ECOL 320E Ecological Systems

Course Description

The course includes basic concepts in Ecology moving from the organism level to biosphere, including populations, communities, biome, and their interactions. Processes and organization in terrestrial habitats have special mention.

Aspects such as the use of technology to reduce environmental impacts and reconcile human development with environmental stewardship while recognizing the importance of socioeconomic factors in achieving these goals will be analyzed.

Practical activities, where knowledge acquired during the lectures is applied, are included in the course, as well as field exercises involving data collection: observations and measurement for testing hypotheses and drawing conclusions (scientific method).

No previous knowledge on Ecology is required, however biological background is desired. If you want to know more about Ecology as a scientific discipline, visit the Ecological Society of America web page: https://www.esa.org/about/what-does-ecology-have-to-do-with-me/

Course Goals and Methodology

The course aims to introduce the student to the science of Ecology. It will focus on the study of ecosystems, their components, and interactions between abiotic, biotic, and living organisms. Basic principles of Ecology, emphasizing population, community, biomes and ecosystems, are approached relying on different tools to learn about them.

Lectures will emphasize general principles and models. Case studies from the literature will be used to exemplify natural phenomena. The course also focuses on the application of ecological principles in solving environmental problems. Field and laboratory activities will offer students hands-on opportunities to examine natural processes, and to collect, analyze and interpret data. Students will also conduct independent research projects.

Learning Objectives

Ecological systems is intended for Biological Science majors & minors and for students who required a science base course. The course will examine the structure and function of ecological systems, including individuals, populations, communities, biomes and ecosystems, and the influence of society on the biosphere. By the end of the semester, students who complete all necessary assignments will be able to:

1. 1understand major concepts and terminology in the field of ecology;
2. identify mechanisms of adaptation to arid environments;
3. be able to apply quantitative tools (simple mathematical models and statistics) to ecological problems;
4. produce a scientific paper from experimental design and data gathering to writing up;
5. be prepared to pursue advanced study in ecology, if they choose.

Required Texts

The course materials will be uploaded to the course's page on Blackboard Learn platform, from where the students can access them.

Useful texts on Ecology are:
Textbook:

- Beeby, A. and Brehnnan, A.M. (2004). First Ecology. 2nd Edition. Oxford University Press, 317.
- Begon, M., Harper, J.L. & Townsend, C.R. (2006). Ecology. 4th Edition. Blackwell Science. Milan, Italy. 1143p.
- Dodson, S.I. et al. (1998) Ecology. 1st Edition. Oxford University Press, Inc. New York. 433p.
- Kormondy, E.J. (1996) Concepts of Ecology. 4th Edition. Prentice Hall. New York. 559 p.
- Molles, M.C. (2008) Ecology: Concepts and Applications. 4th Edition. McGraw-Hill Companies, Inc. United States of America. 586 p.
- Ricklefs, R. E. The Economy of Nature, 6th Edition. 2008. WH Freeman and Co. (ISBN 9780716738831).

Course Requirements and Grading

Assessment will involve a midterm and a final exam (all written), several assignments, described below, and a final paper which will be evaluated through their content and oral presentation in class. Finally, students will be required to complete assigned readings/summarize articles etc. outside class and to actively participate in class discussions, which will be reflected in their 'participation' grade. (N.B.: 'being there' is not = 'participation')

- Class Participation 20%
- Homework 5%
- Assignments 25%
- Midterm Exam 15%
- Final Paper 15%
- Final Exam 20%

Assignments to be completed by students

There will be six assignments worth a total of 3.0 points (30%) towards your final grade. Detailed instructions for each assignment will be given in class. Dates for assignments to be completed will be announced in class with time enough for the students to complete them all in a comfortable way. All students will complete all minimum calculations and answers to posed questions in each activity.

Assignments:

Assignment	Points	Percentage (%)
Climate Diagram	0.50	25%
Soil properties	0.50	
Biome video	0.50	
Population size estimation	0.50	
Life Tables	0.50	

Final paper (15%): This short analytical essay provides students with the opportunity to articulate and apply key terms and concepts from the course and use them to discuss topics in which they are interested. In this essay you will select theoretical concepts, using them to a study case, an example from real life, or a topic in which you are interested.

The objective here is to relate theory with current hot topic regarding ecology that happen, and to deepen into those theoretical notions that you find interesting. There is an additional space for you to reflect about how learning about these concepts is affecting (or not) your perceptions of nature and the way in which humans interfere with the functioning of it.

