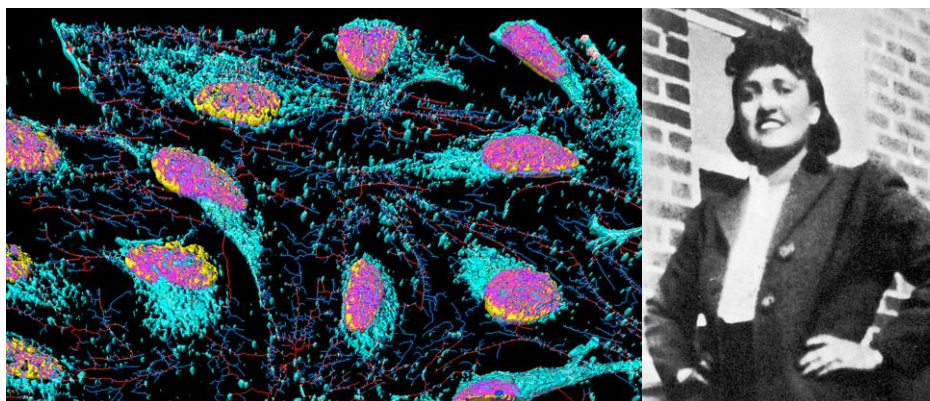


# BISC-220 (Cell Biology and Physiology) Lecture Syllabus

University of Southern California (USC), Summer 2023



*HeLa cells (left) are considered to be “immortal” cells that are part of a cell lineage grown from the cancer cells harvested from the cervix of a woman named Henrietta Lacks (right). While these cells have served as a powerful tool for in vitro molecular biology research for many decades, the story behind their initial collection exists at the (at times painful) intersection between bioethics and social justice in United States history. You can learn more about Henrietta’s story from the book “The Immortal Life of Henrietta Lacks” by Rebecca Skloot, which includes several quotes and anecdotes from surviving members of the Lacks family.*

Left Image: [HeLa cells imaged with fluorescent microscopy](#), Right Image: [Henrietta Lacks](#)

## Summary and Purpose

The overarching goal of this course is to provide biology and other life science majors with the necessary foundations in *molecular and cellular biology* and *mammalian physiology*. Topics explored will include (but are not limited to): the molecular composition of prokaryotic and eukaryotic cells, the central dogma describing the processes of DNA transcription and translation, the cell cycle and cell division, cell metabolism and enzyme kinetics, and surveys of mammalian physiological systems. Recommended prerequisites include high school-level biology and general chemistry.

## Learning Objectives

By the end of the semester, students will be able to:

- **Describe** the ways in which molecular and cellular structures influence their function in the context of specific physiological systems.
- **Illustrate** the relationship between enzymes that catalyze essential biochemical reactions such as those that occur during cellular respiration and photosynthesis.
- **Identify** key cellular structures, tissues and organs that work synchronously to coordinate bodily responses and maintain homeostasis.
- **Explain** the consequences of cellular dysfunction at the physiological level, and the impacts on this dysfunction on (human) health and disease development.

**Instructor:** Rita Barakat [“REE-duh BEAR-uh-CAT”, she/ her], PhD, [rbarakat@usc.edu](mailto:rbarakat@usc.edu)

**Lectures:** Tuesdays - Fridays, 10:00 am - 12:00 pm in HNB 100 (also simulcast and recorded via Zoom)

**Office Hours:** Wednesdays, 2:30 - 4:00 pm in SGM 722, OR by appointment via Zoom (appointments must be made at least 24 hours in advance)

**Laboratory Director:** Brett Spatola, PhD, [spatola@usc.edu](mailto:spatola@usc.edu)

**Office Hours:** ZHS 362, open-door policy

**Graduate Student Teaching Assistant:** TBD

**Laboratory:** Tuesdays and Wednesdays from 1:00 - 3:50 pm in ZHS 365

**Office Hours:** TBD

**Textbook:** *Campbell Biology (12<sup>th</sup> Edition)*, by Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky and Rebecca Orr. Published by Pearson, ISBN: 9780135988046.

