

BISC 313 Syllabus

Updated 1-7-23

Evolution and Population Genetics, Spring 2023

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Office hours: TBA

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Office: RRI 316B
Office hours: Announced in lab

Meeting times for Lecture: MWF 11-11:50 ZHS 163

Meeting times for Lab: Thursday 11-12:50 OR 2-3:50 ZHS 458 (the section you registered for)

Because much of the lecture and lab will require active participation, this course will be held in person. Unless you have an excused absence, we expect you to attend.

Textbooks and course materials

Evolution, 4th Edition, by Douglas Futuyma and Mark Kirkpatrick.
Readings and other materials will be posted on Blackboard (see below)

Websites:

<https://blackboard.usc.edu>

Course Description

Evolution is one of the pillars of modern biology. As evolutionary biologist Theodosius Dobzhansky put it so elegantly, in the title of his 1973 essay, “Nothing in biology makes sense except in light of evolution.” The same can be said of human biology and medicine. Pathogens, parasites, symbionts, and their victims or hosts evolve. Training in evolutionary thinking enables biologists to understand biological diversity and how organisms adapt and can help biomedical researchers and clinicians to ask useful questions about modern human health and disease that they might not otherwise pose. BISC 313 the population genetic mechanisms underlying our current theory of evolution and how evolutionary thinking in the era of genomic science is advancing our understanding of biology and medicine.

In the laboratory section of the course, you’ll apply concepts learned in class by contributing to a real-life research project in evolution and population genetics going on at USC. The lab will be run in the same way that we conduct research in our own groups: Throughout the semester you will work under the mentorship of the course TA and instructors to conduct your research project and provide regular updates on your progress and the outcome of your work. More formal presentations will also be a component of the lab.

Class structure: Lecture will center on weekly reading assignments, typically addressing one broad topic each week. Two classes a week will focus on activities and material related to each topic. One class a week will be a student-led discussion of a primary research article, facilitated by the instructor. Exams will assess your comprehension of the topics introduced in readings and lecture and your ability to apply these concepts to research questions and issues that pertain to the environment and human health.

Prerequisites: BISC 220 or 221, and BISC 120 or 121 (the first-year biology sequence)

Learning Objectives

By the end of this course, you will be able to:

- explain and analyze the processes and patterns of evolution
- apply your knowledge of the processes and patterns of evolution to address biological problems ranging from the scale of individual human health to global well-being
- read and comprehend primary research articles published in peer reviewed journals
- discuss contemporary topics related to evolutionary biology and be able to explain these topics to your friends and the public
- perform essential laboratory techniques used in the study of population biology and evolution, and apply the scientific method to address research questions pertaining to phenomena in the natural world
- develop skills communicating science and working as part of a research team

If you are interested in pursuing research outside of class or setting up an internship, check out resources from the [Office of Experiential and Applied learning](#) (there are many excellent programs, but see SOAR and SURF for on-campus research opportunities).

LECTURE SCHEDULE *Note that the schedule is subject to change. Any schedule changes will be discussed in class and posted on Blackboard.*

Week	Day	Date	Assessment	Topics	Instructor
1	Mon	9-Jan		Introduction	Schwartzman
	Wed	11-Jan		Tree thinking	Schwartzman
	Fri	13-Jan	JC	Journal club	Schwartzman
2	Mon	16-Jan	<i>NO CLASS: M.L. King Day, University Holiday</i>		
	Wed	18-Jan		Natural selection and adaptation	Schwartzman
	Fri	20-Jan		Natural selection and adaptation	Schwartzman
3	Mon	23-Jan		Mutation and variation	Nuzhdin
	Wed	25-Jan		Mutation and variation	Nuzhdin
	Fri	27-Jan	JC	Journal club	Nuzhdin
4	Mon	30-Jan		Genetic theory of natural selection	Schwartzman
	Wed	1-Feb		Genetic theory of natural selection	Schwartzman
	Fri	3-Feb	Midterm 1, Weeks 1-4		
5	Mon	6-Feb		Evolution of genes and genomes	Schwartzman
	Wed	8-Feb		Evolution of genes and genomes	Schwartzman
	Fri	10-Feb	JC	Journal club	Schwartzman
6	Mon	13-Feb		Phenotypic evolution	Schwartzman
	Wed	15-Feb		Phenotypic evolution	Schwartzman
	Fri	17-Feb	JC	Journal club	Schwartzman
7	Mon	20-Feb	<i>NO CLASS: President's Day, University Holiday</i>		
	Wed	22-Feb		Genetic drift	Schwartzman
	Fri	24-Feb		Genetic drift	Schwartzman
8	Mon	27-Feb		Speciation	Nuzhdin