Format: maximum 3 pages in length (including a paragraph for personal reflection), 1.5 spaced, with 11 pt Calibri font. In addition to this, each essay should contain a Bibliography section referring to the academic sources used, **using CSE style** (Name Year):

- In-Text Citation (Name-Year)
  - Format: (Author Year)
  - Example:
    Paraphrasing: (Smith 2020)
    Direct quote: (Smith 2020, p. 45)
- Reference List (Name-Year)
  - Format for Books:
    - Author(s). Year. Title of Book. Publisher.
    - Example: Smith, J. 2020. The Importance of Sleep in Education. Sleep Press.
  - Format for Journal Articles:
    - Author(s). Year. Title of article. Journal Name. Volume (Issue): Page numbers.
    - Example: Johnson, L., and M. Lee. 2019. The effects of sleep on academic performance. Journal of Educational Psychology. 112(3):300-312.
  - Format for Websites:
    - Author(s). Year. Title of webpage. Publisher (if applicable). Available from: URL
    - Example: Williams, R. 2018. How Sleep Affects Brain Function. National Sleep Foundation. Available from: https://www.sleepfoundation.org

Keep in mind: Essays will be evaluated according to the rubric included in this syllabus. Please make sure you consider this before submitting it.

Submission: The essay must be submitted electronically prior to the start of class on April 28th.

Presentation: during the last classes student will present their essay to the class, explaining their work and briefly discussing it and answering questions from their classmates.

Rubric for Final Paper

Grading / Aspect	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Identification of topic and analysis	Main topic is clearly identified, analysis focusses on concrete aspects of it, parts connected with each other and related to concepts described during the course. The analysis is thorough, with well-supported arguments and evidence.	There is a main topic identified, and analyzed in general terms and it is related to concepts described during the course, though some aspects could be expanded or clarified.	The topic is somewhat clear, but the analysis lacks depth or clear evidence in some parts.	Student does not identify the topic or jumps from topic to topic. The analysis is shallow or lacks evidence.
Personal perspective and position	The personal perspective is clearly articulated, with a well-reasoned and supported position. Shows critical thinking based on academic sources.	The personal perspective is clear, and the position is supported, but may not be fully developed or well-reasoned.	The personal perspective is present but lacks strong reasoning or support.	The personal perspective is unclear, or the position is weak or unsupported.
Format and Organization	The paper follows the required format, is well-organized, and flows logically with smooth transitions. Includes proper source referencing in-text and in the reference list.	The paper follows the format with minimal organizational issues. Transitions are mostly smooth. Source references are included in-text and in the reference list with minor errors.	The paper is somewhat disorganized or does not fully adhere to the format. Transitions may be unclear. Source references are included but may have significant formatting issues.	The paper lacks clear organization, does not follow the required format, or is difficult to follow. Source references are missing, incorrectly formatted, or only refers to webpages and websites.
Presentation	The topic is clearly defined and mastered in the presentation. The presentation is clear, engaging, and well-rehearsed. The speaker is confident and uses visuals effectively. The student stays in the allotted time.	The topic is clearly defined and presented, with minor lapses in delivery. The speaker is mostly confident, only additional notes are needed as support.	The topic is not clearly defined and the presentation is somewhat unclear or lacks engagement. The student is not understandable and may seem unprepared or unsure.	The presentation is unclear, disorganized, or unengaging. The speaker may be unprepared or lack confidence.
Use of Visuals/Supporting Materials	Visuals and supporting materials enhance understanding and are expertly integrated into the presentation.	Visuals and supporting materials are effective but may not be fully integrated or may be slightly distracting.	Visuals and supporting materials are used, but they do not add much value or may be unclear.	Visuals and supporting materials are lacking, irrelevant, or distracting.

Grade conversion table (some universities may use a slightly different scale)

SPANISH GRADE	10	9.5 – 9.9	9.0 – 9.4	8.5 – 8.9	8.0 – 8.4	7.5 – 7.9	7.0 – 7.4	6.5 – 6.9	6.0 – 6.4	5.5 – 5.9	5.0 – 5.4	0 - 4.9
U.S. GRADE	A+	A	A-	B+	B	B	B-	C+	C	C	C-	F

General Course Policies

- Please keep your cell phones turned off during class.
- Each assignment hand in will have specific instructions. Assignments that will be handed in electronically should be in Word (.docx) format. Formats like pdf, odt, gift, tiff, etc., will not be taken. Only a hard copy can substitute the Word electronic format.
- Appointments with the instructor can be made face to face or through e-mail.
- Class participation is an important learning method that will be continually used and evaluated.

Laptops and tablets in class

Laptops will only be used during the lectures for determined, previously announced, activities.

I encourage you to take handwritten notes during lectures, rather than using a laptop. My lectures will include graphs, which are not easy to produce in typed notes. In addition, studies have shown that students typing notes on a laptop do not process and retain information as well as those taking notes by hand.

