

**BISC 330L: Biochemistry
Lecture Syllabus, USC Spring 2020**

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 O₂ 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.

Lectures:

Monday, Wednesday and Friday 11:00-11:50 a.m. (Section 13023)
Monday, Wednesday and Friday 12:00-12:50 p.m. (Section 13024)
Room THH 101

Instructors:

Dr. Xiaojiang Chen
Email: xiaojiac@usc.edu, Office: RRI 119A, Office Hours: Wednesday 3-4pm

Dr. Fabien Pinaud
Tel: (213) 740-2262, Email: pinaud@usc.edu Office: RRI 204A, Office Hours: Tuesday 1-2pm

Dr. Grayson Jagers
Email: jagers@usc.edu Office: ZHS 256, Office Hours: Tuesday 12-1pm

Laboratory Manager:

Eric Noakes
Email: enoakes@usc.edu

Prerequisite: CHEM 322A (Organic Chemistry)

Textbook: Berg, Tymocko & Stryer, BIOCHEMISTRY (8th, 2015)
BISC 330L Lab Manual (Provided for you online)

Course Grades:

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)

Exam Dates:

Midterm 1: Tuesday, February 18, 4:00-4:50pm

Midterm 2: Tuesday, March 31, 4:00-4:50pm

Final Exam: TBD

Wk.	Date	Lecture Topic	Reading
1	Jan. 13 (XC)	Introduction: chemistry of life process	1.1-1.2
	Jan. 15	Water, pH and acid/base equilibria	1.3
	Jan. 17	DNA discovery & genomic revolution	1.4
2	Jan. 20	No Lecture – MLK Day	
	Jan. 22	Amino acid structures & properties	2.1
	Jan. 24	Primary structure of proteins	2.2
3	Jan. 27	Primary structure of proteins	2.3
	Jan. 29	Tertiary & quaternary structures	2.4 - 2.6
	Jan. 31	Protein purification methods	3.1
4	Feb. 3	Amino acid analysis & sequencing	3.2
	Feb. 5	Protein structure determination	3.6
	Feb. 7	Protein structure determination	4.1 - 4.2
5	Feb. 10	DNA replication & gene expression	4.3 - 4.4
	Feb. 12 (FP)	Enzymes: Basics	8.1 - 8.2
	Feb. 14	Enzymes: Transition State	8.3
6	Feb. 17	No Lecture – President's Day	
	Feb. 19	Enzymes: Michaelis-Menten; Inhibition	8.4 – 8.5
	Feb. 21	Enzymes: Catalytic Strategies	9
7	Feb. 24	Enzymes: Regulatory Strategies	10
	Feb. 26	Carbohydrates	11
	Feb. 28	Lipids and Cell Membranes	12.1 – 12.3
8	Mar. 2	Lipids and Cell Membranes	12.4 – 12.6
	Mar. 4	Membrane Channels & Pumps	13
	Mar. 6	Signal Transduction Pathways	14
9	Mar. 9 (GJ)	Introduction to Metabolism	15
	Mar. 11	Introduction to Metabolism	15
	Mar. 13	Glycolysis	16
	Mar. 15-22	Spring Recess	
10	Mar. 23	Regulation of Glycolysis	16
	Mar. 25	Gluconeogenesis	16
	Mar. 27	Glycolysis and Review	16
11	Mar. 30	The Citric Acid Cycle	17
	Apr. 1	The Citric Acid Cycle	17
	Apr. 3	Oxidative Phosphorylation	18
12	Apr. 6	Oxidative Phosphorylation	18
	Apr. 8	Oxidative Phosphorylation	18
	Apr. 10	Oxidative Phosphorylation	18
13	Apr. 13	Photosynthesis	19
	Apr. 15	Photosynthesis	19
	Apr. 17	Photosynthesis	19
14	Apr. 20	The Calvin Cycle	20
	Apr. 22	The Calvin Cycle	20
	Apr. 24	The Pentose Phosphate Pathway	20
15	Apr. 27	Glycogen	21
	Apr. 29	Fatty Acid Metabolism	22
	May 1	Review for Final Exam	
	TBD	Final Exam	

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 (with written documentation), 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, written 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.

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.

Email Communication:

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.

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct/>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu/> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international

graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu/> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

Statement For Students With Disabilities:

Students requesting academic accommodations based on a disability are required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP when adequate documentation is filed. Please be sure the letter is delivered to Dr. Mathews as early in the semester as possible. DSP is located in STU 301 and is open 8:30am–5:00pm, Monday through Friday. The phone number for DSP is (213) 740-0776. For more information, please visit the following link: http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html

BISC 330L – BIOCHEMISTRY

LABORATORY SYLLABUS & SCHEDULE

INSTRUCTIONAL LABORATORY MANAGER

Eric Noakes, M.S.

