

BISC 330L: Biochemistry
Lecture Syllabus, USC Spring 2021

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.

Lecture Day/Time:

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

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

Instructors:

- Dr. Nancy Castro
Email: ncastro@usc.edu,
Office Hours: Tuesday and Thursday 11 AM to Noon

- Dr. Fabien Pinaud
Tel: (213) 740-2262, Email: pinaud@usc.edu
Office Hours: TBD

- Dr. Grayson Jagers
Email: jagers@usc.edu,
Office Hours: TBD

Office Hours: Office hours will be conducted through Zoom. Links will be provided at a later date.

Laboratory Manager:

Eric Noakes
Email: 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.

Prerequisite: CHEM 322A (Organic Chemistry)

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

Wk.	Date	Lecture Topic	Reading
	Jan. 15 (NC)	Introduction: chemistry of life process	1.1-1.2
1	Jan. 18	No Lecture – MLK Day	
	Jan. 20	Water, pH and acid/base equilibria	1.3
	Jan. 22	DNA discovery & genomic revolution	1.4
2	Jan. 25	Amino acid structures & properties	2.1
	Jan. 27	Primary structure of proteins	2.2
	Jan. 29	Primary structure of proteins	2.3
3	Feb. 1	Tertiary & quaternary structures	2.4 - 2.6
	Feb. 3	Protein purification methods	3.1
	Feb. 5	Amino acid analysis & sequencing	3.2, 3.3
4	Feb. 8	Protein structure determination	3.5
	Feb. 10	Protein structure determination	3.5
	Feb. 12	DNA replication & gene expression	4.1 - 4.7
5	Feb. 15	No Lecture – President's Day	
	Feb. 17 (FP)	Enzymes: Basics	8.1 - 8.2
	Feb. 19	Enzymes: Transition State	8.3
6	Feb. 22	Enzymes: Michaelis-Menten; Inhibition	8.4 – 8.5
	Feb. 24	Enzymes: Catalytic Strategies	9
	Feb. 26	Enzymes: Regulatory Strategies	10
7	Mar. 1	Carbohydrates	11
	Mar. 3	Lipids and Cell Membranes	12.1 – 12.3
	Mar. 5	Lipids and Cell Membranes	12.4 – 12.6
8	Mar. 8	Membrane Channels & Pumps	13
	Mar. 10	Signal Transduction Pathways	14
	Mar. 12	Wellness Day	
9	Mar. 15 (GJ)	Introduction to Metabolism	15
	Mar. 17	Introduction to Metabolism	15
	Mar. 19	Glycolysis	16
10	Mar. 22	Glycolysis	16
	Mar. 24	Glycolysis & Gluconeogenesis	16
	Mar. 26	The Citric Acid Cycle	17
11	Mar. 29	The Citric Acid Cycle	17
	Mar. 31	Oxidative Phosphorylation	18
	Apr. 2	Oxidative Phosphorylation	18
12	Apr. 5	Oxidative Phosphorylation	18
	Apr. 7	Wellness Day	
	Apr. 9	Oxidative Phosphorylation	18
13	Apr. 12	Photosynthesis	19
	Apr. 14	Photosynthesis	19
	Apr. 16	Photosynthesis	19
14	Apr. 19	The Calvin Cycle	20
	Apr. 21	The Calvin Cycle	20
	Apr. 23	The Pentose Phosphate Pathway	20

15	Apr. 26	Glycogen	21
	Apr. 28	Fatty Acid Metabolism	22
	Apr. 30	Wellness Day	
	TBD	Final Exam	

Exam Dates:

Midterm 1: Tuesday, February 16, 4:00-4:50pm

Midterm 2: Tuesday, March 30, 4:00-4:50pm

Final Exam: TBD (Final Exam Week May 5th through 12th, 2021)

Exam Information:

Exams will be provided on Blackboard. Information regarding the exams will be provided as those dates approach. Respondus Monitor and Lockdown Browser will be required for lecture exams.

