BISC 404 Ecology and Biodiversity

Units: 4

Spring 2023 – Mondays & Wednesdays – 2:00-3:20 pm

Location: GFS 109 and ZHS 458

Instructors:

Laura Melissa Guzman

Office: AHF B17

Office Hours: By appointment

Contact Info: guzmanur@usc.edu

Cameron Egan

Office: AHF141

Office Hours: TBD

Contact Info: camegan@usc.edu

Teaching Assistant: Charles Lehnen

Office: AHF B10

Office Hours: TBD

Contact Info: lehnen@usc.edu

Course Description

Ecology is the study of the relationships between species and their environment. This 4-unit course provides students with current understanding of the field of ecology and biodiversity. Specifically, students will be introduced to community ecology, macroecology, biodiversity and ecosystem functioning, patterns of biodiversity, and current debates on trends in biodiversity.

In this class, you will be introduced to the most current developments in ecological research that help us understand how populations, communities and ecosystems are structured across space and time. The material in this course will build on the contents and skills you have acquired in other introductory ecology courses.

You will also be introduced to concepts in ecological theory, modeling, and data management and analysis. We will use quantitative statistics and graphical skills that you may have not previously learned. You will learn graphical analysis skills, writing skills and library literature skills, building on what you have encountered in previous courses.

A key component of this course will be reading classic and contemporary literature in ecology, as well as providing written and verbal summaries of this literature.

Learning Objectives

By the end of this course students will be able to:

1. Discuss in detail classic and contemporary literature in ecology.
2. Summarize the major concepts and findings in ecology.
3. Assess whether empirical evidence supports theories in ecology.
4. Perform basic analyzes of ecological data.
5. Perform basic simulations of ecological theory.
6. Synthesize in written and verbal manner scientific literature.

Prerequisite(s): None
Co-Requisite(s): None
Concurrent Enrollment: None
Recommended Preparation: BISC 315 (Intro to Ecology) or equivalent, BISC 444 or previous knowledge of R or any other programming language is advantageous but not a requirement.

Technological Proficiency and Hardware/Software Required

Students will use R and RStudio for the labs.

Required Readings and Supplementary Materials

Textbook:

- Community Ecology by Gary G. Mittelbach and Brian J. McGill 2019 (online version can be accessed via the USC library).
- Foundations of Ecology - Classic Papers with Commentary. L.A. Real and J.H. Brown (individual papers can be accessed from USC library)
- Community Ecology, 2nd Edition by Peter J. Morin Wiley-Blackwell 2011 (online version can be accessed via the USC library).
- All papers provided via BB but can also be accessed from USC library.

Website: https://blackboard.usc.edu (site for course materials, lecture notes, quizzes, additional readings, grades etc.)

Description and Assessment of Assignments

Lecture assessment: Understanding of lecture material will be assessed through 2 midterms and a final exam.
Lab assessment: Students will provide simulation and analysis results for 4 computer labs
Paper summaries: Every student will be tasked with presenting scientific papers on three days; they will present this verbal summary during lecture. Each student will be evaluated for critically presenting the paper in the discussion session and for participating in the discussions of other group presentations. Each presentation for each paper should be short, no more than 10 minutes as we will discuss both student presentations in the second half of the class. The student should be ready to answer questions about the methodology and the key messages of each paper.

Grading Breakdown

Assessment Tool (assignments)	Points	% of Grade
Midterm 1	150	18.75
Final exam	150	18.75
Lab assignments 7 (20 each)	140	17.5
Participation in discussions on labs 9-10 (30 each)	60	7.5
Paper summary total (60 per paper x 5)	300	37.5
TOTAL	800	100

Grading Scale

Course final grades will be determined using the following scale

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	59 and below

Assignment Submission Policy

Lab assignments and paper summaries will be submitted via BlackBoard.

Grading Timeline

Grades will be returned within 2 weeks from the time the assignment of exams are due.

Additional Policies

Exams

The lecture portion of this course will include two midterm exams and a final exam. Exams may include multiple choice questions, fill-in answers, definitions, T/F, short answers, and short or long essays. Material will be drawn from lectures, readings, and laboratory material. Make-up exams are exceedingly rare and are only considered for a verified University approved reason. The final exam and the midterms are not cumulative, but the concepts covered in each exam will build on each other. Midterm 1 will be at the end of Week 5, midterm 2 will be at the end of week 10, and the final exam will be during final exam period.

Midterm 1 will cover the material from weeks 1-4, midterm 2 will cover weeks 5-9, and the final exam will cover weeks 10-14.

Grading

Making keys for graded material will be posted on BlackBoard for the lab assignments. If you feel that an error was made in the grading of an examination or lab, you need to do the following: 1) Check the answer key with your TA 2) Prepare a printed statement explaining why you feel your grade was incorrect, and 3) submit this along with a re-grade Request Form (downloaded from Blackboard) and your original examination or graded activity to your TA within one week of the time the exam or other graded document was returned to you. Your entire exam or document may be re-graded and, as a result, your grade may increase or decrease from a requested re-grade. Stated reasons for a grade change must be legitimate (e.g., error in totaling the score).

Laboratory portion of the Course:

Your lab is worth 25% of your final grade for the course. Laboratory activities will be computer based and discussion based.

PLANNED ABSENCES: Students who will miss an examination for observance of a religious holiday should review the University's policy on such absences (SCampus; policy.usc.edu/student/scampus/). Requests for such absences should be made by email to the TA and the professors at within two weeks of the start of the semester. If the absence is approved, a reasonable accommodation will be provided. If you have a professional reason for missing a class or activity, request these dates at the beginning of the semester (verified athletic events, presentations at professional meetings, etc.). We will consider accommodating verified truly professional or career-oriented requests.