Office: ZHS 353

Email: enoakes@usc.edu

Phone: 213-740-6079

TEACHING ASSISTANTS

Please refer to your lab section information.

BLACKBOARD CONTENT

Lab materials will be available online through Blackboard. Supplemental lab information, lab quizzes, announcements, and grades should be accessed using blackboard. With your USC email username and password you will be able to access all course content on the secure site: <https://blackboard.usc.edu>. If you have technical issues please contact blackboard@usc.edu. It is your responsibility to stay up to date with all Blackboard announcements and content.

REQUIRED LABORATORY SUPPLIES

1. BISC 330L Lab Manual (Available on Blackboard).
2. Carbon Copy Laboratory Notebook
3. Lab Coat
4. Fine Point Permanent Marker

ATTENDANCE

You are required to attend all the weekly laboratory sessions in your registered section. You must remain for the entire lab session or until you are excused by your laboratory instructor. **APPOINTMENTS THAT WILL INTERFERE WITH YOUR REGULARLY SCHEDULED LAB SESSION SHOULD NOT BE MADE.**

LABORATORY POINT DISTRIBUTION

Lab Quizzes – 24 pts (8 x 3 pts each)

Formal Lab Report – 62 pts

Syllabus/Safety Form – 4 pts

Post-Lab – 90 pts (6 x 15 pts each)

Lab Final Exam – 70 pts

Total: 250

LABORATORY POLICIES

DURING LAB

You will be expected to come dressed in appropriate attire. All students should be wearing closed toe shoes; NO shorts should be worn in the lab. ALL students must wear a lab coat and other proper PPE while inside the lab. If you are not dressed in proper attire you will not be allowed to stay for lab.

Students are expected to come to lab prepared. This means you should have reviewed the experiment procedure **BEFORE** coming to lab. You should either print the procedure or write it in your lab manual **BEFORE** entering the lab. If you have a question regarding the experiment your instructor will ask you to bring your lab procedure with you. Stay on top of Blackboard announcements as well.

Students are expected to participate with the experiments, clean-up, and disposal of waste for every lab. In the instance that a lab station is left unsatisfactorily then **10 POINTS WILL BE DEDUCTED** from your overall grade **PER** observation. If a specific lab station cannot be identified then the **ENTIRE CLASS WILL BE DEDUCTED 10 POINTS.** It is the responsibility of everyone to ensure the lab is maintained.

POLICY ON LAB MAKE-UP OR SUBSTITUTION

If you missed your regular lab due to a serious illness or emergency which prevents you from attending school, you may attend another open lab within the same week. No make-up lab will be offered once the week is over. Please send an e-mail request to the Instructional Laboratory Manager within 24 hours of your missed lab to make arrangements for make-up of missed content.

If you need to make a lab substitution due to an unforeseen event, or religious holiday, send an e-mail request to the Instructional Laboratory Manager at least 48 hours in advance to acquire approval. **PROOF IS REQUIRED.** For all other occurrences other than the ones mentioned above please contact the Instructional Laboratory Manager as soon as possible. **THERE IS NO GURANTEE SPACE WILL BE AVAILABLE.**

If you are approved for lab make-up or substitution, it is **YOUR** responsibility to make sure your scores are properly recorded in Blackboard.

LAB QUIZZES

Each Student will take a quiz online through the Blackboard system PRIOR to their lab session. Lab quizzes will open every FRIDAY at 5pm and close every MONDAY at 11:59 pm of every week. Each quiz will be worth **3 points**. There will be no make-up lab quizzes.

You will have 15 minutes to complete the quiz. **YOU WILL HAVE UNLIMITED ATTEMPTS.** Quiz answers will be reviewed in lab.

NOTE: Once a quiz is submitted there will be no honoring of request to retake the quiz. There are no practice quizzes available for lab. It will be each student's responsibility to ensure they have completed all quizzes before the deadline.

POST LAB REPORTS

You will submit eight post-lab reports worth **15 points each** for the labs indicated on the lab schedule. Post lab reports are to be written in a carbon copy lab notebook and are due at the beginning of the following week's lab. If the post lab is not submitted at the start of lab it is considered late and will have a 20% point deduction. For each day the post-lab is handed in late, you will receive an additional 20% point deduction.

NOTE: The only computer generated items that are acceptable to be submitted with the post lab report are tables and graphs. They must be pasted into their appropriate sections to avoid any loss of points.

NOTE: If you miss lab and are not excused you will not be able to submit a post lab the following week when it is due.