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, 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.

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)

Lectures:

Lectures will be conducted through Zoom. Links will be provided through blackboard. 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.

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 and Schedule – Spring 2021

INSTRUCTIONAL LABORATORY MANAGER

Eric Noakes, M.S.

Office: Zoom (By Appointment)

E-mail: enoakes@usc.edu

LABORATORY INSTRUCTORS

Please see the 'Contacts' tab on the laboratory Blackboard site.

BLACKBOARD CONTENT

This laboratory course will be taught entirely online this semester due to the COVID-19 pandemic. You will access all course materials through the course Blackboard site. Your grades will be available through Blackboard as well. You will use your USC e-mail username and password to access Blackboard at this link: <https://blackboard.usd.edu>. If you have technical issues please contact: blackboard@usc.edu.

LABSTER ACCESS

Access to Labster lab simulations will be provided at no additional cost to you. You will access the assigned Labster simulations through the laboratory Blackboard page.

ATTENDANCE

Attendance is required for all scheduled lab sessions unless otherwise stated. You will access live labs via Zoom (link available on Blackboard). If your scheduled lab session falls on a Wellness Day, your lab lecture will be provided as a recording 24 hours early. Anything due on a Wellness Day will have its due date extended by 24 hours. Access to another section's live lab session will be available upon request when your regularly scheduled lab session falls on a Wellness Day (recommended but not required).

LABORATORY POINT DISTRIBUTION

Course Contract – 5 Points

Quizzes – 20 Points

Lab Report – 60 Points

Dishonesty Tutorial – 5 Points

Post-Labs – 100 Points

Lab Final – 60 Points

Total – 250 Points

Laboratory Policies

LAB MAKE-UP

Because you have three days to complete each quiz and four days to complete each post-lab, no late submissions or make-up labs will be offered except under extraordinary circumstances. It is your responsibility to submit documentation of your excuse to the instructional laboratory manager within 24 hours after the corresponding deadline. Your excuse will be validated by the lab manager and granted at their discretion. If you anticipate missing a quiz or lab due to a religious holiday or any other reason, you must contact the lab manager at least one week in advance to obtain approval. Please note that if the documented excuse does not cover all three or four days of an assignment, your request will be denied. If you miss the lab final due to a serious illness or other allowable reason, you must contact the lab manager within 24 hours of the missed exam to have your excuse validated and a makeup exam given.

ANNOUNCEMENTS

It is your responsibility to keep up with all Blackboard announcements. These announcements will contain critical course information, including any potential adjustments to the schedule. There will be a weekly overview announcement each Friday at 5:00pm.

LAB QUIZZES

Pre-lab quizzes will be posted each Friday at 5:00pm prior to the lab it covers. Quizzes will cover content from the lab presentation slides, which will also be posted Friday at 5:00pm. You should study the lab presentation slides prior to attempting the quiz. You will have 15 minutes to complete each quiz. Multiple attempts will not be permitted. The quiz must be completed by Monday at 5:00pm. Each quiz is worth 2 points.

LAB SIMULATIONS

Each week you will access a simulation through Labster. The simulations contain questions which will be scored by the program, generating a performance score along with a completion score. Your performance score will not count toward your lab grade. Only a 100% completion score will be required. Failure to complete the lab simulation will result in a score of zero for the corresponding post-lab assignment.

POST-LABS

Post-lab assignments will be made available each Monday at 5:00pm and be due each Friday at 5:00pm. Post-labs will cover material from both the lab presentation slides and the lab simulations. Each post-lab is worth 10 points. Failure to complete the corresponding lab simulation will result in a score of zero for the post-lab assignment.

LAB REPORT

You will submit a formal lab report covering Labs 2-7. Please see the 'Lab Report Guidelines' document for details. The lab report will be due Friday 4/2/2021 at 5:00pm and is worth 60 points.

