Fall 2025 Syllabus: Biology 5333/6333 Advances in Evolutionary and Ecological Theory

Time and Place of Class Meetings: T/Th 10:30 – 11:50 pm Classroom Building C201

Instructor: Dr. Elizabeth La Rue
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Instructor: Dr. Eli Greenbaum
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Office Hours: By appointment

Pre-requisite courses: Solid background in ecology and/or evolution (instructor's discretion)
Textbook and Materials: Copies of select literature and all other class materials will be made available on Blackboard

Description of Course Content: This course provides as a foundational survey of historical progress and recent advances in evolutionary and ecological theory, including knowledge of the literature of the discipline for graduate students in the Ecology and Evolutionary Masters or PhD Programs.

The ability to write and synthesize literature to identify a novel research question is a necessary skill for a graduate student to complete their thesis or dissertation. Therefore, this course also serves to train students to review and synthesize relevant ecology and evolution literature to their thesis or dissertation topic to ensure their ability to successfully engage in research and professional practice research skills in the fields of ecology and evolutionary biology.

Student Learning Outcomes: After successfully participating in this course, students will:

- Gain broad knowledge on evolutionary and ecological concepts, theory and methodological paradigms
- Have a thorough understanding of the development of evolutionary and ecological theory
- Be able to critically read, evaluate and discuss a research paper from the primary literature
- Be able to present ideas clearly to a classroom audience at the graduate level

Course Activities/Assignments: Students will be evaluated through a combination of assignments and in-class participation and attendance.

- **Attendance, participation, and annotated bibliographies (33%)**
- **In-Class presentations (33%)**
- **Project: "Development of an Evolutionary or Ecological Theory" Final Paper (individual project) (34%)**

Assessment of Course Objectives: All assignments *are due by the start of class* on the date on the syllabus unless specified otherwise. No late assignments will be accepted but a generous number of assignments will be automatically excused.

Grading Policy: Students will be graded on the assessment activities listed above. These are totaled to determine the student's final grade: <90% (A); 80-90% (B); 70-80% (C); 60-70% (D); <60% (F)

Make-up Policy: There will be no opportunity to make-up grades in this class unless extraordinary circumstances prevail and the lead faculty is consulted expediently.

Attendance Policy: It is expected that students will attend all lectures associated with this class. If attendance is not possible, students should email the lead faculty explaining due cause. Attendance will determine in part, the class participation grade allocated for this class.

Academic Integrity Policy: Academic dishonesty is prohibited and considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. More information on academic dishonesty can be found at http://academics.utep.edu/Default.aspx?tabid=23785. All forms of academic dishonesty will be reported and result in the allocation of an automatic failing final grade in this course.

Civility Statement: Students are expected to conduct themselves in a professional manner in class. Text messaging and the use of cell phones while lectures are in progress will not be tolerated. If necessary, students should voice concerns through email to the instructor.

Disability Statement: If a student has or suspects he/she has a disability that needs accommodation, he/she should contact Disabled Student Services Office (DSSO) 747-5148 or at dss@utep.edu or go to Room 106 Union East Building. The student is responsible for presenting the instructor with any DSS accommodation letters and instructions.

Military Statement: If students are in the military and are in a situation that could entail deployment, they should consult the lead faculty of this course as soon as possible.

Drop date: To receive an automatic "**W**", the last day to drop or withdraw from this class is **October 28, 2025**. After this date, a "**W**" can only be assigned by the Dean of the College of Science, and is only granted under exceptional circumstances.

Overall Theme: "Development of Evolutionary and Ecological Theories"
In this class you will follow the development of multiple evolutionary and ecological topics or theories through a mix of seminal and current literature. Each student will be responsible for presenting on several topics - It will likely be most beneficial to you to choose topics that are directly related to your own thesis/dissertation project. Throughout the semester, you will work through each topic in turn and complete the following assignments:

1. Class Participation (33%)
Class participation makes up 1/3 of your grade - students will be assessed on their contribution to class discussion and on their professional conduct (including class attendance and on-time arrivals to class). Students are encouraged to ask questions, stimulate discussion and draw relevant attention to their field of study and past experience. You also must have completed the assigned reading to receive credit, which will be assessed via annotated bibliography entries on blackboard. You will not be awarded participation credit if you are not present or have not done the bibliography entry – you can miss 6 classes without penalty to allow students to stay home when sick or other unavoidable absences. After that, further missing attendance and work will drop the participation percentage proportionally.

Annotated bibliography entries
For each paper you read for class discussions (2 each week ≈ 30), and an additional 10 papers relevant to evolutionary or ecological theory that you select for your final paper (40 total), you will write annotated

bibliography entries with short descriptions of (i) what the paper is about; (ii) how it is relevant to you, particularly with respect to your research interests; and (iii) an example scientific statement citing the paper. These components will be discussed and demonstrated in class. The entries for papers for class discussion will be due before each class, and we will provide feedback as you go on the proper format.