## Assigned Readings

All assigned readings listed on the course syllabus are recommendations, but are not required readings. Exam questions will not be based on information that is only included in the textbook, though information presented in lectures will be aligned to and overlap with information included in these assigned readings.

## Lectures

All lectures will be held in-person in the Hedco Neuroscience Building (HNB), Room 100. Lectures will also be streamed live and recorded via Zoom, and the Zoom meeting information will be made available on the course Blackboard page. Lectures take place live on Tuesdays through Fridays from 10:00 am - 12:00 pm (PT), as per the USC Summer 2023 Schedule of Classes. All lectures will be recorded and automatically made available via the course Blackboard page within 24 hours of the live lecture broadcast.

Attendance at lecture is not mandatory, however, unforeseen technical issues may result in a delay in uploading or complete loss of a lecture recording, and thus, it is in your best interest to attend the live in-person lectures whenever possible. Recurring schedule conflicts with live lectures require a formal petition from the Registrar's Office, please contact the course instructor and lab director if you anticipate that you will have this kind of conflict with the lecture (or lab) portions of the course.

## Laboratory

Please make sure to review the associated *Laboratory Course Syllabus/ Manual* (to be posted on the laboratory section course Blackboard page) to ensure that you have all the necessary information and materials for the lab portion of the course. Attendance in the lab section of the course is mandatory, and failure to attend lab sections will result in a significant loss of lab section points. Any foreseeable conflict(s) with lab sections should be indicated to the course lab director and the teaching assistant for that section in writing as soon as possible to avoid loss of lab section points.

## Exams

Content: The four exams will be based on content presented in the lecture portion of the course. While the exams are not strictly "cumulative", the nature of the course content is such that understanding of foundational concepts presented early in the course will be necessary for understanding future topics. Thus, it is recommended that you review select topics from previous sections of the course prior to each exam.

Dates: Exams will take place in-person in the regular lecture hall (HNB 100), unless otherwise noted. Students with OSAS-approved accommodations will be notified in advance of any alternative locations. Please mark the following dates and times for the four lecture exams in your calendar.

**Lecture Exam 1: Friday (5/26) from 10:00 - 11:00 am (PT) in HNB 100**

**Lecture Exam 2: Tuesday (6/6) from 10:00 - 11:00 am (PT) in HNB 100**

**Lecture Exam 3: Friday (6/16) from 10:00 - 11:00 am (PT) in HNB 100**

**Lecture Exam 4: Friday (6/23) from 10:00 - 11:00 am (PT) in HNB 100**

See the *Absences, Extensions and Make-ups* and *Technology* sections below for more information on the administration of lecture exams. All exam-related accommodations must be documented through OSAS prior to the administration of the exam.

Regrade Policy: Exam regrade requests will only be accepted if they are submitted in writing within 24 hours of receiving your exam grade and include the information in the *Exam Regrade Request Form*, which can be found on the course Blackboard page.

## Grading

Your overall course grade will be broken down into the following categories/ point values, for a total of *1000 points*. There are no extra credit opportunities in this course, so please do not ask about them.

Deliverable	Quantity	Individual Points	Total Points
Lecture Exams	4	160	640
Lecture Quizzes	5	12	60
Laboratory Exam	1	100	100
Laboratory Assignments	TBD	TBD	200
<b>TOTAL POINTS</b>	<b>1000</b>		

It is not our intention to curve course grades, however, there historically have been independent curves for each exam. Please note that any curves are not indicative of the final course grades, as these curves will vary based on overall course performance on individual exams and in lab sections.

## Communication

If you ever need to communicate with the course instructor outside of class, please visit during scheduled office hours, or you can send an email with **your name and “BISC-220” in the subject line** to [rbarakat@usc.edu](mailto:rbarakat@usc.edu) to make an appointment for office hours or share written inquiries. All emails sent after 6:30 pm (PT) may not receive a response until the following day. In general, all emails sent during a weekday (Monday - Friday) will receive a response within 24 hours, and all emails sent during a weekend (Saturday - Sunday) will receive a response within 48 hours, with some exceptions for holidays.