LAB FINAL

At the end of the semester there will be a comprehensive lab final. The exam will cover concepts and techniques learned throughout the semester. The lab final is worth 60 points.

GRADES

All lab grades will be posted on Blackboard within one week of their deadlines. It is your responsibility to notify your lab instructor of any grading errors within one week of their posting. The laboratory section will account for 25% of your total grade in the course.

ZOOM CALLS

When accessing live lab sessions via Zoom, you must be logged in with your USC credentials. Personal accounts will not be permitted into course Zoom rooms.

TIME ZONE

All scheduled events and deadlines given in this syllabus and on Blackboard correspond with the local time in Los Angeles, California. This is Pacific Standard Time (PST) until 3/14/2021 at 2:00am when we switch to Pacific Daylight Time (PDT).

DSP ACCOMMODATIONS

Any student requesting academic accommodations must register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please submit this letter to the instructional laboratory manager as early in the semester as possible (and at least one week prior to a quiz or exam to be considered).

LAB SCORE NORMALIZATION

Lab scores may be normalized at the end of the semester to correct for differences in grading between the lab instructors.

ACADEMIC DISHONESTY

You must comply with all university, department, and course policies regarding academic dishonesty. Course-specific policies will be given in the announcements as needed. You may not post any course content online under any circumstances. This includes services like Chegg and Course Hero, among others. We will enforce academic dishonesty policies to the fullest extent possible, which may result in consequences anywhere from an F in the course to expulsion from the university.

Schedule

Week	Dates (Wellness)	Scheduled Labs Simulations	Assignments (points)
1	1/15	Welcome Announcement	None
2	1/18 – 1/22	Lab Introduction and Orientation <i>Lab Safety</i>	Course Contract (5) Dishonesty Tutorial (5) Quiz 1 (2)
3	1/25 – 1/29	Lab 1: Serial Dilutions and Pipetting <i>Pipetting</i>	Post-Lab 1 (10) Quiz 2 (2)
4	2/1 – 2/5	Lab 2: Protein Extraction <i>Protein Denaturation</i>	Post-Lab 2 (10) Quiz 3 (2)
5	2/8 – 2/12	Lab 3: Quantification of Proteins I <i>Pigment Extraction</i>	Post-Lab 3 (10) Quiz 4 (2)
6	2/15 – 2/19	Lab 4: Quantification of Proteins II <i>ELISA</i>	Post-Lab 4 (10) Quiz 5 (2)
7	2/22 – 2/26	Lab 5: Ion Exchange Chromatography <i>Parkinson's Disease</i>	Post-Lab 5 (10) Quiz 6 (2)
8	3/1 – 3/5	Lab 6: Ultrafiltration and Enzyme Kinetics <i>Enzyme Kinetics</i>	Post-Lab 6 (10) Quiz 7 (2)
9	3/8 – 3/12 (3/12)	Lab 7: SDS-PAGE Electrophoresis <i>Gel Electrophoresis</i>	Post-Lab 7 (10) Quiz 8 (2)
10	3/15 – 3/19	Lab 8: Protein Crystallization <i>Protein Synthesis</i>	Post-Lab 8 (10) Quiz 9 (2)
11	3/22 – 3/26 (3/23)	Lab 9: Photosynthesis <i>Electron Transport Chain</i>	Post-Lab 9 (10) Quiz 10 (2)
12	3/29 – 4/2	Lab 10: Cholesterol <i>Hematology</i>	Post-Lab 10 (10) Lab Report (60)
13	4/5 – 4/9 (4/7)	Final Review	None
14	4/12 – 4/16	Lab Final Exam	Lab Final (60)
15	4/19 – 4/23 (4/22)	No Lab	None
16	4/26 – 4/30 (4/30)	No Lab	None
17	5/3 – 5/7	Study Days / Final Exams	None
18	5/10 – 5/14	Final Exams / Commencement	None