**THE UNIVERSITY OF TEXAS AT EL PASO COLLEGE OF SCIENCE**
DEPARTMENT OF BIOLOGY & THE ENVIRONMENTAL SCIENCE PROGRAM

# Spring 2023 Syllabus for Ecosystem Ecology

## BIOL 4466 (CRN: 26692), BIOL 5301 (CRN: 21314), BIOL 6321 (CRN: 25989)

Instructor: Dr. Marguerite Mauritz, she/her (memauritz@utep.edu)

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# 1 Course Description

## 1.1 Overview

This course will cover principles of terrestrial ecosystem ecology through lectures, reading, and data-based inquiry. We will critically evaluate key concepts in ecosystem ecology and their relevance to society. Cycles are a prominent feature of ecosystem ecology and we will cover the physical and biological factors that control: energy cycles, water cycles, carbon cycles, and nutrient cycles. Ecosystem processes are connected at multiple scales in space and time, that do not necessarily conform to the boundaries imposed by humans. We will discuss ecosystem ecology in the context of natural, managed, and urban settings. We will consider the role of above- and below-ground processes, plant-, animal-, and human-dynamics. We will cover some of the technologies used to collect ecological data. Lab exercises will engage students with real datasets to explore ecological principles and gain experience with data analysis, interpretation, and visualization.

## 1.2 Instructor

Below is a table of ways to contact me, choosing a contact method, and my typical response time.

| Method | Detail | Time available | Response time | Why? |
|---|---|---|---|---|
| Ask in class or ask your peers in labs | In class | ***Try this first*** | Immediate. | Build peer community, figure out assignments, understand course material, coding help |
| Office Hours | B415 | Wednesday 1.30-2.30pm | Immediate | A good place to have a 1-to-1 conversation and get immediate answers. |
| E-mail/Black board message | memauritz @utep.edu | M-F, 9am – 5pm, not guaranteed outside these times | 1-3 hours | Any: Concerns, questions, assignment help |

## 1.3 Timing and Deadlines

| **Content** | **Time** | **Deadline/Frequency** |
|---|---|---|
| Lectures | T/Th 9-10:20 | Twice per week |
| Literature Reviews | Choice of 2 | Sunday 23:59 in weeks of your choice. |
| Lab | T 13:30-16:20 | Due at the end of lab |
| Mini Quizzes | Th 11:00 | Due Monday 23:59 |
| Final Project | Last two weeks | 30 Apr 23:59 |
| Final Exam | Exam week | May 10 23:59 |

# 2 Learning Objectives

This course includes a combination of lectures, data analyses (labs), assignments, discussion boards, and a final exam focusing on ecosystem ecology and ecological data analysis. The primary objectives are to:

1. Learn important theories, methods, and technologies used in ecosystem ecology.
2. Analyze real ecological datasets.
3. Critically evaluate key concepts and approaches in ecosystem ecology.
4. Read, discuss, and synthesize current ecosystem ecology literature and data in written and discussion-style formats.
5. Discuss and reflect on the social, cultural, and political contexts in which we do ecology, what this means for science and society, and the importance of ecology for society.

# 3 Course Materials

Blackboard will be the primary platform for accessing course materials, the synchronous discussion, and for office hours. I may rely on Microsoft Teams for some direct interactions.

## 2.1 Reading

**Textbook:** Principles of Terrestrial Ecosystem Ecology by Chapin, Matson and Mooney. *This textbook will be provided as an Ebook on the class Blackboard site with relevant chapters referred to in class schedule.*

**Additional:** Weekly lecture material will be accompanied with peer-reviewed literature and other materials to reflect contemporary views and relate to student interests. *Students are welcome to make suggestions!*

## 2.2 Software

Labs will almost entirely rely on statistical software package *R* (a free, open-source software environment for data analysis and visualization, available via www.r-project.org). If you anticipate issues with accessing these resources, please let me know.

# 4 Attendance

Attendance is required for all lectures and labs, unless specifically indicated in the schedule. For labs I expect everyone to show up at the beginning of lab. You are free to leave when you feel you have adequately completed the exercise.

