



ECOL 320E Ecological Systems

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Office Hours: Tue & Thu 16:00-17:30

Course Information:
Spring 2023
Mon & Wed (16:00-17:20)

Course Description

Course Goals and Methodology

The course aims to introduce the student to the science of Ecology. We will focus on the study of ecosystems, their components, and the interactions between abiotic, biotic, and living organisms. We will study the basic principles of ecology, emphasizing population, community, and ecosystem ecology. We will rely on different approaches to learn about Ecology and the way ecologists study natural systems. Lectures will emphasize general principles and models that underline this theory. 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. The field and laboratory activities will offer students hands-on opportunities to examine natural process, and to collect, analyze and interpret data. Students will also conduct independent research projects.

Learning Objectives

This course 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, 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. understand 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: Ricklefs, R. E. *The Economy of Nature*, 6th Edition. 2008. WH Freeman and Co. (ISBN 9780716738831).

Beeby, A. and Brehnnan, A.M. (2004). *First Ecology*. Second Edition. Oxford University Press, 317.

Begon, M., Harper, J.L. & Townsend, C.R. (1996) *Ecology*. Third Edition. Blackwell

Science. Milan, Italy. 1143p.

Dodson, S.I. *et al.* (1998) *Ecology*. First Edition. Oxford University Press, Inc. New York. 433p.

Kormondy, E.J. (1996) *Concepts of Ecology*. Fourth Edition. Prentice Hall. New York. 559 p.

Molles, M.C. (2002) *Ecology: Concepts and Applications*. Second Edition. McGraw-Hill Companies, Inc. United States of America. 586 p.

Smith, R.L. & Smith, T.M. (2001) *Ecology and Field Biology*. Sixth Edition. Addison Wesley Longman, Inc. United States of America. 771 p.

Smith, R.L. & Smith, T.M. (2000) *Elements of Ecology*. Fourth Edition. Addison Wesley Longman, Inc. United States of America. 567 p.

Multimedia support

Available at UPO library (name of DVD or CD-ROM followed by library code)

- Biomes, 551 BIO
- Ecology, 504 ECO
- Desertification, 504.5 DES
- Living things & their environments, 574 LIV
- Population Genetics & Evolution, 575 AP

Stiling, P.D. (1992) *Ecology. Theories and Applications*. Second Edition. Prentice Hall. New Jersey. 539 p.

Voght, K.A. *et al.* (1996) *Ecosystems. Balancing Science with Management*. First Edition. Springer-Verlag. New York. 470 p.

General Course Policies

- Please keep your cell phones turned off during class.
- All assignments will be handed in electronically in word (.doc) 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 via e-mail.
- Class participation is an important learning method that will be continually used and evaluated.

Laptops and tablets in class

I encourage you to take handwritten notes during lectures, rather than using a laptop. My lectures will almost always 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 why **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.**

Course Requirements and Grading

Assessment will involve a midterm and a final exam (all written) and a final paper that will be evaluated through its content (in pairs/small groups) on a relevant set topic based on lab and field- work. (N.B. students will be graded individually). 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' does not = 'participation').

Midterm Exam	20%
Homework	25%
Final Exam	25%
Class Participation	10%
Final Paper	20%

Assignments to be completed by students:

There will be five assignments worth a total of 2.5 points (25%) 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. One of the assignments will be on plant competition and students will produce their own data to write up the compulsory final paper. All students will complete all minimum calculations and answers to posed questions in each activity.

Assignments:

Climate Diagram	(0.50)	}	25%
Soil Respiration	(0.50)		
Distance methods	(0.50)		
Life Tables	(0.50)		
Biome presentation	(0.50)		
Final Paper on a hot topic	(20%)		

Final paper (20%): 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 in reality, and to deepen into those theoretical notions that you find interesting. Complementing this, 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 2 pages in length (including a paragraph for personal reflection), 1.5 spaced, with 11-12pt Times new roman font. In addition to this, each essay should contain a *Bibliography* section referring to the academic sources used, **using APA style.**

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 the 19th

Presentation: during the last classes student will present their essay to the class, explaining their work and briefly discussing it with questions. These presentations will be scheduled in class.

Rubric for Final Paper

Aspect/grading	Poor (5-7)	Well done (7-9)	Excellent: 10
Identification of topic and analysis	Student does not identify the topic, or jumps from topic to topic	There is a main topic identified, and analyzed in general terms	Main topic is identified, analysis focusses on concrete aspects of it, parts connected with each other.
Personal perspective and position	Personal views are identified and developed, but there is no use of academic sources /There are sources, but none comes from academic materials	Personal views are identified and developed, but student uses for analysis sources others than academic materials.	Personal views are identified and developed, & student uses for the analysis academic sources.
Format	Students do not refer to any academic sources	Student refers to sources used but only in the references section	Student refers to sources used in the body of text & provides full details using official systems (APA, MLA)



Rubric for Participation in class

Skills /Grading	Inadequate	Average	Exemplary
Level of engagement, active participation	Student never contributes to class discussions	Student contributes to class discussions proactively, but not frequently	Proactively and regularly contributes to class discussions, sometimes initiating discussions on issues related to class topics
Relevance of contribution to topic under discussion	Contributions when made are off topic or distracting from discussions	Contributions are always relevant	Contributions are always relevant and promote deeper analysis of topics
Preparation	Student is not prepared, does not seem to have read material	Student reads the material ahead, but not always	Student is consistently well prepared, reading and thinking about material

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

Spanish Grade:	10	9.5-9.9	9-9.4	8.5-8.9	8-8.4	7.5-7.9	7-7.4	6.5-6.9	6-6.4	5.5-5.9	5-5.4	0-4.9
U.S. grade:	A+	A	A-	B+	B	B	B-	C+	C	C	C-	F

General Course Policies

Attendance and Punctuality

Attendance and punctuality are required. Arriving late to class is disruptive to both the professor and your classmates. Please be punctual, as your professor will count your late arrival as half of an absence.

