ECOL 320E Ecological Systems

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Course Information Spring 2024

Mon (17:30 – 18:50) &

Wed (16:00 – 17:20)

Office hours: Appointment schedule by e-mail.

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. 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*. 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.
- Smith, R.L. & Smith, T.M. (2001) *Ecology and Field Biology*. 6th Edition. Addison Wesley Longman, Inc. United States of America. 771 p.
- Smith, R.L. & Smith, T.M. (2000) Elements of Ecology. 4th 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*. 2nd Edition. Prentice Hall. New Jersey. 539 p.
- Voght, K.A. et al. (1996) *Ecosystems. Balancing Science with Management*. 1st Edition. Springer-Verlag. New York. 470 p.

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')

Midterm Exam	20%
Assignments	30%
Final Exam	25%
Class Participation	10%
Final Paper	15%

Assignments to be completed by students

There will be four 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	
Soil properties	1.00	
Biome presentation	1.00	
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 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 24th.

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

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 and it is related to concepts described during the course.	Main topic is identified, analysis focusses on concrete aspects of it, parts connected with each other and related to concepts described during the course.
Personal perspective and position	Personal views are not identified and 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 sources others than academic materials.	Personal views are identified and developed, & student uses academic sources.
Format	The structure of the essay is not organized. References are not included in the essay text body. Bibliography section is not included or only refers to webpages and websites.	The format enables comprehension and includes references in the essay text body. Bibliography section is included.	The format enables comprehension. Student refers to sources used in the body of text & provides full details using official systems (APA).
Presentation	The topic is not clearly defined and presented. The student has not prepared the oral presentation and needs to read. The student is not understandable, and the design of the presentation is not attractive.	The topic is clearly defined and presented. The oral presentation is understandable, only additional notes are needed as support. The student has not stayed in the allotted time. The design of the presentation is attractive.	The topic is clearly defined and mastered in the presentation. The oral presentation is understandable, and the student has gone through different aspects to get to a conclusion. The student stays in the allotted time. The design of the presentation is attractive.

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

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.

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.**

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 in your **final grade**.

Attendance to field activities is mandatory and you cannot miss them as it will represent a cero in that activity. Please, carefully check the days when we will be in the field before planning your trips. If you miss any of these classes, you miss the credits those activities are worth.

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 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 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 it before **February 22nd**. 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

Calendar

Mid-term exam	March 11th
Final paper due:	April 24th
Final Exam	To be announced

Holidays

Wednesday, February 28th – Día de Andalucía
Thursday, February 29th – Puente
Sunday, March 24th – Sunday, March 31st – Semana Santa (Holy Week)
Saturday, April 14th – Saturday, April 20th – Feria de Abril (Seville's April Fair)

Course Schedule

Session	Date	Topic	Activity
1	Jan. 24th	**Course presentation.**	Overview of the course.
2	Jan. 29th	**Introduction to Ecology**	Lecture 1. Lecture in class.
3	Jan. 31st	**The Mediterranean Climate**	Lecture 2. Learn how to produce a climate diagram. Homework due Feb. 12th
4	Feb. 5th	**Carbon cycle**	Lecture 3. Lecture in class.
5	Feb. 7th	**Soil respiration**	Lecture 4. Lecture in class.
6	Feb. 12th	**The soil as living organism**	Lecture 5. Record data. Report due Mar. 4th. Hand in climate diagram.
7	Feb. 14th	**Effects of climate variables on living organisms I**	Lecture 6. Lecture in class.
8	Feb. 19th	**Effects of climate variables on living organisms II**	Lecture 7. Lecture in class
9	Feb. 21st	**Biotechnology and Sustainability**	Visit to Instituto de la Grasa (Spanish National Research Council).
10	Mar. 4th	**Industrial Ecology**	Lecture 8. Lecture in class. Hand in soil report. and instructions to biomes presentation. Presentation on March 18th.
11	Mar. 6th	**Pre-exam questions and answers**	
12	Mar. 11th	**Mid-term exam**	
13	Mar. 18th	**Biomes of the world**	Presentations in class.
14	Mar. 20th	**Dispersal and distribution.**	Lecture 9. Lecture in class.
15	Apr. 1st	**Introduction to Population Ecology**	Lecture 10. Lecture in class. Hot topic choosing for final paper. Due date April. 24th .
16	Apr. 3rd	**Life tables and demography**	Lecture 11. Lecture in class. Homework due April 10th.
17	Apr. 8th	**Population growth**	Lecture 12. Lecture in class.
18	Apr. 10th	**What are communities?**	Lecture 13. Lecture in class. Hand in life tables activity.
19	Apr. 22nd	**Interactions**	Lecture 14. Lecture in class.
20	Apr. 24th	**Ecological Systems**	Hand in final paper. Presentations in class.
21	Apr. 29th	**Ecological Systems**	Presentations in class.
22	May 10th	**Ecological Systems** **Pre-exam questions and answers**	Presentations in class. Overview for the final exam.
23	May. 13th – 16th	**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 two weeks to complete each assignment.

This syllabus is subject to change.