Laptop screens can also be distracting to other students in the course as well as myself. This is the reason **no computers, tablets or phones during the class are allowed. Their use will be considered as a lack of participation and as such, it may affect the final grade of students using those devices.**

About using Artificial Intelligence (AI)

The use of AI tools such as grammar checkers, ChatGPT, etc. and automatic translation tools is prohibited unless expressly permitted by the instructor to enhance the students' learning experience. Plagiarism includes, but is not limited to, the unacknowledged use of these tools to create content submitted as one's own. If the use of any of these tools is suspected, the instructor may request notes and other materials used in preparing assignments. Students must retain these materials until final grades are posted. Failure to produce these materials when requested may negatively impact the student's grades.

Student Engagement Policy

Student's engagement will account for at least 20% of the final grade for every course, thus highlighting its significance for high-impact learning.

Students will receive two engagement grades: a mid-term grade (at least 10%) and an end-of-semester grade (at least 10%).

An engagement rubric is provided to ensure transparent and consistent grading.

RUBRIC

Criteria	Exemplary (9-10)	Proficient (7-8)	Passing (5-6)	Poor (0-4)
Attendance	Arrives on time and stays for the entire duration of class. No absences, or if absent once, demonstrates knowledge of course material missed.	Misses no more than two sessions or is occasionally late. Demonstrates knowledge of course material missed.	Misses 3 or 4 sessions or frequently arrives late/leaves early; exhibits little knowledge/interest regarding course material missed.	Misses 5 or more sessions and does not demonstrate knowledge of course material missed.
Preparation	Consistently well-prepared; demonstrates deep understanding of readings and completes assignments.	Usually prepared; completes readings with some understanding and usually completes assignments.	Occasionally prepared. Demonstrates limited understanding of materials and occasionally completes assignments.	Rarely prepared; minimal effort to engage with course materials.
Participation	Actively participates in discussions with thoughtful comments/questions ; demonstrates knowledge of the material and critical thinking skills.	Participates often demonstrating knowledge of material and critical thinking skills.	Participates once in a while or contributions lack depth or relevance.	Does not participate or is disruptive during discussions.
Attentiveness & Respect	Fully engaged and attentive during all sessions; respectful to professor and fellow students. Use of laptop/tablet for notetaking only; no cellphone use.	Generally attentive, with very infrequent lapses in focus and use of electronic devices for non-class related purposes. Respectful to professor and fellow students.	Occasionally inattentive or disengaged. Use of electronic devices for non-class related purposes thus showing disrespect towards professor and fellow students.	Rarely attentive, focused or responsive. Repeated use of electronic devices for non-class related purposes thus showing disrespect towards professor and fellow students.
Collaboration & Feedback	Effectively collaborates with peers in group or in-class activities following professor's instructions. Incorporates feedback to improve learning & performance.	Collaborates frequently with peers or in in-class activities. Incorporates feedback and makes moderate efforts to improve learning & performance.	Occasionally works well with peers but does not contribute substantially to in-class or group assignments. Responds to feedback inconsistently with minimal improvement.	Does not collaborate with peers, does not complete in-class or group assignments. Ignores feedback.

Absences and lack of engagement

Absences during the add/drop period do not count against students' engagement grade, but may impact their performance in the course.

As a consistent lack of academic engagement may raise concerns about a student's overall academic performance, the following steps will be taken in order to support students' success:

Initial outreach – after missing 3 classes
E-mail from professor reiterating engagement policy and consequences for additional absences.

Second outreach – after missing 4 classes
E-mail from professor and notification of academic staff at the International office.

Academic probation – after missing 6 classes
Student is called in for a meeting with academic staff at the International office. Automatic notification of home institution and further academic consequences.

Any additional absences will result in a failing grade.

Missed or Late Work

Assignments handed in later than 24 hours after the deadline **will not be evaluated**.

Assignments handed in within the first 24 hours after the deadline will count **half** of their maximum value.

Academic Honesty

Academic integrity is a guiding principle for all academic activity at Pablo de Olavide University. Cheating on exams and plagiarism (which includes copying from the internet) are clear violations of academic honesty. A student is guilty of plagiarism when he or she presents another person's intellectual property as his or her own. The penalty for plagiarism and cheating is a failing grade for the assignment/exam and a failing grade for the course. Avoid plagiarism by citing sources properly (using footnotes or endnotes and a bibliography).

Learning Accommodations

If you require special accommodations, you must stop by the International Center to speak to Marta Carrillo to either turn in your documentation or to confirm that our office has received. Marta will explain the options available to you.

