



BISC 372 Cell Biology

Units: 4

Lectures: Mondays and Wednesdays 9:30 – 10:50 am

Location: HED 103

Discussion: Thursdays 1:00 – 1:50 pm

Location: DMC 204

Instructor: Xianrui Cheng, Ph.D.

Office: Zoom

Office Hours: Thursday 9:30-11:30, by zoom appt.

Contact Info: xianruic@usc.edu

Instructor: Rory Spence, Ph.D.

Office: Zoom

Office Hours: Thursday 9:30-11:30, by zoom appt.

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Teaching Assistant: Elenita Melikterminas

Office: zoom

Office Hours:

Contact Info: melikter@usc.edu

Course Description

Few fields in biology are developing more rapidly on more fronts and with more excitement than cell biology. This class serves as an introduction to the experiments, theories and knowledge of modern cell biology. We will pay particular focus on organelles, signaling, cytoskeleton, and the cell cycle. Classes will be lecture format twice a week as well as a once a week discussion section. Grading will consist of 2 exams, a midterm and a final, as well as 8 quizzes and participation in discussion section. Of course, respect and support for your classmates (and your professors) during discussions is expected. We will also read and analyze original research articles. While the book does an excellent job of giving us the basics of cell biology, papers will provide us with cutting edge hypothesis and results.

Learning Objectives

1. Demonstrate the importance the structure and function of cellular components.
2. Demonstrate how cellular components are localized and organized.
3. Connect the regulatory mechanisms related to the diversity of cellular components.
4. Understand landmark experiments within cell biology.
5. Apply relationships between cell biology and society.

Prerequisite(s): BISC 220 or BISC 221 and MATH 125 or equivalent

Technological Proficiency and Hardware/Software Required

USC Technology Rental Program

We realize that attending classes online and completing coursework remotely requires access to technology that not all students possess. If you need resources to successfully participate in your classes, such as a laptop or internet hotspot, you may be eligible for the university's equipment rental program. To apply, please submit an [USC Technology Rental Program Application](#) .

USC Technology Support Links

[Zoom information for students](#)

[Blackboard help for students](#)

[Software available to USC Campus](#)

Required Readings and Supplementary Materials

Bruce Alberts, et al. Molecular Biology of the Cell. New York: W.W.Norton & Company, 7th edition. ISBN: 9780393884821. Reading assignments for each class will be posted on Blackboard. The textbook is required. A copy of the book is available in the reference section of the library.

Description and Assessment of Assignments

There will be 2 exams for the class, one midterm and one final. Each exam will be worth 30% of your grade. The exams will **not** be memorization of facts, instead they will test your ability to think critically and creatively about topics we have covered in class. The exams will be multiple choice. Exam dates are firm. If you ever are unsure of your grade or have any questions, please feel free to reach out to us in person or via email. We are willing to regrade exams. However, you must return the exam within one week of when we return it to you with a written response of what you believe should be regraded. We reserve the right to regrade the entire assignment. 8 quizzes must be completed on blackboard prior to coming to that week's discussion section. Each quiz will be worth 15 points and will be written by the professors. Quizzes will be worth 30% of your total grade. The quizzes will be based on topics from that week's lecture. This way quizzes will allow you to be prepared for discussion as well as help you keep up to date on your studying for exams. Attendance in discussion sections is mandatory and active participation in discussion section is worth 10% of your grade.

Participation: Active participation requires that you attend weekly discussion sections in person. To receive full participation points, one must attend discussion and be prepared to participate in fruitful conversations regarding the topic, assignment or paper for that day. This does not mean one has to have the "correct" or "best" answers. This instead means that you are willing to think critically about cell biology and share your ideas with your peers and discussion instructor.

Grading Breakdown

Assignment	Points	% Of grade
Midterm exam	120	30
Final exam	120	30
Discussion Quizzes	6 @ 10pts each (60)	15
Assignments (13, drop the lowest)	12 @ 5 pts each (60)	15
Discussion Participation	40	10
TOTAL	400	100

Grading Scale

Final grades are based on the total points earned in the course. Course grades will be determined according to the following scale:

A 93-100, A- 90-92

B+87-89 ,B 83-86, B- 80-82

C+ 77-79, C 73-76, C-70-72

D+ 67-69, D63-66, D- 60-62

F59 and below

Instructors reserve the right to adjust the grading scale at the end of semester.

Assignment Submission Policy

Assignment Submission: Assignments are due via email to your TA at 5pm the day before discussion, ie Wednesday by 5pm. There are 13 assignments total. Late quizzes or make-up exams will not be given. Please refer to the university policy for excused absences.

Additional Policies

Synchronous session recording notice: Classes will be recorded via zoom. You are strongly encouraged to come to in person lecture and discussion attendance is required. We expect each student to study 8 hours a week outside of class. 5 hours should be dedicated to reading the textbook for each week. We expect 3 hours a week are dedicated to studying and preparing for the exams and quizzes.

