



## **BISC404L: Ecology and Biodiversity**

**Section: 13404R**

**4 units**

**Lecture Meeting days/time:** Monday, Wednesday 2:00-3:20

**Location:** [Kaprielian Hall](#) (KAP) 138

**Lab Meeting days/time:** Monday 3:30-6:20

**Lab Location:** [Zumberge Hall](#) (ZHS) 458

**Instructor:** Cameron Egan, Ph.D. (he/him)

**Office:** [Hancock Foundation Building](#) (AHF) 141

**Office Hours:** Tuesday and Friday, 2:00-3:00 pm (and by appointment)

- Office hours are open for drop-ins and dedicated entirely to you. During these hours, my office door is open and all are welcome!
- I also have availability outside of my scheduled office hours. Please contact me via email to set up an appointment.

**Contact Info:** [camegan@usc.edu](mailto:camegan@usc.edu)

**Teaching Assistant:** Charles Lehnen

**Contact Info:** [lehnen@usc.edu](mailto:lehnen@usc.edu)

**Office Hours:**

### **Course Description**

Ecology is the study of the relationships between species and their environment. This 4-unit course provides students with a 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

At the end of the course, you will be able to:

- Discuss classic and contemporary literature in ecology in detail.
- Summarize the major concepts and findings in ecology.
- Assess whether empirical evidence supports theories in ecology.
- Perform basic analyzes of ecological data.
- Perform basic simulations of ecological theory.
- Be proficient in R and GitHub
- Synthesize in written and verbal manner scientific literature.

**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.

## Textbooks and Course Readings

- Community Ecology by Gary G. Mittelbach and Brian J. McGill 2019 (online version can be accessed via the USC library).
- Community Ecology, 2nd Edition by Peter J. Morin Wiley-Blackwell 2011 (online version can be accessed via the USC library).
- Biological Diversity – Frontiers in measurement and assessment by Anne E. Magurran and Brian J. McGill (online version can be accessed via USC library)
- All papers provided via Brightspace but can also be accessed from USC library.

## Evaluation Criteria and Grading

<b>Paper Summary:</b>	Every student will be tasked with presenting and leading the discussion on a scientific paper once during the semester. Paper discussions will be held every Wednesday, and you are expected to sign up for a spot by January 22 <sup>nd</sup> (otherwise you will be assigned a spot by Professor Egan). More information on the expectations and rubric is available on Brightspace.
<b>Entry Tickets:</b>	This is a highly dynamic and discussion heavy course! As such it is important that you come to class prepared to discuss by completing assigned readings. To help encourage you to come to class prepared, you will receive points for submitting an entry ticket for each discussion paper assigned throughout the semester. More information can be found on Brightspace.
<b>Exams:</b>	Understanding of lecture material will be assessed through a midterm and a final exam. Exams will be take-home and open book. You will be asked comprehensive questions that will require you to think deeply and synthesize ecological concepts and literature.
<b>Laboratory:</b>	Attendance at all laboratory sessions is <b>mandatory</b> except for in the case of emergency or extreme circumstances. The lab is computer intensive and will require you to become familiar with Github, R, and RStudio (we will help you). Your lab score will be based on 6 lab assignments where you provide a simulation and analysis of results for ecological data.

**Table 1.** Grading Breakdown

The course grade will be based upon 500 possible points:

Assessment	Points	% of Grade
Paper Discussion Lead	60	12
Discussion Entry Tickets	20	4
Midterm Exam (March 3)	135	27
Final Exam (Hand-in May 7, 11:00 am)	135	27
Lab Assignment (6 x 25 pts)	150	30
<b>TOTAL</b>	<b>500</b>	<b>100</b>

**Course Grading Scale**

Course final grades will be determined using the following scale:

Letter grade	Corresponding numerical percentage range
A	90 – 100
A-	86 – 89
B+	82 – 85
B	78 – 81
B-	74 – 77
C+	70 – 73
C	66 – 69
C-	62 – 65
D+	58 – 61
D	54 – 57
D-	50 – 53
F	49 and below

**Grading Curve Policy**

To ensure both equity and academic rigor in the evaluation process, a grading curve may be applied to final scores at the end of the term. This curve is designed to account for unforeseen variations in assessment difficulty while maintaining fairness across the class.

