

Fall 2025 Syllabus

CHEM 1810: Chemical Biology

Department of Chemistry @ University of Pittsburgh

Key information

Instructor: Dr. Grace E. Kenney

Email: gkenney at pitt dot edu – please include „CHEM1820“ in the subject!!! (Yes, as one word, to make it easier to search for!)

Lectures: Eberly 228, M/W/F 15-15:50

Recitations: Eberly 228, W 16-16:50

Office hours: By appointment – just send an email or ask after class and we'll set something up.

Office location: Chevron Annex 657.

Website: On [Canvas](#). Slides will be posted before class; recordings will be posted after class, along with any supplementary information and follow-ups. Problem sets, answer keys, and grades will also be posted here.

Accessibility:

Personal information

Please let me know if your preferred name or pronouns are not correctly reflected in the student directory. If you feel comfortable using NameCoach or otherwise providing a pronunciation guide for your name, you are welcome to do so.

Accommodations

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, and I will work with you set them up. See the DRS [website](#) for further information. (Please don't wait until right before an exam!)

Classroom recording

If requested, and if all course members agree to it, lectures can be recorded & linked on the course website; students are requested not to make additional recordings or post these recordings online.

Course description:

This course explores biochemistry from a chemical perspective, with a particular focus on exploring and manipulating proteins and pathways. Building on this, we will discuss how we can apply chemical tools in the context of these complex biological systems. Recent advances at the interface between chemistry and biology will be discussed throughout the course, as will relevant techniques and technologies.

Resources:

Lectures

Lectures will draw on the textbook as well as a wide range of other sources (with citations available in the slides). Slides will be posted prior to class; where applicable, additional material may also be made available and posted on Canvas after class. Questions are encouraged – if I don't notice you, *please* speak up.

Recommended textbook

This text will be used for many sections, but it will not be the sole source. Other material will be presented during lectures or posted on Canvas.

David van Vranken & Gregory Weiss. *Introduction to Bioorganic Chemistry & Chemical biology*. 1st ed., Garland Science, 2013. ISBN 978-0-8153-4214-4

Recommended references.

While not required, this text is a helpful reference for core biochemistry concepts, particularly for students without a strong background in those areas, and I'll provide relevant chapter numbers for it too:

Destin Heilman & Stephen Woski. *Fundamentals of biochemistry*. 6th ed, Wiley, 2024. ISBN: 9781119903505.

The previous edition is Voet, Voet, & Pratt. *Fundamentals of biochemistry: life at the molecular level*. 5th ed, Wiley, 2016. ISBN: 978-1-118-91840-1. Also available in the library are the 3rd edition: QD415 .V63 2008, and the 4th edition: QD415 .V63 2013.

Earlier related texts - like the Voet & Voet *Biochemistry* textbooks (in the library: QP514.2 .V64 2004, QP514.2 .V64 2011) - are also options. .

In parallel, this recent chemical biology text is a good reference for cutting-edge techniques and concepts:

Howard C. Hang, Matthew R. Pratt, & Jennifer A. Prescher. *Advanced chemical biology: chemical dissection and reprogramming of biological systems*. 1st ed., Wiley, 2023. ISBN: 978-3-527-34733-9

I have also identified several online courses that have a very complete set of resources (slides, videos, problem sets, etc.) that may also provide an introduction to biochemical concepts:

BU [BI/CH 421](#) (2020) - (properties of biological macromolecules & an intro to enzymes)

BU [BI/CH 422](#) (2021) - (metabolism and pathways)

MIT [5.07 OCW](#) (2013) - (carbohydrates and lipids, metabolism, cell energetics)

MIT [5.08 OCW](#) (2016) - (proteins/enzymes, natural products & secondary metabolites)

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, prohibit unauthorized duplication or retransmission of course materials. See [Library of Congress Copyright Office](#) and the [University Copyright Policy](#).

Schedule

Note that this schedule is tentative; topics and timeline may both be adjusted.

Chemical biology of macromolecules

Aug 25 – Aug 29 – introduction to chemical biology, & background. Van Vranken & Weiss, Ch. 1. (See also Heilman & Woski, Ch 1-2).

Sept 1 – Sept 15 – DNA and RNA. Van Vranken & Weiss, Ch. 2-3. (See also Heilman & Woski Ch 4, Ch 22-25).

[Pset 1 – Nucleic acids]

Sept 17 – Oct 8 – Proteins and other biological macromolecules. Van Vranken & Weiss, Ch. 5 & Ch. 7. (See also Heilman & Woski Ch 3-4, Ch 5, Ch 7.)

[Pset 2 – Proteins and other biological macromolecules]

[Exam 1 – Covering biological macromolecules]

Chemical biology of enzymes, secondary metabolites, and pathways

Oct 13 – Oct 29 – Enzyme chemistry. Van Vranken & Weiss, Ch 6. (See also Heilman & Woski, Ch 9-10.).

