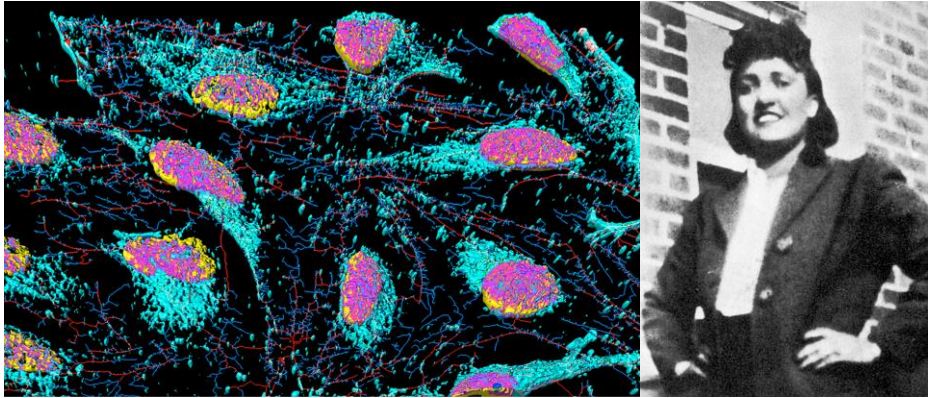


BISC-220 (Cell Biology and Physiology) Lecture Syllabus

University of Southern California (USC), Spring 2024



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

Lectures: Tuesdays and Thursdays, 8:00 am - 9:20 am in SAL 101 (also simulcast and recorded via Zoom)

Office Hours: (Most) Thursdays, 1:00 - 2:00 pm in SGM 722, *OR* by appointment in-person or via Zoom (appointments must be made *at least 24 hours in advance*)

Laboratory Director: Brett Spatola, PhD, spatola@usc.edu

Office Hours: ZHS 362, open-door policy

Graduate Student Teaching Assistant: **TBD**

Laboratory: Tuesday-Friday

Office Hours: **TBD**

Textbook: *Campbell Biology (12th 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 SAL 101. 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 and Thursdays as per the USC Spring 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. In-person 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.

Quizzes

Throughout the course, five quizzes will be administered via Blackboard to assess your understanding of the material presented in lecture during that week. Quizzes will become available on Fridays at 12:00 pm (PT) and will be due (and no longer be available) by the next Tuesday at 10:00 am (PT). You may use your lecture notes, the textbook or other resources to complete these quizzes, however, we strongly encourage you to treat these quizzes as “mini” exams and prepare accordingly. The style, format and difficulty level of the quiz questions are designed to be similar to exam questions, and thus, these quizzes are meant to serve as “problem sets” that provide you with an opportunity to practice and prepare for the exams. As with all other assignments in the class, there are no make-ups or extensions for quizzes, unless you provide a valid reason for missing a quiz in writing. While there will be six quizzes administered altogether, your lowest quiz score will be dropped from your final grade.

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 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, Feb 9 from 2:00 – 3:00 pm PT

Lecture Exam 2: Friday, Mar 8 from 2:00 – 3:00 pm PT

Lecture Exam 3: Friday, Apr 5 from 2:00 – 3:00 pm PT

Lecture Exam 4: Wednesday, May 1 from 8:00 – 9:00 am PT

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.

Grading

Your overall course grade will be broken down into the following categories/ point values, for a total of 500 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	150	600
Lecture Quizzes	13	3	39
Laboratory Exam	1	100	100
Laboratory Assignments	7	N/A (points vary)	261
TOTAL POINTS		1000	

It is not our intention to curve course grades, however, a curve may be applied to final grades depending on the grade distribution. Please note that any advisory curves posted throughout the term 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 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) and the laboratory directory (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. You must also ensure that you are able to access the course page on [Blackboard](#). 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) 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*)