The curve will not penalize high-performing students or artificially inflate grades but will aim to reflect a balanced and realistic distribution of outcomes. Adjustments, if necessary, will be based on overall class performance, ensuring that final grades align with expected academic standards.

Students are encouraged to focus on mastery of course material rather than grades and comparisons with peers. Any curving adjustments will prioritize consistency and fairness.

**Tentative Lecture Schedule**

Following is a tentative schedule of topics for the term which may subject to modification dependent on time and learning needs.

Date	Class Topic	Readings/Preparation	Paper Discussions
Jan 13 (Mon)	Introduction to Course and How to Read a Scientific Paper		
Jan 15 (Wed)	Scale in Ecology and Patterns of Biological Diversity	Mittelbach Ch 1 and Ch 2	
Jan 20 (Mon)	<b>No class - Martin Luther King Jr. Day</b>		
Jan 22 (Wed)	Diversity-Stability, Biodiversity, and Ecosystem Functioning	Mittelbach Ch 3	
Jan 27 (Mon)	Population Growth and Density Dependences Part 1	Mittelbach Ch 4	
Jan 29 (Wed)	Population Growth and Density Dependences Part 2	Mittelbach Ch 4	<b>Discussion 1:</b> MacArthur (1958)
Feb 03 (Mon)	Fundamentals of Predator-Prey Interactions	Mittelbach Ch 5	
Feb 05 (Wed)	Selective Predators and Responsive Prey	Mittelbach Ch 6	<b>Discussion 2:</b> Olito and Fukami (2009)
Feb 10 (Mon)	Species Interactions in Ecological Networks	Mittelbach Ch 10	
Feb 12 (Wed)	Food Chains and Food Webs	Mittelbach Ch 11	<b>Discussion 3:</b> Paine (1974)
Feb 17 (Mon)	<b>No class - President's Day Holiday</b>		
Feb 19 (Wed)	Fundamentals of Competitive Interactions	Mittelbach Ch 7	<b>Discussion 4:</b> Connell (1961)
Feb 24 (Mon)	Species Coexistence and Niche Theory	Mittelbach Ch 8	
Feb 26 (Wed)	Beneficial Interactions in Communities	Mittelbach Ch 9 Morin Ch 7	<b>Discussion 5:</b> Callaway et al. (2002)
Mar 03 (Mon)	<b>Midterm</b>		
Mar 05 (Wed)	Patchy Landscapes, metapopulations and fugitive species	Mittelbach Ch 13	
Mar 10 (Mon)	Metacommunities	Mittelbach Ch 14	
Mar 12 (Wed)			<b>Discussion 6:</b> Lahaye et al. (1994)
Mar 17 (Mon)	<b>No class - Spring Recess</b>		
Mar 19 (Wed)			
Mar 24 (Mon)	Island Biogeography		
Mar 26 (Wed)	Latitudinal gradients in biodiversity		<b>Discussion 7:</b> Diamond (1969)
Mar 31 (Mon)	Diversity Indices - Estimating and measuring richness	Magurran Ch4 and 5	
Apr 02 (Wed)	Diversity Indices - Compositional similarity and beta diversity	Magurran Ch 6	<b>Discussion 8:</b> Whittaker (1960)
Apr 07 (Mon)	Community Assembly	Morin Ch 9	
Apr 09 (Wed)	Stable and Unstable Communities	Morin Ch 12, Mittelbach Ch 15	<b>Discussion 9:</b> Tilman et al. (2006)