It is strongly recommended that you check in with the course instructor and/ or lab director at least once throughout the semester in office hours, and we recommend that you set up an appointment at least 24 hours in advance to best accommodate your schedule. Questions about lecture content should be first directed to the teaching assistant, and if they are unable to answer your question and/ or if you would like further clarification, you may contact the course instructor and/ or lab director. All questions about grading and/ or exam or other schedule conflicts should be directed to the course instructor and lab director. The teaching assistant will not respond to any grading-related inquiries.

## Absences, Extensions and Make-ups

**Please read this section carefully, and if you have any questions about these policies, do not hesitate to reach out to the instructor ([rbarakat@usc.edu](mailto:rbarakat@usc.edu)) and the laboratory director ([spatola@usc.edu](mailto:spatola@usc.edu)).**

There are absolutely no extensions, make-up exams or make-up lab assignments in this course, except in the case of certain extenuating (and documented) circumstances.

- If you miss one exam in the course for a valid (documented) reason, your exam grade will be an average of your other three exam scores. Otherwise, you will receive a “0” for the missed exam.
- If you miss the final exam in the course, you will receive an Incomplete ( I ) grade for the course.
- If you miss two or more exams for valid (documented) reasons, you will receive an Incomplete ( I ) grade for the course.

As we will be conducting the course in-person, it is important that you follow the guidelines below as it relates to your physical health and well-being. Despite the lack of restrictive public health policies and requirements in-place, COVID-19 and other infectious diseases are still prevalent in the community, so in order to protect yourself and your classmates, please make sure to do the following:

- **If you feel sick, notify the lab director and teaching assistant via email immediately and do not attend the lecture or laboratory sections in-person.**
- Explain your *valid reason* for being absent (physical/ mental health-related or family emergency) and include relevant documentation to verify your illness or injury.

- Provide information about how you intend to *stay on top of the information* presented in the section(s) you missed (i.e. scheduling a visit for office hours with the instructor, lab director and/ or teaching assistant).

### **Technology**

A computer with stable internet access and the latest version of [Zoom](#) installed are strongly recommended for full participation in this course. Please take the necessary steps before each class to ensure that all these technological requirements are met. If you have any questions, comments or concerns regarding these technological requirements, please contact the course instructor, lab director and if necessary, [Information Technology Services](#) (ITS, [consult@usc.edu](mailto:consult@usc.edu)) as soon as possible so that we can help to accommodate your needs.

### **Diversity, Equity and Inclusion**

The BISC-220 faculty and teaching assistants take issues regarding diversity, equity and inclusion very seriously when it comes to curricula, student engagement and beyond. As a result, we expect you to be kind, courteous, patient and open-minded at all times during your participation in this course, and to be empathetic towards your peers and instructors, as their lived experiences and beliefs may differ from yours but are equally important and valid. If you or a colleague in the course is concerned about any harassment, discrimination or any other troubling behavior, please notify the course instructor and/ or lab director immediately. In addition, the [Student Health Center](#), the [Ombuds Office](#) and [Title IX Office](#) are all resources available to you to address issues related to harassment and discrimination of any kind.

### **Special Accommodations**

If you require any special accommodations (including, but not limited to: closed captions during discussion sections via Zoom/ Google Slides, additional time to complete written exercises and quizzes, alternative assignments due to a physical or mental/ psychological condition, etc.), please let the course instructor and lab manager know so we can do our best to accommodate your needs. In addition, please ensure that you are registered with the [Office of Student Accessibility Services \(OSAS\)](#) so that your accommodations are met in a timely manner.

### **Academic Integrity**

There is a [zero-tolerance policy](#) for any cheating or plagiarism of any kind in this course. Those who are caught engaging in this breach of academic conduct will automatically receive a [zero grade for the assignment in question](#), and potentially other consequences as dictated by [USC Code of Ethics](#).