Date	Day	Topic	Campbell Biology – 11 th Ed.	Lecturer
Jan 9	Tu	01 Introduction; Biomolecules	Ch 1, Ch 2, Ch.4, Ch 5	Barakat
Jan 11	Th	02 Water	Ch 3	Barakat
Jan 16	Tu	03 The Cell 1	Ch 6	Barakat
Jan 18	Th	04 The Cell 2	Ch 6	Barakat
Jan 23	Tu	05 Cell membranes	Ch 7	Barakat
Jan 25	Th	06 Cell communication 1 *	Ch 11	Barakat
Mar 30	Tu	07 Cell communication 2	Ch 11	Barakat
Feb 1	Th	08 Metabolism 1	Ch 8	Barakat
Feb 6	Tu	09 Metabolism 2	Ch 8	Barakat
Feb 8	Th	10 Metabolism 3	Ch 9	Barakat
Feb 9	F	<i>EXAM 1 (lectures 1-7)</i>	-----	-----
Feb 13	Tu	11 Metabolism 4	Ch 9	Barakat
Feb 15	Th	12 Photosynthesis	Ch 10	Barakat
Feb 20	Tu	13 The cell cycle; Mitosis	Ch 12	Barakat
Feb 22	Th	14 Microtubules **	Ch 12	Barakat
Feb 27	Tu	15 Meiosis	Ch 13	Barakat
Feb 29	Th	16 Cardiovascular system 1	Ch 42.1 - 42.4	Barakat
Mar 5	Tu	17 Cardiovascular system 2	Ch 42.1 - 42.4	Barakat
Mar 7	Th	18 Respiration	Ch 42.5 - 42.7	Barakat
Mar 8	F	<i>EXAM 2 (lectures 8-15)</i>	-----	-----
Mar 12	Tu	<i>Spring Break</i>	-----	-----
Mar 14	Th	<i>Spring Break</i>	-----	-----
Mar 19	Tu	19 Immunity 1	Ch 43	Barakat
Mar 21	Th	20 Immunity 2	Ch 43	Barakat
Mar 26	Tu	21 Fluid and electrolyte balance 1	Ch 44	Barakat
Mar 28	Th	22 Fluid and electrolyte balance 2	Ch 44	Barakat
Apr 2	Tu	23 Endocrine system 1	Ch 45	Barakat
Apr 4	Th	24 Endocrine system 2	Ch 45	Barakat
Apr 5	F	<i>EXAM 3 (lectures 16-22)</i>	-----	-----
Apr 9	Tu	25 Reproduction 1	Ch 46	Barakat
Apr 11	Th	26 Reproduction 2 ***	Ch 46	Barakat
Apr 16	Tu	27 Nervous system 1	Ch 48	Barakat
Apr 18	Th	28 Nervous system 2	Ch 49	Barakat
Apr 23	Tu	29 Motor system 1	Ch 50.5	Barakat
Apr 25	Th	30 Motor system 2	Ch 50.5	Barakat

* Friday, January 26 is the last day to drop without a mark of W and with tuition refund

** Friday, February 23 is the last day to drop without a mark of W and without tuition refund

*** Friday, April 5 is the last day to drop with a mark of W

May 1	W	<i>EXAM 4 (lectures 33-43); 8AM</i>
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B. Laboratory Syllabus

Laboratory Schedule

Lab #	Date	Lab topic	Assignment
	Jan 9 - 12	No lab this week	
1	Jan 16 - 19	Lab Safety	Macromolecules labster
2	Jan 23 - 26	Food Macromolecules I	Scientific reading + questions
3	Jan 30 – Feb 2	Food Macromolecules II/Experimental Design	Unknown protein post-lab
4	Feb 6 - 9	Enzymes	Enzyme results post-lab
5	Feb 13 - 16	Cell Membrane/Transport	Peer review + questions
6	Feb 20 - 23	Photosynthesis	Chromatography post-lab
7	Feb 27 – Mar 2	DNA/Restriction enzymes	Restriction digest post-lab
8	Mar 6 - 9	Fermentation	Lab report assigned
	Mar 13-16	NO LABS—Spring Break	
9	Mar 20 - 23	Cardiovascular Function During Exercise	Cardiovascular labster
10	Mar 27 – Mar 30	Blood/Blood typing	Lab report due; Antibodies labster
11	Apr 3 - 6	Nervous System	Nervous system labster
	Apr 10 – 13	Lab exam	
	Apr 17 - 20	Presentations	
	Apr 24 - 27	Presentations	

Some minor changes might occur during the semester.