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	Wed	1-Mar		Speciation	Nuzhdin
	Fri	3-Mar			
			Midterm 2, Weeks 5-8		
9	Mon	6-Mar		Species interactions	Nuzhdin
	Wed	8-Mar		Species interactions	Nuzhdin
	Fri	10-Mar	JC	Journal club	Nuzhdin
			SPRING BREAK		
10	Mon	20-Mar		Conflict and cooperation	Schwartzman
	Wed	22-Mar		Conflict and cooperation	Schwartzman
	Fri	24-Mar	JC	Journal club	Schwartzman
11	Mon	27-Mar		Symbiogenesis	Schwartzman
	Wed	29-Mar		Symbiogenesis	Schwartzman
	Fri	31-Mar	Midterm 3, weeks 9-11		
12	Mon	3-Apr		Sex and reproductive success	Nuzhdin
	Wed	5-Apr		Sex and reproductive success	Nuzhdin
	Fri	7-Apr	JC	Journal club	Nuzhdin
13	Mon	10-Apr		Evolution of life histories	Nuzhdin
	Wed	12-Apr		Evolution of life histories	Nuzhdin
	Fri	14-Apr	JC	Journal club	Nuzhdin
14	Mon	17-Apr		Evolution of development	Nuzhdin
	Wed	19-Apr		Evolution of development	Nuzhdin
	Fri	21-Apr	JC	Journal club	Nuzhdin
15	Mon	24-Apr		Urban environments	Nuzhdin
	Wed	26-Apr		Urban environments	Nuzhdin
	Fri	28-Apr	Final Exam, weeks 12-15		

JC: Journal club.**LAB SCHEDULE** All labs meet in ZHS 458 unless otherwise noted

Week	Day	Practical Activity	Assignment
1	Thu 12-Jan	<i>Introduction/core skills</i>	
2	Thu 19-Jan	<i>Group meeting: lab safety, articulating research goals</i>	Presentation 1
3	Thu 26-Jan	<i>Make selection plates, practice plating</i>	Check in 1
4	Thu 2-Feb	<i>First streak, overview of colony PCR</i>	Check in 2
5	Thu 9-Feb	<i>Second streak, PCR practice, intro to gel electrophoresis</i>	Check in 3
6	Thu 16-Feb	<i>Third streak, practice gel electrophoresis & extraction</i>	Check in 4

7	Thu 23-Feb	<i>Colony PCR, Sanger Sequencing, 16S genotyping</i>	Check in 5
8	Thu 2-Mar	<i>Gel electrophoresis, DNA isolation, submit samples</i>	Check in 6
9	Thu 9-Mar	<i>Microscopy</i>	Check in 7

SPRING BREAK

10	Thu 23-Mar	<i>Sanger sequencing: results analysis</i>	Check in 8
11	Thu 30-Mar	<i>Open lab- Analysis catchup</i>	Check in 9
12	Thu 6-Apr	<i>Group meeting: sequencing results</i>	Presentation 2
13	Thu 13-Apr	<i>Open lab</i>	Check in 10
14	Thu 20-Apr	<i>Final presentations</i>	Presentation 3
15	Thu 27-Apr	<i>Final presentations</i>	

GRADES: A copy of any document associated with grading may be retained by the Instructors and/or TA. Your grade will be determined by the following point system:

	Points possible	Percent
Journal club evaluations	90 (10 each)	15%
Midterms 1,2,3	240 (80 each)	40%
Final exam	80	13.3%
Lab	190	31.7%
TOTAL	600	100%

Journal club evaluations: will consist of 2 parts. One part you will complete and turn in on Blackboard before class, and one part you will complete in class.

Midterms and Final exams: these will be in-person. Practice problems will be posted on Blackboard for each week. The practice problems won't be graded as assignments, but about half of them will appear as questions on your exam.

The lab portion of your grade (300 points) comes from these categories:

Lab Credit:	Points possible	Percent
Presentations	90 (30 each)	47.4%
Check ins	100 (10 each)	52.6%
Total	100	100%

Your lab TA will provide more information about each type of assignment in class and on Blackboard.

GRADING SCALE

Letter grade	Corresponding numerical point range
A	≥95-100
A-	≥90-94
B+	≥87-89
B	≥83-86
B-	≥80-82
C+	≥77-79
C	≥73-76
C-	≥70-72
D+	≥67-69
D	≥63-66
D-	≥60-62
F	<60

COURSE POLICIES

COMMUNICATION: Email is the preferred form of communication with the Instructors outside of class. Responses can be expected within 24-48 hours, though there may be an additional delay over weekends/holidays. If an in-person meeting is desired, please email a request to set up a meeting time.

Behavioral norms for class:

- Treat everyone with respect and dignity.
- Criticize ideas, not individuals.
- Always be mindful of the following: would you say it to the individual in person?
- Be courteous and refrain from interrupting others.
- Don't dominate conversations- ensure everyone has a chance to contribute.
- Ask questions, especially when you don't understand something.
- Support your statements with evidence and explain your rationale.

Course netiquette (zoom sessions, if instruction must be moved online):

- Mute your microphone if you are not speaking
- Chat will only be used to make comments to the entire class (private chat will be disabled).
- Please use the "raise hand" function in Zoom to request clarification or ask questions. This will reduce interruptions.
- Your video doesn't have to be on but be present and participate if you are attending the live sessions.
- If you have technical issues, please email the instructor (julias21@usc.edu or snuzhdin@usc.edu depending on the week)

PLANNED ABSENCES: Requests for absences should be made by email to the Instructor at least 2 weeks in advance and preferably as early in the semester as possible. If the absence is

approved a reasonable accommodation will be provided, if possible, which may include coordinating remote participation or a make-up assignment.

GROUP WORK: Studying together is encouraged! For graded work, your Instructor will indicate whether working together is permitted. If it's not explicitly stated for the assessment, you are expected to complete the assignment on your own, not as a group.

Statement on Academic Conduct and Support Systems

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), 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 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](#).

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

Dornsife has embedded counselors that you can book appointments with. These are free and confidential resources. Booking information [here](#). Counseling and mental health also offers free [single session workshops](#) focused on developing skills to thrive.

[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.