## 5 Course Assessment

This is a grid of the assessment structure and places with flexibility. Read below for descriptions.

| **Grade Component** | **Percent of grade** | **Frequency** | **Flexibility** | **Grad students** |
|---|---|---|---|---|
| Participation and Engagement | 15% | During semester | Choose questions and engagement activity | |
| Literature Review | 10% | 2 topics | Choose 2 readings or EEB seminar | Instead choose 1 topic to develop either: *Education Module, *Conceptual Diagram, *Trace a Concept |
| Labs | 40% | Weekly | Drop lowest grade, Option to redo 2 | |
| Mini quizzes | 10% | Weekly | None | |
| Final: Lab | 25% | 2 weeks, end of semester | Choose 10% or 15% allocation | Instead develop an analysis with your own data |
| Final: Take Home | | 1 week, end of semester | Choose 10% or 15% allocation | |

## 5.1 Participation and Engagement (15%)

Active engagement and curiosity are crucial for learning. In this class we will foster both by asking questions and exploring beyond the classroom. This grade will consist of two parts – formulating questions and engaging with ecology around El Paso.

**Questions:** you should submit at least 4 questions to me throughout the semester (~1 every 3 weeks). These questions can address any ecological concept or process that is relevant to topics we cover in lectures or labs. For example: *more explanation, additional examples, clarifying your own understanding, connections between topics, application, etc.* You may submit a question that you also asked during class.

**Ecology around El Paso:** Engage with the ecology or environmental issues in the El Paso region and write a 300-500 word reflection). The written reflection should include (a) what you did, (b) why you picked a particular activity, (c) what ecological processes you observed or learned about, (d) one thing that was new to you/surprised you/or you particularly liked the way it was presented.

Possible options include going for a hike (eg: Franklin Mountains State Park Tom Mays or Chuck Heinrich, Billy Rogers Arroyo Park, Lost Dog, Westside Open Reserve, Rio Bosque, Hueco Tanks, River Trail), visiting a city park, visiting an environment-focused museum (eg: Tec$H_2O$ Learning Center, El Paso Museum of Archaeology, Franklin Mountains Visitor Center), participate in a volunteer or organized activity (eg: Frontera Land Alliance, Insights DinoTrack Tour or Nature Challenge, Franklin Mountains State Park guided hikes). I'd love to hear if you have other ideas – you can run them by me to make sure they'll count!

## 5.2 Literature Review (10%)

Choose two class readings to write a 400-500 word summary of the paper. You can choose the weeks that you find most interesting. The summary should describe the question/goal of the paper, methodology used, key results, main conclusions, and two reflective comments. The two comments could be: what you learned, a question (eg: about a concept, a method, a definition), an example that connects the reading to something else you know about, a link to the labs, related news/media content, or an aspect you would like to explore further. You may draw a figure or diagram to summarize the work. You are also welcome to choose your own reading from the peer-reviewed scientific literature (check with me!). During the semester I will announce seminars from the EEB weekly seminar series. If you attend, you can write your review based on the seminar.

## 5.3 Labs (40%)

Labs will engage you in the scientific process and will build in complexity through the semester. The early labs will focus heavily on building skills for working with data in R with the emphasis

shifting increasingly to data and analytical interpretation. As the class progresses you will be expected to apply R-code from the earlier labs. Labs will generally use real, publicly available datasets to provide a realistic reflection of what ecosystem ecology and data analysis are like. I encourage you to communicate with your peers to complete labs, however the work you turn in **must be your own**. Even if your goal is not to become an ecosystem ecologist, it is my hope that you will learn skills that are widely applicable, eg: R and data-management skills, making inference from data, recognizing limitations of datasets, problem-solving, complex analysis, presenting data-based conclusions and opinions.

Every lab will have a component that is due once per week. Assessment criteria and submission instructions will be provided with each lab since each will be slightly different. The emphasis will be on learning, progress, and critical thought. Assignments will require some description of the process you followed and how you arrived at a given conclusion. The labs will be self-graded, which means that after assignments have been submitted, I will release the answer-key for you to grade your own assignments. The purpose of this is to encourage you to review the answers and build coding skills through the semester. I will check your self-grading and unless the grade is entirely unjustified, you will receive the grade you give yourself. Grades will be provided each week.

