

Chemistry 1810 – Chemical biology: Discoveries at the interface

Syllabus · Fall 2017 · University of Pittsburgh

Instructor: Professor W. Seth Childers
Office: Chevron Science Center, Room 801
Office Hours:
E-mail: wschild@pitt.edu

Class meetings
TTH 4:00-5:15
Lawrence Hall 121

Office Hours - Chevron Science Center 801
W1-2, T11-12, or by appointment

TA- Izzy Carnaval
icc8@pitt.edu
M11-12

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. Throughout the course particular emphasis will be placed on the molecular interactions that underlie biological processes.

Text

Van Vranken, David & Weiss, Gregory. *Introduction to Bioorganic Chemistry and Chemical Biology*, 1st ed.; Garland Science: New York, 2013.

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

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 and learning objectives. If you know you will miss a class, an email notice of your expected absence is appreciated.

Courseweb

Materials presented in class will be posted on Courseweb typically at least 2 days after each class period. In addition materials (e.g. reading assignments and videos) and other activities will 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

Chemistry 1810 – Chemical biology: Discoveries at the interface

Syllabus · Fall 2017 · University of Pittsburgh

(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. There will be no final exam for this course.

Component	Tentative Dates	
Exam 1: Chapter 1-4	Sep 28, 2017	25%
Exam 2: Chapter 5-6	Nov 2, 2017	25%
Exam 3: Chapter 7-9	Dec 5, 2017	25%
Chembio Literature Wiki: Glossary/Bio	Oct 24, 2017	1%
Chembio Wiki: Article Summary	Nov 14, 2017	1%
Chembio Wiki: Peer Review	Nov 21, 2017	1%
Finalized Chembio Wiki with Concept Video	Nov 30, 2017	20%
Chembio Wiki: Peer Learning and Review	Dec 7, 2017	2%

*No final exam will be given for this course.

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.

Chemistry 1810 – Chemical biology: Discoveries at the interface
Syllabus · Fall 2017 · University of Pittsburgh

Tentative Dates		Theme/Assignments
Week 1	8/29, 8/31	Central dogma, non-covalent interactions, DNA structure, DNA Nanomaterials (Origami)
Week 2	9/5, 9/7	Plasmids, recombinant DNA technology, sequencing technology, genome editing, expansion of the genetic alphabet - engineering new base pairs
Week 3	9/12, 9/14	RNA Structure, mRNA processing, riboswitches, RNA, transcription, high throughput DNA sequencing, RNA-seq, Chip-Seq siRNA, oligonucleotides as drugs
Week 4	9/19, 9/21	Translation, tRNAs, Genetic code expansion with unnatural amino acids
	9/26	Amino acid structure, protein secondary structure
Week 5	9/28	Exam 1: The Central Dogma (Chapters 1-4)
Week 6	10/3, 10/5	Metal interactions with proteins, leucine zipper and helical bundles, tertiary protein folds, peptide nanomaterials
Week 7	10/12	Protein functions, enzyme kinetics, enzyme inhibition mechanisms, small molecule binding interactions
Week 8	10/17, 10/19	Enzyme catalytic mechanisms, cofactors, computational design of enzymes, enzyme engineering
Week 9	10/24, 10/26	Activity based profiling, bioconjugation, fluorescent proteins, optogenetics, chemical induced proximity
	10/31	Signal transduction, writer-eraser-reader systems, protein interaction domains,
Week 10	11/2	Exam 2: Protein Structure and Function (Chapters 5-6)
Week 11	11/7, 11/9	Eukaryotic and Bacterial Signaling Systems, allosteric regulation scaffolding proteins,
Week 12	11/14, 11/16	Feedback loops and Boolean logic in signaling, Polyketides, Fatty Acids, and Lipid Signaling
Week 13	11/21	Terpenes natural products
Week 14	11/28, 11/30	Metabolic pathways, carbohydrate nomenclature, metabolic balances, metabolic engineering, introduction to glycobiology concepts
	12/5	Exam 3: Systems: Signaling, Polyketides, Terpenes, Carbohydrates
Week 15	12/7	Metabolic Pathways (Chapters 7-9) Finalize Chembio Wiki and Video Review