.0-96.9	A
89.0-92.9	A-
85.0-88.9	B+
81.0-84.9	B
79.0-80.9	B-
74-78.9	C+
69.0-73.9	C
65.0-68.9	C-
60.0-64.9	D+
55.0-59.9	D
50.0-54.9	D-
0-49.9	F

Exam Re-grades:

- If you believe that part of an exam was scored in error, you may request that I regrade it.
- Such requests must be submitted via Gradescope.

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Week	Dates	Topic	Reading Assignment pages	Reading assignment Sections	HW Due Date
25-Aug Fall Term Classes Begin					
1	26-Aug 28-Aug	Foundations of Biochemistry Part 1	p. 1-40	Foundations of Biochemistry	4-Sep (Th) (HW 1)
1-Sep Labor Day Monday					
2	2-Sep 4-Sep	Foundation of Biochemistry Part 2	p. 43-64, 70-83, 90-93	2.1 Weak interactions in Aqueous Systems, 2.2 Ionization of Water, Weak Acids and Weak Bases, 2.3 Buffering against pH changes in Biological Systems, 3.1 Amino Acids, 3.2 Peptide and Proteins, 3.4 Structure of proteins: primary structure	11-Sep (Th) (HW 2)
3	9-Sep 11-Sep	Amino Acids Primary Structure, Secondary Structure	p. 106-128	4.1 Overview of Protein Structure, 4.2 Protein Secondary structure, 4.3 Protein tertiary and Quaternary structure	18-Sep (Th) (HW 3)
Chemical Biology Group and Topic Selection by Sep 21					
4	16-Sep 18-Sep	Tools of Biochemistry	p. 83-90, p. 164-169	3.3 Working with Proteins 5.2 Complementary Interactions between Proteins and Ligands	23-Sep (Tue) (HW 4)
5	23-Sep 25-Sep	New Material for Exam 2 Exam 1 – Sep 25			

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Module	Dates	Topic	Reading Assignment pages	Reading assignment Sections	HW Due Date
6	23-Sep 30-Sep 2-Oct	Enzyme Catalysis	p. 177-188, 203-213	6.1 An introduction to enzymes, 6.2 How Enzymes work, 6.4 Examples of Enzymatic Reactions	16-Oct (Th) (HW 5)
7	7-Oct 9-Oct	Enzyme Kinetics	p. 188-203	6.3 Enzyme kinetics as an approach to understanding the mechanism	No HW
Select Group Topic – Oct 9^h					
Oct 10th-12th Fall Break					
8	14-Oct 16-Oct 21-Oct	Enzyme Inhibition	p. 197-203, 319-320	6.3 Enzymes are subject to reversible or irreversible inhibition 9.2 Fusion protein and immunofluorescence can reveal the location of the protein in cells	23-Oct (HW 6)
9	21-Oct 23-Oct	Enzyme Inhibition Continued New Material for Exam 3 starts			

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Week	Dates	Topic	Reading Assignment pages	Reading assignment Sections	HW Due Date
10	28-Oct 30-Oct	Exam 2 DNA and the central dogma	p. 263-269, p.1006-1015	8.1 Some Basic Definitions and Conventions. 27.1 The Genetic Code	13-Nov (HW 7)
Chemical Biology Draft Infographic November 6th at 11:59 PM					
12	4-Nov 6-Nov	Higher-order structure of nucleic acids	p.269-294	8.2 Nucleic Acid Structure 8.3 Nucleic Acid Chemistry,	No HW
13	11-Nov 13-Nov	DNA Polymerase, PCR, Biotechnology	p. 294-317,	8.3 Nucleic Acid Chemistry, 9.1 Studying genes and their products	
Infographic Peer Review Due November 13th at 11:59 PM					
14	18-Nov 20-Nov	Enzymes and Nucleic Acid technology in industry		Rosa, S. S., Prazeres, D. M. F., Azevedo, A. M., & Marques, M. P. C. (2021). mRNA vaccines manufacturing: Challenges and bottlenecks. <i>Vaccine</i> , 39(16), 2190–2200. https://doi.org/10.1016/j.vaccine.2021.03.038	
Chemical Biology Peer Review due November 20th at 11:59 PM					
11-23 through 11-30 Thanksgiving Break!					
15	2-Dec 4-Dec	Share Infographic 2-Dec Exam 3 – 4-Dec			
	5-Dec	Last Day of the Semester			