Labs will be weighted equally for grading. You will automatically drop the lowest grade and have the option to re-submit two labs before the final (see section 6.2).

## 5.4 Mini quizzes (10%)

Short quizzes will be given each week. These are check-points to help you keep on-track with the material and help me to regularly assess class comprehension.

## 5.5 Final Assessment (15% + 10 % = 25%)

The final assessment will have two components: a final lab and a final take-home exam. I will ask you to choose between 10% or 15% allocation for each component.

You will develop the final lab based on your interests and will build on tools and skills from the semester labs. You could adapt a semester lab and apply it to a different dataset, explore a different aspect of a dataset we have already used, develop the visual presentation components of an existing lab. The instructor will help you develop your idea.

The exam will be a take-home, open-book exam, given in the last week. The exam will comprise multiple choice, short answer, and long answer questions. The final will test foundational knowledge and problem-solving skills related to the objectives of this course. It will cover all lectures, lab assignments, assigned reading, discussion topics.

# 6 Grading Policy

## 6.1 Group Work and Discussion

Students are encouraged to communicate with each other to work through challenges and exchange ideas during the labs and for literature reviews. **The work you submit should however be your own: in your own words and your perspective. See section 9 for permitted use of generative AI tools.**

## 6.2 Make-up Policy

You have the option of re-submitting 2 lab exercises before finals week to improve the grade on them. If you re-submit an assignment it MUST be your own work, in your own words. Plagiarism and reproducing work of others will not be tolerated.

## 6.3 Mini quizzes and Final

Mini quizzes can only be taken in the week they are given. Final exams cannot be retaken or submitted late.

# 7 Grading Scale

Grading rubrics will be made available for questions/engagement, literature reviews, and labs. Final course grades will be assigned using the following percentage categories:
>90% (A)
80-90% (B)
70-80% (C)
60-70% (D)
< 60% (F)

# 8 Respectful conduct

Students are expected to conduct themselves in a professional manner during all peer and instructor engagement. Learning requires mutual respect that maintains the rights, safety, dignity, and worth of every individual. Each of us comes from a different background with different life experiences and perspectives. We need to be sensitive to the situation of others and also be prepared to listen. By sharing ideas and respecting difference, we can thrive, learn,

and grow. Disagreement is valuable to growing our perspective, when done with respect. This takes work.

With online and message-based interactions it's particularly easy to forget there is a person at the other end of our messages. Please consider this before you post. **Statements that attack race, origin, sexual orientation, gender-identity, personal appearance, or individual identity will not be tolerated.** *If you have any concerns, your first step should be to notify me via email.*

## 9 Academic Integrity Policy:

*You learn more if the work is your own.*

**Academic integrity** is the pursuit of scholarship free from fraud and deception. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabrication of information or citations, facilitating acts of dishonesty by others, possessing unauthorized copies of examinations, submitting the work of others claimed as one's own, submitting work used for other classes (without the knowledge of the instructor) or tampering with the work of other students. Instances of academic dishonesty threaten the atmosphere of trust and free exchange of ideas. Such instances will result in a discussion with the instructor. Depending on the severity of the infraction, the offending student will receive a failing grade for work discovered to be fraudulent or the student may be dismissed from the class with a failing grade.

**Generative artificial Intelligence (AI) tools** (eg: ChatGPT) are powerful and worth learning how to use productively. In this class, you may use AI tools for coding in the lab assignments. It's important to know that you are responsible for the information submitted based on AI-generated materials and must ensure they are correct and do not violate academic honesty standards. You must acknowledge the use of AI tools, even if only to generate ideas. When using AI tools include an appendix that describes (a) a citation of the exact AI tools used, (b) an explanation of why the tools were used (eg: to generate ideas, to surmount a barrier to code or writer's block, to stimulate thinking/ideas, to get started faster, to save time, to clarify a concept, to experiment, translation, etc.), (c) copy-paste of the entire exchange with most relevant sections highlighted. AI generated text does not substitute for a scientific citation. If in doubt, ask me.