Date	Class Topic	Readings/Preparation	Discussion Papers
Apr 14 (Mon)	Species Traits	Mittelbach Ch 12	
Apr 16 (Wed)	Phylogenetic Diversity	Magurran Ch 14	<b>Discussion 10:</b> Peay et al. (2012)
Apr 21 (Mon)	Habitat Fragmentation and Extinction Debts	Fahrig (2003)	
Apr 23 (Wed)	Applied Community Ecology	Morin Ch 14	<b>Discussion 11:</b> Mariani (2024)
Apr 28 (Mon)	Final Paper Discussions		<b>Discussion 12:</b> D'Antonio (1993) <b>Discussion 13:</b> Relva et al. (2009)
May 30 (Wed)	Final Paper Discussions		<b>Discussion 14:</b> Hampton et al. (2013) <b>Discussion 15:</b> Sutherland et al. (2012)

### Tentative Lab Schedule

Lab attendance and participation is mandatory to receive a passing grade in the course. You must attend the lab section in which you are registered.

Date	Lab Topic	Deliverables
Jan 13 (Mon)	Lab 1 - Intro to GPT, Github, and downloading R/Rstudio	
Jan 20 (Mon)	<b>No class - Martin Luther King Jr. Day</b>	
Jan 27 (Mon)	Lab 2 - Introduction to R	
Feb 03 (Mon)	Lab 3 - Population growth, Lotka-Volterra and functional responses	Lab 2 Assignment Due
Feb 10 (Mon)	Midterm Review with super TA Charles!	
Feb 17 (Mon)	<b>No class - President's Day Holiday</b>	
Feb 24 (Mon)	Lab 4 - Modeling competition	Lab 3 Assignment Due
Mar 03 (Mon)	Lab Period to work on Lab 4 Assignment with Support	
Mar 10 (Mon)	Lab 5 - Modeling metacommunities and the Vegan Package (yum)	Lab 4 Assignment Due
Mar 17 (Mon)	<b>No class - Spring Recess</b>	
Mar 24 (Mon)	Lab 6 - Morphological Diveristy and Diversification	Lab 5 Assignment Due
Mar 31 (Mon)	Lab period to work on Lab 6 Assignment with Support	
Apr 07 (Mon)	Lab 7 - Phylogenetic Analyses in R	Lab 6 Assignment Due
Apr 14 (Mon)	Lab period to work on Lab 7 Assignment with Support	
Apr 21 (Mon)	<b>Discussion 16:</b> Wilcox et al. (1985) <b>Discussion 17:</b> Corlett (2015)	Lab 7 Assignment Due
Apr 28 (Mon)	<b>Discussion 18:</b> Wainwright et al. (2017) <b>Discussion 19:</b> Yelenik et al. (2014)	

### **Course Specific Policies**

Communication – I am here to support you in your learning and want you to be in contact with me as much as possible. The best way to reach me is by email. In your communication, please be sure to include the course in the subject line (**BISC404**) so I will be better suited to respond to your email. I do my best to respond to emails within 24hr (during the week) and on Monday if your email is sent over the weekend. If it has been more than 24hrs please send me a gentle reminder.

Policy on Late Work – Late laboratory assignments will be penalized by a 10% reduction in the assignment grade every 24 hours late unless due to an emergency situation excused by the instructor. Email the instructor as soon as possible to discuss alternate arrangements due to an emergency.

Extra Credit – **No extra credit will be given** for special projects, etc.

Impairments Affecting Your Performance – Students occasionally encounter difficulties that affect their academic performance, such as illness, accidents, bereavement, depression, anxiety, learning disabilities, and other problems. If you encounter such difficulties, please bring them to the attention of one of the instructors. We can refer you to resources and may be able to offer accommodation. All such discussions will be confidential. Please seek help as soon as you feel your performance is being affected.

### **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 Evaluations**

Course Evaluations will be conducted towards the end of the semester and will appear in the 'Course Evaluations' tab on the Blackboard. It is an important review of your experience in the class with the intent being for you to provide feedback on my teaching practice. Please take the time to complete these evaluations as I use these to help improve/strengthen my teaching. I welcome all constructive feedback!

### **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, compromises 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](http://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).

**Support Systems:**

[Learning Support & Resources](#) - You are part of a learning community made up of faculty, staff, and fellow students. Follow the link to find resources to help support your academic growth and success!

[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](mailto: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.