FORMAL LAB REPORT

You are required to write a formal lab report covering labs 2-7. The lab report is due at the beginning of the lab period during the week indicated on the lab schedule. The formal lab report is worth **62 points**. The report must have a physical submission **AND** must be uploaded to "Turnitin" on Blackboard to be considered submitted on time. **AFTER A 10 MINUTE GRACE PERIOD THE REPORT IS CONSIDERED LATE.**

If you intend to submit your formal lab report late then it must be submitted by 4 pm the day after it was due (Both physical copy and upload to Blackboard). Lab reports submitted late will have a 30% reduction in score after grading. If the lab report is not submitted by 4pm the day it was due you will receive a "0" for the formal lab report, no exceptions.

LAB EXAM

There will be a lab final exam that will test your understanding of the topics and experimental procedures covered in the laboratory sessions. The lab final is worth **70 points**.

NO MAKE-UP EXAMS WILL BE GIVEN FOR THE LAB FINAL. You can take the exam in another lab section if you missed the exam due to **SERIOUS ILLNESS** or an **EMERGENCY** which prevents you from attending school. You must notify the

Instructional Laboratory Manager within 24 hours prior to or subsequent of the missed exam.

MISSED LAB: EXCUSES

If you miss lab due to a SERIOUS illness (e.g., admission to the hospital) or an emergency (e.g., traffic accident, fire, flood) and you could not attend school, you must notify the Instructional Laboratory Manager **no later than 24 hours** of the missed lab. A valid excuse must include names and phone numbers of involved parties for verification purposes. If you do not have a valid excuse or fail to provide it, you will receive zero points for that lab session.

Medical Excuses: A valid medical excuse must be in writing from your doctor. All medical excuses will be validated with your clinician. It should include your name, the doctor's name you saw, a written statement from the clinician, and contact information.

NOTE: Self Verification documentation from the Engemann Center is not sufficient to substantiate medical emergencies or issues that prevent your attendance for lab.

GRADES

All grades, lecture and lab assignments, are posted on Blackboard (<https://blackboard.usc.edu>) in their respective grade sections. It is the student's responsibility to notify your TA or the Instructional Laboratory Manager as soon as possible if errors are found or scores are missing within one week of posting.

The laboratory section will account for 25% of your final grade (250 points).

LABORATORY SCORE NORMALIZATION

If necessary, the laboratory scores will be normalized at the end of the semester to correct for differences in grading between teaching assistants.

SCHEDULE

WEEK	DATE	SCHEDULED EXPERIMENT EXAM ASSIGNMENT
1	Jan 13 – 17	No Labs this Week
2	Jan 20 – 24	Lab 1: Serial Dilutions and Pipetting Quiz 1 (Opens Friday)
3	Jan 27 – 31	Lab 2: Protein Extraction Quiz 2 (Opens Friday)
4	Feb 3 – 7	Lab 3: Spectrophotometric Quantification of Proteins I No Quiz <i>Submit Post Lab 1 (for Lab 2)</i>
5	Feb 10 – 14	Lab 4: Spectrophotometric Quantification of Proteins II Quiz 3 (Opens Friday)
6	Feb 17 – 21	Lab 5: Ion Exchange Chromatography Quiz 4 (Opens Friday) <i>Submit Post Lab 2 (for Lab 4)</i>
7	Feb 24 – 28	Lab 6: Ultrafiltration and Enzyme Kinetics Quiz 5 (Opens Friday) <i>Submit Post Lab 3 (for Lab 5)</i>
8	Mar 2 – 6	Lab 7: Final Analysis – SDS-Page Electrophoresis No Quiz
9	Mar 9 – 13	Scientific Writing (Mandatory Attendance) Review formal lab report formatting.
10	Mar 16 – 20	SPRING RECESS– NO LABS Quiz 6 (Opens Friday)
11	Mar 23 – 27	Lab 8: Protein Crystallization Quiz 7 (Opens Friday) FORMAL LAB REPORT DUE
12	Mar 30 – Apr 3	Lab 9: Photosynthesis Quiz 8 (Opens Friday) <i>Submit Post Lab 4 (for Lab 8)</i>
13	Apr 6 – 10	Lab 10: Cholesterol <i>Submit Post Lab 5 (for Lab 9)</i>
14	Apr 13 – 17	Final Exam Review (Mandatory Attendance) <i>Submit Post Lab 6 (for Lab 10)</i>
15	Apr 20 – 24	Lab Exam (Last Week of Labs)
16	Apr 27 – May 1	No Labs this Week
17	May 4 – 8	Study Days Exams
FINAL	May 12	Lecture Final 4:30pm – Good Luck!!