Attendance to lab activities is mandatory and you cannot miss them as it will represent a zero in that activity. Please, check carefully the days when we will be in the lab before planning your trips. If you miss any of these classes you miss the credits those activities are worth. Our teaching labs are always very busy as the Ecology department teaches many different courses. This makes it impossible to design make up classes for labs activities.

ABSENCES: Attendance is mandatory at all classes. As we understand that you might fall ill or be unable to come to class (e.g. due to a religious holiday, a flight delay, a family wedding/reunion, a graduation, a job interview, etc.) at some point during the semester, you are allowed up to 4 absences. You will be responsible for the material covered and any work missed. You will not need to justify your absences (up to 4) in any way unless you miss an exam, a presentation, a quiz, etc. In this case, you must present a doctor's note (signed, stamped and dated) to be able to reschedule the exam, etc. It will still count as an absence but you will be allowed to retake the exam, etc. We don't encourage you to use all 4 days unless you really need them as your participation grade may suffer if you are not in class. If used unwisely and you get sick late in the semester, the following penalties will apply:

On your 5th absence, 1 point will be taken off of your final grade (Spanish grade of 1-10)

On your 6th absence, 3 points will be taken off of your final Spanish grade

On your 7th absence, you will automatically fail the course

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 Dishonesty

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 to either turn in your documentation or to confirm that our office has received it. 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. 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. Changes induced by introduced species. Why species reach a new environment. 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. The 10' rule.
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 the society.

List of hot topics in Ecology

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

Calendar

Mid-term exam	Monday, March 6 th
Final paper due:	Wednesday, April 19 th
Final Exam	To be announced

Holidays:

Tuesday, February 28 – Día de Andalucía

Sunday, April 2 – Sunday, April 9 - Semana Santa (Holy Week)

Saturday, April 22 - Saturday, April 29 – Feria de Abril (Seville's April Fair)

Course Schedule

Session	Topic	Activity
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1 Jan. 25 th	Course presentation. Introduction to Ecology	Overview of the course. Lecture 1. Lecture in class.
2 Jan. 30 th	The Mediterranean Climate	Lecture 2. Lecture in class
3 Feb. 1 st	Carbon cycle	Lecture 3. Lecture in class
4 Feb. 6 th	Effect of climate variables on living organisms	Lecture 4. Learn how to produce a climate diagram. Homework on climate diagrams due the 27 th of February
5 Feb. 8 th	Effect of climate variables on living organisms. Continued	Lecture 5. Lecture in class and instruction to biomes presentation
6 Feb. 13 th	The soil as a living organism	Lecture 6. Start the soil respiration lab. Meet with the Prof. in lab room 1.09 Building 23 Read the handout on soil respiration for the next class
7 Feb. 15 th	Soil respiration	Record data in the lab and understand how to treat them and how to write the report on the topic. The report due the 1 st of March
8 Feb. 20 st	Dispersal and alien species	Lecture 7. Lecture in class.
9 Feb. 22 nd	Introduction to Population Ecology	Lecture 8. Lecture in class
10 Feb 27 th	Biomes of the world	In class presentations by the students on worlds biomes. Hand in climate diagrams
11 March 1 st	Pre-test and self-evaluation	Hand in the soil respiration report
12 March 6 th	Mid-term exam	
13 March 20 th	Life tables	Lecture 9. Lecture in class and learn how to build life tables. This activity will be handed in on the 27 th of March
14 March 22 nd	Population growth	Lecture 10. Lecture in class. Read the handout on 'how to estimate populations density', in preparation for the next class
15 March 27 th	How to estimate populations density	Field work. Meet in the lab room 1.09 in building 23. Hand in life tables activity.
16 March 29 th	How to estimate populations density-Continued	Class work on the data gathered in the field activity
17 April 10 th	What are communities?	Lecture 11. Lecture in class
18 April 12 th	Dendrochronology, concepts and basics	Lecture in the forest and fieldwork
19 April 17 th	Interactions	Lecture 12. Lecture in class
20 April 19 th	Ecological Systems Final Paper presentations 2	Student's presentations in class. Hand in the final paper.

22 May 3 rd	Ecological Systems Final Paper presentations 2	Student's presentations in class.
23 May 8 th	Ecological Systems Final Paper presentations 3	Student's presentations in class.
29 May 10th	Ecological Systems Final Paper presentations 4 Pre-test and self-evaluation	Student's presentations in class Overview for the final exam
May 12th-17th	Finals Week	

If needed other dates for handing in the assignments will be announced in class with plenty of time for the students to be able to complete them. As a general term, students will be given a week to complete each assignment. ***This syllabus is subject to change.***