Course Schedule: A Weekly Breakdown

Lecture or Discussion	Week	Due Before Class	Topic	Instructor
Lecture 1	1	Read: Ch. 16 (pp. 957-964; p.971; pp. 984-986)	Introduction to the cytoskeleton; actin and actin motors	Dr. Cheng (Jan 8)
Lecture 2	1	Read: Moore et al. <i>Nature</i> 591, 659–664 (2021). https://doi.org/10.1038/s41586-021-03309-5	Research paper discussion: How are mitochondria inherited during cell division?	Dr. Cheng (Jan 10)
Discussion 1	1	Assignment 1	Assignment 1	(Jan 11)
Lecture 3	2	Read: Ch. 16 (pp. 987-995; pp. 999-1003)	Microtubules and microtubule motors	Dr. Cheng (Jan 17)
Discussion 2	2	Assignment 2 Quiz 1	Assignment 2	(Jan 18)
Lecture 4	3	Read: Ch. 16 (pp.1007-1010; pp.1013-1018; pp.1021-1023)	Intermediate filaments and cell polarity	Dr. Cheng (Jan 22)
Lecture 5	3	Read: Roman et al., <i>Science</i> 374,355-359 (2021). https://doi.org/10.1126/science.abe5620	Research paper discussion: How does muscle repair itself after a workout?	Dr. Cheng (Jan 24)
Discussion 3	3	Assignment 3	Assignment 3	(Jan 25)
Lecture 6	4	Read: Ch. 17 (pp.1027-1030; pp. 1032-1042)	Introduction to the cell cycle; genome replication	Dr. Cheng (Jan 29)
Lecture 7	4	Read: Ch. 17 (pp.1046-1051; pp. 1053-1058)	Mitosis	Dr. Cheng (Jan 31)
Discussion 4	4	Assignment 4 Quiz 2	Assignment 4	(Feb 1)
Lecture 8	5	Read: Ch. 8 (pp.551-553) Read: Xiong and Ferrell. <i>Nature</i> 426, 460-465 (2003). https://doi.org/10.1038/nature02089	Research paper discussion: How does a cell “remember” its identity?	Dr. Cheng (Feb 5)
Lecture 9	5	Read: Ch. 17 (pp.1064-1068; pp.1077-1078)	Cytokinesis and cell growth control	Dr. Cheng (Feb 7)

Discussion 5	5	Assignment 5	Assignment 5	(Feb 8)
Lecture 10	6	Read: Ch. 18 (pp. 1089-1097)	Cell death	Dr. Cheng (Feb 12)
Lecture 11	6	Read: Cheng and Ferrell. <i>Science</i> 361,607-612 (2018). https://doi.org/10.1126/science.aah4065	Research paper discussion: How does death spread within a cell?	Dr. Cheng (Feb 14)
Discussion 6	6	Assignment 6 Quiz 3	Assignment 6	(Feb 15)
Lecture 12	7	Read: Ch. 12 (pp.688- 694); Ch. 21 (pp.1217- 1225)	Self-organization within a cell and in a developing embryo	Dr. Cheng (Feb 21)
Discussion 7	7	Review	Mid-term exam review	(Feb 22)
Lecture 13	8	Read: Cheng and Ferrell. <i>Science</i> 366, 631-637 (2019). Tsai et al., <i>Science</i> 370, 113-116 (2020)	Research paper discussion: How do cells and tissues organize themselves?	Dr. Cheng (Feb 26)
Lecture 14	8	Midterm	Lectures 1-13 Discussions 1-7	(Feb 28)
Discussion 8	8	TBD	TBD	
Lecture 15	9	Ch. 1/8 7 th Edition	Experimental Approaches	Dr. Spence
Discussion 9	9	Assignment 7	Assignment 7	Dr. Spence
Spring Break	10			
Lecture 16	11	Ch. 4 7 th Edition	Nucleus: Structure and Function	Dr. Spence
Lecture 17	11	Ch. 4	Nucleus: Chromatin, Organization	Dr. Spence
Discussion 10	11	Assignment 8 Quiz 4	Assignment 8	
Lecture 18	12	Ch. 4 & Ch. 12	Nucleus: Transport	Dr. Spence
Lecture 19	12	Ch. 13	Endomembrane System: Co- translational Translocation	Dr. Spence
Discussion 11	12	Assignment 9	Assignment 9	
Lecture 20	13	Ch. 13	Endomembrane System: Endoplasmic Reticulum	Dr. Spence

Lecture 21	13	Ch. 13	Endomembrane System: Vesicle Transport, Golgi, Lysosomes	Dr. Spence
Discussion 12	13	Assignment 10 Quiz 5	Assignment 10	
Lecture 22	14	Ch. 13	Endomembrane System: Endocytosis, Disease	Dr. Spence
Lecture 23	14	Ch. 15	Signaling: GPCR	Dr. Spence
Discussion 13	14	Assignment 11	Assignment 11	
Lecture 24	15	Ch. 15	Signaling: RTK, MAPK	Dr. Spence
Lecture 25	15	Ch. 20	Cancer	Dr. Spence
Discussion 14	15	Assignment 12 Quiz 6	Assignment 12	
Lecture 26	15	Ch. 23	Pathogens	Dr. Spence
Lecture 27	15	Exam Review	Lectures 15-26 Discussions 8-14	
Discussion 15	15	Assignment 13 Evaluations	Assignment 13 Evaluations	
FINAL				

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. You may contact OSAS at (213) 740-0776 or via email at 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

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.