



CHEM 520A: Advanced Chemical Biology

Units: 2

Fall 2023 - T/Th - 9:30-10:50 am

Location: TRF 120B

Instructor: Matthew Pratt

Office: TRF114B

Office Hours: By appointment

Contact Info: matthew.pratt@usc.edu, (213) 740-3014

Course Description

CHEM 520A: Advanced Chemical Biology is designed for graduate students and advanced undergraduates who are interested in the interface of chemistry and biology of DNA, RNA, proteins, and lipids. This chemistry course will provide students with a solid understanding of both the fundamental biology of these critical biomolecules and the application of chemistry for their investigation and manipulation. The course will start with the function, chemistry, and integrity of DNA before moving onto transcription and RNA regulation as well as genome engineering. The class will then cover peptide and protein synthesis, directed evolution of protein function, cellular metabolism, and lipid chemistry and biology. Finally, the course will cover posttranslational modifications, protein modifications, and bioorthogonal chemistry. Overall, CHEM 520A will provide students with a firm foundation in the techniques, theories, and methods to investigate these topics in their own projects and critically interpret the work of other scientists in the field.

Learning Objectives

By the end of this course, students should be able to describe the basic biology of DNA, RNA, proteins, and lipids. They should also be able to recall how chemical biology techniques can be applied to investigate and manipulate these biomolecules and assess the appropriateness of different techniques in different experimental situations. Accordingly, they should be able to take the concepts presented in lecture and apply that knowledge to similar but different situations on homework and exams.

Prerequisite(s): None

Co-Requisite(s): None

Concurrent Enrollment: None

Recommended Preparation: CHEM 322a & b: Organic Chemistry, BISC 320: Molecular Biology, and BISC 330: Biochemistry (or equivalents)

Required Readings and Supplementary Materials

Advanced Chemical Biology (1st edition) edited by Hang, Pratt & Prescher. Available from Wiley-VCH or Amazon (<https://www.amazon.com/Advanced-Chemical-Biology-Dissection-Reprogramming/dp/352734733X>)

Description and Assessment of Assignments

Assignments in the course include exams, seminar attendance, and homework.

Participation

You are required to attend the Chemical Biology Seminar Series (Select Thursdays 12:30 - 1:30 pm). Each seminar attendance is worth 10 points. The seminar dates for Spring 2024 are: 2/1, 2/8, 2/15, 3/7 & 4/25. If you have another class at these times, you will be excused from this portion of the class.

Grading Breakdown

Your grade will be determined according to the following distribution:

Assessment Tool (assignments)	Points	% of Grade
Weekly Homework (15)	150	38%
Seminar Attendance	50	11%
Exams (2)	200	51%
TOTAL	400	100%

Grading Scale

Your grade will be determined using a curve established by the overall performance of all students in the class. This curve will only be used to move scores up. Guaranteed minimal final course-grades will be determined using the following scale:

Letter grade	%
A	93-100
A-	90-93.9
B+	87-89.9
B	83-86.9
B-	80-82.9
C+	Below 80%

Assignment Submission Policy

Each textbook chapter has associated homework questions. Students will be expected to answer these questions on a physical sheet of paper. The questions will be handed in at the beginning of the lecture covering the associated chapters. For example, questions from Chapter 2 will be due at the beginning of the lecture covering Chapter 2. Each set of homework questions will be worth 10 total points. No late homework will be accepted.

Grading Timeline

Graded homework and exams will be returned within 2 weeks of submission.

Course Specific Policies

Make-up Assignments: An excused absence from an assignment will be granted by the instructor only on the basis of proper documentation. For example, a missed assignment because of serious medical reasons will be excused only if a certification is provided by a physician.

Contesting Grades: Mistakes can be made during the grading process, and students will have the opportunity to contest grades; however, there is an explicit policy for doing so. A grade on an individual assignment must be contested within two weeks of receiving the grade. There will be no exceptions.

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Policy for the use of AI Generators

Not permitted

Since creating, analytical, and critical thinking skills are part of the learning outcomes of this course, all assignments should be prepared by the student working individually or in groups. Students may not have another person or entity complete any substantive portion of the assignment. Developing strong competencies in these areas will prepare you for a competitive workplace. Therefore, using AI-generated tools is prohibited in this course, will be identified as plagiarism, and will be reported to the Office of Academic Integrity.

Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the internet, or via any other media. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Course Evaluations

Course evaluation occurs at the end of the semester university-wide. It is an important review of students' experience in the class.

Course Schedule

	Week of Monday -	Readings/Preparation	Deliverables
Week 1	1/8/24	Tuesday: Chapter 17	Tuesday: Homework Chapter 17
Week 2	1/15/24	Tuesday: Chapter 18	Tuesday: Homework Chapter 18
Week 3	1/22/24	Tuesday: Chapter 19	Tuesday: Homework Chapter 19
Week 4	1/29/24	Tuesday: Chapter 20	Tuesday: Homework Chapter 20
Week 5	2/5/24	Tuesday: Chapter 21	Tuesday: Homework Chapter 21
Week 6	2/12/24	Tuesday: Chapter 22	Tuesday: Homework Chapter 22
Week 7	2/19/24	Tuesday: Exam #1	
Week 8	2/26/24	Tuesday: Chapter 23	Tuesday: Homework Chapter 23
Week 9	3/4/24	Tuesday: Chapter 24	Tuesday: Homework Chapter 24
Week 10	3/11/24	No class - Spring Break	
Week 11	3/18/24	Tuesday: Chapter 25	Tuesday: Homework Chapter 25
Week 12	3/25/24	No class	
Week 13	4/1/24	Tuesday: Chapter 26	Tuesday: Homework Chapter 26
Week 14	4/8/24	Tuesday: Chapter 27	Tuesday: Homework Chapter 27
Week 15	4/15/24	Tuesday: Chapter 28	Tuesday: Homework Chapter 28
Week 16	4/22/24	Tuesday: Chapter 29	Tuesday: Homework Chapter 29
Study Week	4/29/24	Tuesday: Chapter 30	Tuesday: Homework Chapter 30
Finals	5/6/24	Tuesday: Exam #2	

Statement on Academic Conduct and Support Systems

Academic Integrity:

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, compromises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see [the student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes

it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-5086 or (213) 821-8298

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or otfp@med.usc.edu

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.