



## **BISC 330L: Biochemistry**

**Units: 4**

**Spring Semester 2024**

Monday, Wednesday and Friday 11:00-11:50 a.m. (Section 13023), or 12:00-12:50 p.m. (Section 13024)

**Location:** Lecture: THH 101, Lab: ZHS 357

### **Instructors:**

**Dr. Xiaojiang Chen**

**Office:** RRI 119A

**Office Hours:** TBD

**Contact Info:** [xiaojiac@usc.edu](mailto:xiaojiac@usc.edu)

**Dr. Fabien Pinaud**

**Office:** RRI 204A

**Office Hours:** TBD

**Contact Info:** [pinaud@usc.edu](mailto:pinaud@usc.edu)

**Dr. Grayson Jagers**

**Office:** ZHS 256

**Office Hours:** TBD

**Contact Info:** [jagers@usc.edu](mailto:jagers@usc.edu)

### **Laboratory Manager:**

**Eric Noakes**

**Contact Info:** [enoakes@usc.edu](mailto:enoakes@usc.edu)

### **Email Communication:**

Please allow up to 24 hours for a response from the lecture and laboratory instructors. To ensure privacy, only student's USC email accounts may be used for email communications. Students are responsible for understanding the content of email messages that the instructor sends to their USC accounts. Therefore, each student must check their USC email regularly and make sure their account is not over quota, so new messages can be received.

### **Course Description**

Course Topics: Biochemical bonds and reactions. Interactions with water molecules. Structure/function of DNA, RNA, proteins, lipids and carbohydrates. Enzyme kinetics and mechanisms. Enzyme cofactors and vitamins. Enzyme regulatory strategies. Glucose oxidation and ATP production: glycolysis, citric acid cycle & oxidative phosphorylation. Glucose and O<sub>2</sub> production by photosynthesis in plant chloroplasts. Ribose biosynthesis from glucose by pentose phosphate pathway. Lipid catabolism by beta-oxidation. Mastery of these topics will provide students with a solid foundation in basic biochemical principles. Techniques used to study biochemical pathways will be presented in the context of these major biological mechanisms.

## Prerequisite

CHEM 322A

## Reading and Supplementary Materials

Berg, Tymocko & Stryer, BIOCHEMISTRY (9th, 2019)

BISC 330L Lab Manual (Provided for you online)

## Lectures

It is important to attend all of the lectures during the course and to take good notes for study. Prior to attending each lecture, it is important to have read the appropriate portions of the textbook. However, many of the lectures will contain new and additional information that is not in the textbook. Examinations will be based mainly on information given in the lectures. In studying for examinations, complete and accurate lecture notes are of prime importance.

The lecture slides posted on the course Blackboard internet site (<https://blackboard.usc.edu>), may contain material that is not in the lectures—and the lectures may contain information that is not conveyed in the Blackboard lecture summaries. The lecture slides, as posted on Blackboard, and the textbook are intended to be helpful, but auxiliary to the lectures. All course material, information, announcements and grades will be posted on Blackboard until the end of the semester.

## Exam Information

Midterm exams will be taken during the quiz section period. In case a midterm exam must be missed for legitimate reasons, discuss the situation with the course instructor **prior** to the exam, if possible. If an exam is missed for an emergency or for a valid health reason, the scores of the other two exams will be prorated to comprise your total point score. Rules governing exams are given in more detail in your Student Contract, which is also posted on the class website: <https://blackboard.usc.edu>.

In the event an error is made in the grading of your exam, a submittal of a description of the error with the exam should be returned Mr. Eric Noakes within a week after receiving your graded exam. After this time period, exams will not be regraded.

## Grading Breakdown

The course grade will be based upon **1000** possible points:

250 pts. Midterm 1

250 pts. Midterm 2

250 pts. Final Exam

250 pts. Laboratory (see lab syllabus for specific assignments)

## Grade Distributions

The following is an average of previous years' grade distributions. It is **not** meant to be definitive, but rather to set a general expectation. The final grade distribution for the 2023 spring semester will reflect both overall class performance, and the academic standards of the instructors.

A-range: 90.9 ±1.5%

B-range: 74.1 ±1.4%

C-range: 54.6 ±1.4%

## Course Schedule

Wk.	Date	Lecture Topic	Reading
1	Jan. 8 (XC)	Introduction: chemistry of life process	1.1-1.2
	Jan. 10	Water, pH and acid/base equilibria	1.3
	Jan. 12	DNA discovery & genomic revolution	1.4
2	Jan. 15	<b>No Lecture – MLK Day</b>	
	Jan. 17	Amino acid structures & properties	2.1
	Jan. 19	Primary structure of proteins	2.2
3	Jan. 22	Primary structure of proteins	2.3
	Jan. 24	Tertiary & quaternary structures	2.4 - 2.6
	Jan. 26	Protein purification methods	3.1
4	Jan. 29	Amino acid analysis & sequencing	3.2, 3.3
	Jan. 31	Protein structure determination	3.5
	Feb. 2	Protein structure determination	3.5
5	Feb. 5 (FP)	Enzymes: Basics	8.1 - 8.2
	Feb. 7	Enzymes: Transition State	8.3
	Feb. 9	Enzymes: Michaelis-Menten	8.4
6	Feb. 12	Enzymes: Inhibition and Catalytic Strategies (Part I)	8.5
	Feb. 14	Enzymes: Catalytic Strategies (Part II)	9.1 and 9.2
	Feb. 16	Enzymes: Regulatory Strategies	10
7	Feb. 19	<b>No Lecture – President's Day</b>	
	Feb. 21	Carbohydrates	11
	Feb. 23	Lipids and Cell Membranes	12.1 – 12.3
8	Feb. 26	Lipids and Cell Membranes	12.4 – 12.6
	Mar. 28	Membrane Pumps and Carriers	13.1-13.3
	Mar. 1	Membrane Channels	13.4-13.5
9	Mar. 4	Signal Transduction Pathways	14
	Mar. 6	Molecular motors: Myosin V structure and functions	9.4, 35-35.2
	Mar. 8	Molecular motors: Power stroke and muscle work	9.4, 35-35.2
	Mar. 10-17	<b>Spring Recess</b>	
10	Mar. 18 (GJ)	Introduction to Metabolism	15
	Mar. 20	Introduction to Metabolism	15
	Mar. 22	Glycolysis	16
11	Mar. 25	Glycolysis	16
	Mar. 27	Gluconeogenesis and The Citric Acid Cycle	16, 17
	Mar. 29	The Citric Acid Cycle	17
12	Apr. 1	Oxidative Phosphorylation	18
	Apr. 3	Oxidative Phosphorylation	18
	Apr. 5	Oxidative Phosphorylation	18
13	Apr. 8	Oxidative Phosphorylation	18
	Apr. 10	Photosynthesis	19
	Apr. 12	Photosynthesis	19
14	Apr. 15	Photosynthesis	19
	Apr. 17	The Calvin Cycle	20
	Apr. 19	The Calvin Cycle	20
15	Apr. 22	The Pentose Phosphate Pathway	21
	Apr. 24	Glycogen	22
	Apr. 26	Fatty Acid Metabolism	
	TBD	Final Exam	

**Exam Dates:**

Midterm 1: Tuesday, February 6, 4:00-4:50pm

Midterm 2: Tuesday, March 19, 4:00-4:50pm

Final Exam: TBD

**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).

**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, comprises 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](https://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto: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](mailto: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.