Laboratory Point Distribution

The laboratory portion (361 points) will count for ~36% of your final course grade, distributed as follows:

Activity	Points
Labster simulations	40 (10 x 4)
Lab manual	44 (11 x 4)
Lab participation	44 (11 x 4)
Post-lab assignments	40 (10 x 4)
Scientific reading + questions	13
Lab report	40
Peer review + questions	10
Lab exam	100
Presentation	30

Lab performance

Please read the lab manual each week before your scheduled lab time.

You are required to wear closed toe shoes, long pants, safety glasses, and a knee length lab coat. Eating and drinking are NOT allowed during lab. At the end of lab, you must clean and return all supplies to their proper place and clean your work area. Lab participation points will be lost if any of these guidelines are disregarded.

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.

Laboratory Attendance

You are required to attend lab sessions during your scheduled lab time. It is a student's responsibility to follow up with their Lab Instructor or lab manager to schedule make-up labs or online alternatives. Note that only students with valid excuses will be accommodated.

Post-Lab Assignments

You will have several 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 Blackboard in the beginning of the semester. Lab reports will be submitted on Blackboard through the Turnitin link. Note that plagiarism and/or AI-generated tools will not be tolerated and will result in a 0 on the lab report and referral to SJACS.

Presentation

With a group, you will have to prepare a presentation using scientific research articles and share it with other students in your lab section. Detailed instructions will be posted on Blackboard.

Lab Exam

The cumulative lab exam will test your understanding of the topics, concepts and activities covered during the entire semester. This 60-minute test will be administered during your scheduled lab time. It will

consist of multiple-choice questions, True/False, fill in the blanks, matching and short answers. Here are some important policies regarding lab exams:

- It is your responsibility to take the lab exam during the scheduled exam time.
- If you miss a lab exam due to a serious illness, you must present a valid excuse to the Lab Manager (spatola@usc.edu) within 24 hours of the missed exam. A valid excuse is considered to be an official note from your doctor, or the summary of your visit from the USC Student Health Center. Note that neither you, nor your doctor, need to tell us the nature of your illness – we just want to verify whether you were too ill to take the exam.
- If you miss an exam for non-illness related reasons, you must provide similarly convincing documentation of the emergency to the Lab Manager within 24 hours. If we judge your excuse to be valid, you will be allowed to take the make-up lab exam. If you do not have a valid excuse or fail to provide it within the allotted time, you will receive a zero.
- Students who miss a lab exam due to the observance of a religious holy day should be aware of the University's policy on such absences, published at: <http://orl.usc.edu/religiouslife/holydays/absences.html>. Requests for such absences should be made by email addressed to the Lab Manager (spatola@usc.edu) at least 2 weeks in advance of the absence. If the absence is approved, the student will be allowed to take the make-up lab exam.
- Student-athletes who will have to miss the lab exam due to a previously scheduled NCAA competition should bring the SAAS excuse letter to the Lab Manager at least 2 weeks in advance so alternatives can be arranged.

Students with Disabilities

Students requesting academic accommodations based on a disability are required to register with the Office of Student Accessibility Services (OSAS) each semester. A letter of verification for approved accommodations can be obtained from OSAS. Be sure to email the accommodations letter (PDF) to the Laboratory Manager as early in the semester as possible, **preferably by Feb 3**. Please consult the OSAS website (osas.usc.edu/) for their remote access procedure. Their telephone number is 213-740-0776. If a student's approved accommodation is limited to extra time on exams, the teaching staff of BISC 220 will provide the accommodation. For any other accommodation, such as a private room, reader, or scribe, students must make prior arrangements with the OSAS office 2 weeks before the exam date.

Changing a Lab Section

During the first three weeks of classes you can change your lab section by dropping your current section and adding your new choice through *USC Web Registration System*. You can switch into a new lab section only if it is open (if it has less than 20 students). If a lab section is currently closed you must wait until other students drop before you can switch into that section. No changes are allowed after the third week of classes. You are responsible for taking a screenshot of your scores from Blackboard **before** changing sections and emailing it to your lab manager so your scores can be transferred to the new section.