[Pset 3 – Enzyme catalysis]

Oct 31 – Nov 21 – Natural products, pathways, and signaling/regulation. Van Vranken & Weiss, Ch. 8 & 9. (See also Heilman & Woski, Ch. 11-12.)

[Pset 4 – Primary and secondary metabolism]

[Exam 2 – Covering enzymes and metabolism]

Final presentations

Dec 1 – Dec 5: student presentations

Evaluation

Core components

Component	Tentative Date	Weight
Problem set 1: DNA and RNA	Sep 15	10%
Problem set 2: Proteins & other macromolecules	Sep 29	10%
Problem set 3: Enzyme	Oct 24	10%
Problem set 4: Primary and secondary metabolism	Nov 14	10%
Exam 1: Biological macromolecules	Oct 6	20%*
Exam 2: Chemical reactions driving biology	Nov 21	20%*
Final presentation	Dec 1-5	10%
Recitation participation	---	10%

* Students will be given a class to revise exam errors for partial credit; exam keys will not be posted until after revisions are received.

Recitations

Recitations will focus on specific important chemical biology techniques and on papers that showcase those methods. Students will be expected to read the relevant paper (and any associated material) in advance; these will be provided 1-2 classes in advance.

Problem sets

Problem sets will be provided a week before their due date and returned at least two days before any exam. Collaboration is encouraged, and use of any resources is allowed, but the final answers should be formulated individually.

Exams

Exams are open-book and open-note, but no use of computers, phones, tablets, etc. is allowed. Exams will draw from the text, lectures, and recitations; concepts from earlier problem sets or exams may continue to appear in later assignments. Questions on exams will resemble problem set questions. Curves will be applied if needed. Students will be able to revise exam errors for partial credit, submitting them at the next class. Note that this means answer keys will not be posted until revisions are submitted. If you need accommodations or you have an unavoidable conflict, please contact Dr. Kenney as soon as possible.

Presentation

At the end of the semester, students will present a 15 minute talk on a chemical biology topic of interest. Guidelines on preparing a good scientific talk will be discussed later in the semester. Students are also expected to attend talks, ask questions, etc. (There will be food.)

Grading

85-100%: A- to A+. 70-84%: B- to B+. 55-69%: C- to C+. 40-54%: D- to D+. <40%: F.
If you believe there is an error in the scoring of a problem set or exam question, you may request a regrade by the end of the class after it is returned. Please identify the problem that you think was graded incorrectly. Note that the full problem set or exam *will* be re-examined.

Late submission of work

Problem sets submitted late without prior communication or extenuating circumstances will be evaluated, but the maximum grade on late assignments will drop to 90% one day late, 80% two days late, etc. Missed exams will get a 0% (if not excused.)

Attendance

Attendance to lectures will not be explicitly recorded, but lectures may contain content that is not on the distributed slides, and problem sets and exams will draw primarily from topics covered during class. Participation in recitations is evaluated – students will be expected to be able to discuss or explain components of papers, so frequent absence will be taken into account.

Use of ChatGPT and other generative AI tools

ChatGPT and other LLMs are *not* a reliable source for information on more advanced chemical biology topics. They can and will make superficially plausible (but false) claims and invent citations (or incorrectly attribute concepts to real citations); you are unlikely to catch subtle errors unless you are already familiar with the material. While they can absolutely be helpful

in some contexts, ChatGPT and other LLMs should not be *primary* tools for acquiring knowledge about or interpreting topics discussed in this course. If you choose to use them, you must document your use, you are responsible for evaluating the veracity of any statements and the existence of any sources, and you are responsible for ensuring that the correct primary literature is appropriately cited in any final materials.

Academic Integrity

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. All sources must be clearly cited, and all direct quotes (rare in scientific writing) must be clearly indicated. When describing others' work, you are expected to use your own words to paraphrase or summarize their findings, and to draw from multiple sources or incorporate your own interpretation as appropriate. During exams, no student may use any unauthorized materials during an exam (including use of computers, tablets, phones, etc.).

Violation of this policy may mean confiscation of the exam and a 0 for a grade on the exam.

See the official [academic integrity policy](#) for more information.

Additional university policies

Your Well-being Matters

Everyone will go through some challenging periods during college. You are encouraged to visit [Thrive@Pitt](#) to learn more about well-being and the many campus resources available to help you thrive.

However, If you or anyone you know experiences overwhelming academic stress, persistent difficult feelings and/or challenging life events, you are strongly encouraged to seek support. In addition to reaching out to friends and loved ones, consider connecting with a faculty member you trust for assistance connecting to helpful resources. The [University Counseling Center](#) is also here for you. You can call 412-648-7930 at any time to connect with a clinician.

If you or someone you know is feeling suicidal, please reach out to the University Counseling . You can also contact Resolve Crisis Network at 888-796-8226. If the situation is life threatening, call Pitt Police at 412-624-2121 or dial 911.

Equity, Diversity, and Inclusion

It is my goal to create and maintain a learning environment where students from all backgrounds and identities feel welcome, supported, and respected as they engage with this course. Please note that 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 [page](#).