**Lecture Calendar** (*this calendar is subject to change*)

Week	Lecture	Date	Topic(s)	Optional (Textbook) Reading
1	1	Wednesday, 5/17	Course Overview, Chemistry Review and Macromolecules	Chapters 1 - 5
	2	Thursday, 5/18	The Cell and Membrane-bound Organelles	Chapter 6
	3	Friday, 5/19	Semipermeable Membranes and Intercellular Transport	Chapter 7
2	4	Tuesday, 5/23	Intracellular Signaling and Gene Expression	Chapter 11
	5	Wednesday, 5/24	Cellular Respiration	Chapters 8 - 9
	6	Thursday, 5/25		
		Friday, 5/26	Lecture Exam 1 (covering Lectures 1 - 4)	
3	7	Tuesday, 5/30	Photosynthesis	Chapter 10
	8	Wednesday, 5/31	Enzyme Kinetics	Chapter 5
	9	Thursday, 6/1	DNA Replication and The Central Dogma	Chapters 17 - 18
	10	Friday, 6/2	The Cell Cycle and Cell Division	Chapters 12- 13
4		Tuesday, 6/6	Lecture Exam 2 (covering Lectures 5 - 10)	
	11	Wednesday, 6/7	The Cardiovascular System	Chapter 42
	12	Thursday, 6/8	The Respiratory System	
	13	Friday, 6/9	The Immune System	Chapter 43
5	14	Tuesday, 6/13	The Renal System	Chapter 44
	15	Wednesday, 6/14	The Endocrine System	Chapter 45
	16	Thursday, 6/15	The Reproductive System	Chapter 46
		Friday, 6/16	Lecture Exam 3 (covering Lectures 11 - 14)	
6	17	Tuesday, 6/20	The Nervous System	Chapters 48 - 49
	18	Wednesday, 6/21		
	19	Thursday, 6/22	The Musculoskeletal System and Muscle Contraction	Chapter 50
		Friday, 6/23	Lecture Exam 4 (covering Lectures 15 - 19)	

## B. Laboratory Syllabus

Lab Manager: Brett Spatola, PhD  
[spatola@usc.edu](mailto:spatola@usc.edu)  
Office hours: ZHS 362, open door policy

### Laboratory Schedule:

Lab #	Date	Laboratory	Assignment
1	May 18	Lab safety and syllabus	
2	May 23	Macromolecules	
3	May 25	Experimental Design	Scientific reading due
4	May 30	Enzymes	
5	June 1	Photosynthesis and pigment Extraction	Enzyme post-lab due
6	June 6	Fermentation	Photosynthesis post-lab due
7	June 8	Blood types and antibodies	
8	June 13	Cell membrane and transport	Fermentation lab report due
9	June 15	DNA and restriction enzymes	
10	June 20	Cardiovascular function	DNA post-lab due
11	June 22	Classic Literature Presentation	
12	June 27	Lab exam	

Lab schedule may be subject to change.

### Lab point distribution:

The laboratory portion (**300 points**) will count for **30%** of your final course grade, distributed as follows:

- 🌐 Lab manual and participation– 80 pts (4 x 10 x 2)
- 🌐 Post-lab assignments – 30 pts
- 🌐 Scientific Reading – 15 pts
- 🌐 Lab Report – 40 pts
- 🌐 Presentation – 30 pts
- 🌐 Lab Exam – 105 pts

Lab scores:

Scores for all the lab assignments will be posted on Blackboard – <https://blackboard.usc.edu/>, under your **LAB SECTION**. It is the student's responsibility to immediately notify their Lab Instructor or Lab Manager in the event of any mistakes, so please check your Blackboard scores weekly.

Lab attendance:

You are required to attend during the scheduled lab time. It is a student's responsibility to follow up with their Lab Instructor if they have any questions related to specific lab activities.

Post-lab assignments:

You will have several homework/post-lab assignments, based on the material you learned in the lab, or data obtained in your lab experiments. Assignments will be posted on Bb.

Lab report:

After one of the lab activities you will have to write a scientific lab report. Lab report guidelines will be posted on Bb in the beginning of the semester. Lab report will be submitted on Blackboard through the [turnitin link](#).

Presentation:

This assignment will be done in groups of 2-3. You will have to prepare PPT slides and present during the lab. Detailed guidelines will be posted on Bb.

Lab exam:

The cumulative lab exam will test your understanding of the topics, concepts and activities covered during the entire semester. It will consist of multiple choice questions, T/F, fill in the blanks, matching and/or free response.

It is your responsibility to take the lab exam during the scheduled exam time. Accommodations may be made only if official documentation is presented to the lab instructor/lab manager.