

Chemistry 1810 Chemical Biology

Syllabus • Spring 2019 • University of Pittsburgh

Instructor: Professor Kazunori Koide

Office: Chevron Science Center, Room 1201 (12th floor)

Office Hours: MF 4:00-4:50 PM

E-mail: koide@pitt.edu; When you send an email message to me, use “Chem1810 Chemical Biology” as the subject line.

Class meetings

MWF 3:00-3:50 PM 154 CSC

Recitation W 4:00-4:50 PM 154 CSC

Course Description

This course is designed to teach biochemistry from a chemical and molecular perspective. Advancements 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. Throughout the course particular emphasis will be placed on the molecular interactions that underlie biological processes.

Suggested Reference Books

- David Van Vranken & Gregory Weiss, *Introduction to Bioorganic Chemistry and Chemical Biology*, 1st ed.; Garland Science: New York, 2013. Some course material may consist of advanced topics from published journal articles. Students can acquire these references online through the university library.
- John McMurry & Tadhg Begley, *The Organic Chemistry of Biological Pathways*, 2nd Ed.; Roberts and Company Publishers (www.roberts-publishers.com)

Attendance

New material will be introduced at each lecture period, and you are responsible for all material discussed in lectures. Exams will be centered on material presented in the course. An email notice of your expected absence is not necessary. Course participation in the classroom, particularly during students' presentations, will count toward your final grade.

CourseWeb

PDF files presented in class will be posted on CourseWeb typically within 2 days after each class period. In addition, materials (e.g., reading assignments and videos) and other activities may also be posted on course-web to help you prepare for each class.

Disability Resources

If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and Disability Resources and Services no later than the second week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify Disability Resources and Services, call (412) 648-7890 (Voice or TTD) to schedule an appointment. The Disability Resources and Services office is located in 140 William Pitt Union.

Academic Integrity

Students in this course will be expected to comply with University of Pittsburgh's Policy on Academic Integrity (<http://www.as.pitt.edu/fac/policies/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.

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 (<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

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Grading

The overall course grade will be based on the following distribution (dates subject to change). I will not accept late individual and group assignment.

Component Tentative Dates

Quiz: Amino acids and nucleic acids	Jan 23 (15 min)	5%*
Exam 1: TBA	Feb 1	20%
Exam 2: TBA	Mar 1	20%
Final Exam: TBA	Apr 24	20%
Literature Assignment Step 1	Feb 13	2%
Literature Assignment Step 2	Feb 20	5%
Presentation Step 1	Mar 6	3%
Presentation Step 2	Mar 27	5%
Presentation	Apr 3-19	15%
Participation – ongoing		5%

*The student must be able to draw the correct structures of 20 amino acids and 4 nucleic acids. To pass this course, the student must get 100%.

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 made in writing no later than the next class period after exams are returned. Attach a cover page identifying which problem(s) you believe were scored incorrectly. I will review the entire exam and return it promptly. This is the only mechanism by which an assigned exam grade will be reconsidered.

Material

1/7	Introduction
1/9	Overview of gene expression
1/11	Chemical biology techniques
1/14- 1/30	Metabolism of amino acids
2/1/19	Exam 1
Feb	Biosynthesis of amino acids
Feb	Fluorescence imaging
Feb	FMO theory, stereoelectronic effects, H-bonding, van der Waals/hydrophobic/electrostatic interaction, pi-pi stacking, protein-protein interaction
3/1/19	Exam 2
Mar	Chemical reactivity of biological molecules
Mar	DNA: aromaticity, acidity, basicity, N-glycoside bond, epigenetics, ribose conformation, Watson-Crick, Br-U, 8-oxoG, intercalators, ligation, replication, PCR, chemical synthesis, [2+2] cycloaddition, targeting DNA synthesis, as nucleophiles, DNA-binding drugs RNA: hydrolysis, SHAPE, 5'-capping, splicing, siRNA, antisense, RNA: translation, genetic code expansion, SELEX, mRNA display
Mar-Apr	Protein: structures, charges, arene-arene interaction, peptide-based drugs, chemical peptide synthesis, native ligation
Apr 3-19	Student presentations
4/24 2-2:50 PM	Final exam in the same room