2. In-Class presentations – (33%)

In a 15-30 minute presentation for each assigned topic, you will give some background to the topic demonstrating reading beyond the assigned paper, and you will come prepared to facilitate a good discussion during the remaining class time. *PowerPoint is allowed to provide some background for these presentations but should be limited to < 5 minutes of material or be used as a visual aid for figures/photos not found in the assigned paper to aid in class discussion.* You may also use the whiteboard. Note that due to the various instructors in the class, this may be somewhat flexible depending on who is teaching. Each student will give two presentations (one evolution, one ecology) and dates will be assigned on the first day of class.

3. Annotated Bibliography for final paper (individual project) (4%)

Start reading for your final paper early! Mid-way through the semester you will submit an annotated bibliography of some (at least 10) of the articles you will be using for your final paper. These annotated bibliography entries will include the same components described above.

Due by midnight on Thursday Oct. 23th. You may not submit this assignment late.

4. "Development of an Evolutionary or Ecological Theory" Final Paper (individual project) (30%)

For the paper (ca 4000 words + references) you will essentially conduct a literature review of one of the theories we discussed in class along the timeline of its development. The paper will include:

- The origins of the topic – description, what led to its development, how was it received by the research community?
- What are the main methods and in what locations/settings has this topic been explored?
- Major changes and advances to the topic since its creation: Include a discussion of at least 3-4 papers that substantially moved it forward
- The topic in its current state: How has it changed from its original form? What is most needed to test/develop the topic further?
- What are potential links to policy, application, or interdisciplinary research

The final paper will be due by midnight on Thursday Dec. 4th. A 10% point reduction will be applied for every day that the final paper is submitted late (i.e. if you submit at 1 am on Friday Dec. 5th, then your paper is late and has a 10% point reduction).

Date	**Topic** (Link for papers embedded each week)	Instructor
Tues Aug 26	Syllabus and presentation assignments	Both
Thur Aug 28	Species Concepts (de Queiroz, 2007) https://doi.org/10.1080/10635150701701083	Greenbaum
Tues Sept 2	DNA Barcoding and Species Delimitation (Emerson, 2025) **https://doi.org/10.1111/mec.17677**	Greenbaum
Thur Sept 4	AI and Integrative Taxonomy (Karbstein et al. 2024) https://doi.org/10.1016/j.tree.2023.11.002	Greenbaum
Tues Sept 9	Philosophy of Micro vs Macroevolution (Kearney et al. 2024) https://doi.org/10.1093/jeb/voae065	Greenbaum
Thur Sept 11	Hybridization and Species (Peñalba et al. 2024) https://cshperspectives.cshlp.org/content/16/12/a041445	Greenbaum
Tues Sept 16	Hybrid Specation (Rosser et al. 2024) https://doi.org/10.1038/s41586-024-07263-w	Greenbaum
Thur Sept 18	Adaptive Speciation (Blumer et al. 2025) DOI: 10.1126/science.adr9961	Greenbaum
Tues Sept 23	Traits to Survive Mass Extinction Event (Brownstein et al. 2025) **https://doi.org/10.1098/rsbl.2025.0157**	Greenbaum
Thur Sept 25	CRISPR and Conservation (Schwartz et al. 2025) https://doi.org/10.1016/j.tree.2024.11.011	Greenbaum
Tues Sept 30	IUCN Red List and Conservation (Simkins et al. 2025) https://doi.org/10.1371/journal.pbio.3003051	Greenbaum
Thur Oct 2	Collection Impacts on Mammal Communities (Hope et al. 2018) https://doi.org/10.1093/biosci/bix141	Greenbaum
Tues Oct 7	Importance of Collections (Nachman et al. 2023; Greenbaum, 2017a) https://doi.org/10.1371/journal.pbio.3002318	Greenbaum
Thur Oct 9	Taxonomic Impediment (Engel et al. 2021; Greenbaum, 2017b) https://doi.org/10.1093/zoolinnean/zlab072	Greenbaum
Tues Oct 14	Human Evolution and Anthropocene (Waring et al. 2025) **https://doi.org/10.1098/rstb.2022.0259**	Greenbaum
Thur Oct 16	Top questions in ecology	La Rue
Tues Oct 21	Macrosystems and landscape ecology	La Rue
Thur Oct 23	Ecological niche theory and differentiation ***Final paper bibliography due midnight 10/23 (no late submissions)***	La Rue
Tues Oct 28	Measuring animal behavior	La Rue
Thur Oct 30	Applied ecology: heterogeneity in range management	La Rue
Tues Nov 4	Open source data in ecology	La Rue
Thur Nov 6	Urban ecology and light pollution	La Rue
Tues Nov 11	Invasion versus climate induced range shifts	La Rue
Thur Nov 13	Long-term wildlife population dynamics and disturbance	La Rue
Tues Nov 18	Phylogeny and niche structure in plant communities	La Rue
Thur Nov 20	Chytrid fungi origins and global status	La Rue
Tues Nov 25	Global plant-mycorrhizal fungal diversity	La Rue
Tues Dec 2	Ecosystem ecology	La Rue
Thur Dec 4	Artificial intelligence in ecology ***Final paper due midnight 12/4 (10% penalty each day late)***	La Rue
Final Exams Dec 8-12		