Behavior Policy

Students are expected to show integrity and act in a professional and respectful manner at all times. A student's attitude in class may influence his/her participation grade. The professor has a right to ask a student to leave the classroom if the student is unruly or appears intoxicated. If a student is asked to leave the classroom, that day will count as an absence regardless of how long the student has been in class.

Course Contents

1. **Introduction**: Main concepts in Ecology.
2. **The soil as a living organism**: The importance of soil for the maintenance of life. The meaning of Soil respiration. How to measure soil respiration. Variables that influence soil respiration. Calculations on soil respiration.
3. **The Mediterranean climate**: Environmental conditions the areas of the world with Mediterranean type of climate. Effect of temperature on organisms. Moisture and water availability ecology. Biomes
4. **Carbon cycle**. Importance of carbon. Main elements of the cycle of the element in the environment. Climate change.
5. **Effect of climate variables on living organisms**: Light, temperature and precipitation and how to measure them. Climate vs weather. Climatic diagrams. Adaptations shown by animals and plants to cope with environmental variables. The 10' rule. Breaking ecosystems services.
6. **Biomes of the world**: Main properties; location of the biomes; variations in light, precipitation, temperature and productivity. Threats to the biome.
7. **Dispersal and distributions**: Mechanisms and modes of dispersal used by organisms. Alien organisms and their effect in ecosystems. Changes induced by introduced species. Why species reach a new environment.
8. **Population Ecology and interactions**: Properties of populations: density, dispersion of individuals, age structure. Population growth and regulation. Immigration and emigration. K and r strategists. Intra-specific competition.
9. **Life tables and demography**: Horizontal and vertical life tables. Generation time, life expectancy.
10. **Species interactions**: Types of interactions. Competition. Predation, parasitism, mutualism, commensalism. Coevolution. r-selection and k-selection.
11. **Communities Ecology**: Patterns and process. Communities properties. Types of organisms in communities. Disturbances as drivers of change. Ecological succession and the concept of climax.
12. **Ecosystems Ecology**: Production in Ecosystems. Trophic structure. Secondary productivity. Energy distribution through the ecosystem.
13. **Hot topics**. Students will choose a topic from any of the one proposed by the instructor about ecological crises and other ecological aspects of interest for society.

List of hot topics in Ecology (this list can be modified)

1. The extinction of bees
2. The carbon tax
3. Green education
4. Nature-Deficit disorder
5. Circular Economy
6. The Carbon crisis
7. The Phosphorus crisis
8. The water crisis
9. The green revolution
10. Loss of diversity
11. National Parks
12. Landscape ecology
13. Waste management
14. Bioremediation
15. Fracking
16. Renewable energies
17. The need for nuclear energy
18. Global change
19. The unseen minority
20. Micro algae
21. Land Restauration
22. Ecosystems fragmentation
23. Species recovery
24. Reactive nitrogen in the atmosphere

Course Schedule

Session	Topic	Activity
1	**Course presentation.**	Overview of the course.
2	**Introduction to Ecology**	Lecture 1. Lecture in class.
3	**The Mediterranean Climate**	Lecture 2. Learn how to produce a climate diagram. Homework due Feb. 17th
4	**Carbon cycle I**	Lecture 3. Lecture in class.
5	**Carbon cycle II**	Lecture 4. Lecture in class.
6	**The soil as living organism**	Lecture 5. Lecture in class. Hand in climate diagram.
7	**Soil properties**	Field work. Report due Mar 10th.
8	**Effects of climate variables on living organisms I**	Lecture 6. Lecture in class.
9	**Effects of climate variables on living organisms II**	Lecture 7. Lecture in class. Instructions to biome video. Presentation on Mar 24th.
10	**Biotechnology and Sustainability**	Visit to Instituto de la Grasa (Spanish National Research Council).
11	**Industrial Ecology**	Lecture 8. Lecture in class. Hand in soil report.
12	**Pre-exam questions and answers**	
13	**Mid-term exam**	
14	**Dispersal and distribution.**	Lecture 9. Lecture in class.
15	**Biomes of the world**	Presentations in class.
16	**Introduction to Population Ecology**	Lecture 10. Lecture in class. Hot topic choosing for final paper. Due date April 28th.
17	**Population size estimation**	Field work. Report due April 7th
18	**Life tables and demography**	Lecture 11. Lecture in class. Assignment due April 21st
19	**Population growth**	Lecture 12. Lecture in class. Hand in field work report.
20	**What are communities?**	Lecture 13. Lecture in class.
21	**Interactions**	Lecture 14. Lecture in class. Hand in assignment.
22	**Interaction bingo**	Group activity in class
23	**Ecological Systems**	Hand in final paper. Presentations in class.
24	**Ecological Systems**	Presentations in class.
25	**Pre-exam questions and answers**	
26	**Final exam**	