UNPLANNED ABSENCES: Lectures will be provided on BB as a reference. An attempt will also be made to video record lectures, but classes will be designed to be in person and USC equipment errors may prevent successful recordings of classes. In these cases, students are encouraged to reach out to another student and refer to the posted lecture for missed material. This class follows university policy for missed classes due to medical reasons. If you miss a class or lab exam, quiz, or graded activity due to medical illness you must present a valid medical excuse to the instructional team within 48h of the missed examination or quiz. The reason for missing an examination or quiz must be of a medical nature or totally unavoidable. An invalid excuse, or the excuse turned in late, will result in a score of zero for the activity missed. If you miss the final examination and have provided a valid medical excuse within 72 hours of the examination time, a final course grade of incomplete (IN) will be recorded, and you will be permitted to take a make-up final examination during the following semester.

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.

Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. (Living our Unifying Values: The USC Student Handbook, page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the internet, or via any other media. (Living our Unifying Values: The USC Student Handbook, page 13).

Course Schedule: A Weekly Breakdown

Instructor	Week	Topics/Daily Activities	Readings/Preparation	Papers	Lab	Deliverables
Melissa	Week 1 Jan 8, 10	Introduction to Ecology Ecology as a Science Scale in Ecology Patterns of Biological Diversity	Chapter 1, 2 Mittelbach 2019 Community Ecology	Kingsland (1991) Levin (1992) McGill (2010) Hutchinson (1959) Mittelbach et al. (2007)	Lab 1: How to read a paper, Little, J and R. Parker (2010)	All students give a summary for scientific papers. Students will sign up on the first week for when they present these papers

Melissa	Week 2 Jan 15 no class Jan 17	Diversity - Stability Biodiversity and Ecosystem functioning	Chapter 3 Mittelbach 2019 Community Ecology	McCann (2000) Schindler et al. (2010)	No Lab	
Melissa	Week 3 Jan 22, 24	Population growth and density dependence	Chapter 4 Mittelbach 2019 Community Ecology	Woiwod and Hanski (1992), Johnson et al (2012), Kramer et al (2009), Gotelli et al. (2017)	Lab 2: Introduction to R	
Melissa	Week 4 Jan 29, 31	Predator–prey interactions	Chapter 5, 6 Mittelbach 2019 Community Ecology	Holling (1959) M. L. Rosenzweig and R. H. MacArthur (1963), Kalinkat et al. (2013) McCann (1998)	Lab 3: Population growth, lotka-volterra and functional responses	Lab 2 assignment due
Melissa	Week 5 Feb 5, 7	Food webs and trophic cascades	Chapter 10,11 Mittelbach 2019	Williams & Martinez (2000) DeLong et al. (2015)	No Lab/ study session for midterm	Midterm 1 on Wednesday Feb 8
Cameron	Week 6 Feb 12, 14	Competitive interactions Species coexistence and niche theory	Chapter 7,8 Mittelbach 2019 Community Ecology	Adler et al. (2007), Kraft et al. (2015), RH MacArthur, R Levins (1967), Holt (2009)	Lab 4: Modeling species competition	Lab 3 assignment due

Cameron	Week 7 Feb 19 no class Feb 21	Beneficial Interactions in Communities	Chapter 9 Mittelbach 2019	Bertness & Callaway 1994 Leigh 2010	No lab	Lab 4 assignment due (Due on Tuesday 2pm as Monday is a holiday)
Melissa	Week 8 Feb 26, 28	Patchy landscapes, metapopulations and metacommunities	Chapter 13, 14 Mittelbach 2019	Hanski (1998), Gonzalez et al. (1998), Leibold et al. (2004) Thompson et al. (2020)	Lab 5: Modeling metacommunities, analysis of community data with vegan	
Cameron	Week 9 Mar 4, 6	Biogeography Island Biogeography Latitudinal gradients in biodiversity		Macarthur and Wilson (1967) Valente et al. (2020) Wilf and Labandeira (1999), Benson et al. (2021) Helmus et al. (2014)	Lab 6: Morphological Diversity and Diversification	Lab 5 assignment due
	Mar 10-17	Spring Recess				
Cameron	Week 10 Mar 18, 20	Diversity Indices		Whittaker, R. H. 1960 Anderson et al. 2011	No Lab/ study session for midterm	Midterm 2 on Wednesday March 22

Cameron	Week 11 Mar 25, 27	Community Assembly	Chapter 9 Morin 2011	Weiher et al. 2011	Lab 7: Introduction to taxonomy and phylogenetics in R	Lab 6 assignment due
Cameron	Week 12 Apr 1, 3	Functional and Phylogenetic diversity	Chapter 12 Mittelback 2019	Vellend and Agrawal (2010) Messier et al. (2010) Mouillet et al. (2014)	Lab 8: Building and analyzing trees	Lab 7 assignment due
Melissa	Week 13 Apr 8, 10	Valuing biodiversity Biotic homogenization	Chapter 4 Gaston and Spicer 2004	Vellend et al. (2013) Dornelas et. al (2014) Gonzalez et al. (2016) Maier (2012) Mooers and Pyron (2020) Chase et al. (2019) Díaz et al. (2018)	Lab 9: Discussion on the value of biodiversity. And the current status of biodiversity. Example from Leung et al. (2020)	Lab 8 assignment due

Cameron	Week 14 Apr 15, 17	Conservation			No lab/ study session for final	
Cameron	**Week 15 Apr 22, 24**	Anthropogenic change: Habitat fragmentation and extinction debts Biodiversity and Climate change		Fahrig (2003) Cahill et al. (2012) Dawson et al. (2011)	Lab 10: Discussion on alternative modes of biodiversity protection	
	FINAL May 1-8					Refer to the final exam schedule in the USC Schedule of Classes at classes.usc.edu.

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.