Do not use generative AI for quizzes or exams.

More information on academic honesty can be found at the UTEP Office of Student Conduct and Conflict Resolution: https://www.utep.edu/student-affairs/osccr/student-conduct/academic-integrity.html. Criteria for generative AI are based on sample syllabus policy statements from UT Austin.

## 10 Accommodations and Support Services

If a student has or suspects they have a situation that needs accommodation, they should contact the Center for Accommodations and Support Services, cass@utep.edu or https://www.utep.edu/student-affairs/cass/ . The student is responsible for presenting the instructor with any accommodation letters and instructions.

## 11 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.

# 12 Course Schedule

| Week | Date | Lecture | Quiz (Thursday) | Lab (Tuesday) |
|---|---|---|---|---|
| 1 T | 16-Jan | The Ecosystem Concept | | *no lab* |
| 1 Th | 18-Jan | Climate | Ecosystem Concept | |
| 2 T | 23-Jan | Climate | | Lab 1 |
| 2 Th | 25-Jan | Texas as Art (Chihuahuan Desert Museum) | Climate | |
| 3 T | 30-Jan | Geology/H2O & Energy balance | | Lab 2 (part I and II) |
| 3 Th | 1-Feb | H2O & energy balance | H2O & Energy balance | |
| 4 T | 6-Feb | Carbon dynamics/Plant nutrients | | Lab 3 (Energy balance) |
| 4 Th | 8-Feb | Carbon dynamics/Plant nutrients | Carbon dynamics | |
| 5 T | 13-Feb | Decomposition/Trophic dynamics | | Lab 4 (Carbon dynamics) |
| 5 Th | 15-Feb | Decomposition/Trophic dynamics | Decomposition/Trophic dynamics | |
| 6 T | 20-Feb | The microbiome/Phenology | | Lab 5 (Nutrients and trophic dynamics) |
| 6 Th | 22-Feb | The microbiome/Phenology | Microbiome/ Phenology | |
| 7 T | 27-Feb | Temporal/Spatial | | Lab 6 (Phenology) |
| 7 Th | 29-Feb | Temporal/Spatial | Temporal/Spatial Ecology | |
| 8 T | 5-Mar | Data in Ecology/Earth Systems Models | | Lab 7 (Data in ecology) |
| 8 Th | 7-Mar | Data in Ecology/Earth Systems Models | Data & Models | |
| 9 T | 12-Mar | SPRING BREAK | | |
| 9 Th | 14-Mar | | | |
| 10 T | 19-Mar | Aquatic | | Lab 7 TBD |
| 10 Th | 21-Mar | Disease/Disturbance ecology | Aquatic/Goods and Services | |
| 11 T | 26-Mar | Disease/Disturbance ecology | | Lab 8 (Disease/Disturbance) |

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|---|---|---|---|---|
| 11 Th | 28-Mar | Ecosystem goods & services | Disease/Disturbance | |
| 12 T | 2-Apr | Ecosystem goods & services/ Chihuahuan Desert Garden | | Lab 9 (Ecosystem Goods and Services) |
| 12 Th | 4-Apr | Urban/Global Footprint | Ecosystem goods & services | |
| 13 T | 9-Apr | Urban/Global Footprint | | Lab 10 (Urban Ecology) |
| 13 Th | 11-Apr | Communicating Ecological Issues | Urban/Global Footprint | |
| 14 T | 16-Apr | Communicating Ecological Issues | | Communicating Ecological Issues |
| 14 Th | 18-Apr | FINAL PROJECT | *no quizzes* | FINAL PROJECT |
| 15 T | 23-Apr | | | |
| 15 Th | 25-Apr | | | |
| 16 T | 30-Apr | | | |
| 16 Th | 2-May | FINAL PROJECT PRESENTATIONS | | |
| 17 T | 7-May | FINALS WEEK | | FINAL EXAM |
| 17 Th | 9-May | | | |
| *Yellow highlights are potential guest lectures* | | | | |
| *Green highlights are outside the classroom* | | | | |

***** the schedule is subject to slight changes and modifications. I will notify you of changes. ******