

## ECOL 320E Ecological Systems

**Professor:** María A. Pérez Fernández  
**Office:** Building 22, 4th floor, room 13  
**Email:** maperfer@upo.es  
**Office Hours:** Mon & Wed 17:30-18:30  
Tue 6 Thu 10:30-11:30

**Course Information:**  
Fall 2018  
Mon-Wed (16:00-17:20)  
Tue-Thu (09:00-10:20)

### Course Description

The course includes basic concepts in Ecology moving from the organism level to the biosphere, including populations, communities, biomes and landscapes. Especial importance is given to processes and organization in terrestrial habitats. The course also includes practical activities that led the student to learn by doing and applying the knowledge explained in the lectures. Laboratory and field exercises emphasize techniques of ecological analysis.

No previous knowledge on Ecology is strictly needed, although some biological background is desired. If you are in doubt about your readiness for this course, please come and see the instructor during the first two weeks. To learn more about the practice of Ecology as a scientific discipline, visit the Ecological Society of America or the Australian Ecological Society web pages.

### 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*, 6<sup>th</sup> Edition. 2008. WH Freeman and Co. (ISBN 9780716738831).

Available on class E-learning site (Blackboard)

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%
Home work	25%
Final Exam	25%
Class Participation	10%
Final Paper	20%

Assignments to be completed by students:

There will be four 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	(0.75)		
Distance methods	(0.75)		
Life Tables	(0.50)		
Final Paper on plant competition	(20%)		



## Rubric for Participation in class

Skills /Grading	Inadequate	Avarage	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. Under no circumstances may a student miss more than 6 classes (or 9 for classes that meet daily), even with a medical excuse. An excused absence is one that is accompanied by a doctor's note: signed, stamped and dated - travelling or missing a flight/train/bus/ferry, etc. is not an excuse. The note should be shown to your professor and must be handed in to the staff at the International Center office within one week of returning to class. After 3 unexcused absences your final grade will be lowered by  $\frac{1}{2}$  a point (Spanish grade) for each day missed (starting with the 4th absence). If you have 6 unexcused absences, you will automatically fail the class. It is each student's responsibility to be informed of exam dates, paper due dates, required excursions, etc. before planning any absences (e.g. relatives visiting, traveling, etc.) during the semester.

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. On the week 11 (starting November 26th) we will harvest plants from the competition experiment. If you miss any of these two classes you won't be able to complete the final project. Our green house and teaching labs are always very busy as the Ecology area teaches many different courses. This makes it impossible to design make up classes for labs and glass house activities. If you miss them, you miss the credits those activities are worth.

### Missed or Late Work

Assignments handed in later than 24 hours after the dead line will not be evaluated. Assignments handed in within the first 24 hours after the dead line 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 Rubén to either turn in your documentation or to confirm that our office has received it. The deadline is September 28th. Rubén 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 organism and its environment:** Environmental conditions. Effect of Temperature on organisms. Moisture and water availability ecology. Biomes
3. **Soil:** 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.
4. **The Carbon Cycle:** Primary productivity. Energy flow through ecosystems. Photosynthesis. Plant responses to changes in CO<sub>2</sub>. Climate change and the carbon-climate connection.
5. **Changing the ecosystems:** Alien organisms and their effect in ecosystems. Changes induced by introduced species. Why species reach a new environment. The 10' rule. Breaking ecosystems services.
6. **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.
7. **Life tables and demography:** Horizontal and vertical life tables. Generation time, life expectancy.
8. **Species interactions:** Types of interactions. Competition. Predation, parasitism, mutualism, commensalism. Coevolution. r-selection and k-selection.
9. **Ecosystems Ecology:** Production in Ecosystems. Trophic structure. Secondary productivity. Energy distribution through the ecosystem.
10. **Communities Ecology:** Main types of communities. Community structure. Biodiversity. Geographical gradients. Pattern of successional changes. Primary succession. Secondary succession. Mechanisms of Successional Change. Climax, the end point of Succession. Man in nature: effects and exploitation of natural resources.



## Calendar

<b>Mid-term exam</b>	Wednesday, Oct 24th	Monday-Wednesday group
	Thursday, Oct 25th	Tuesday-Thursday group
<b>Final paper due:</b>	Wednesday, Dec 12th	Monday-Wednesday group
	Tuesday, Dec 11th	Tuesday-Thursday group
<b>Final Exam</b>	December	To be announced

## Holidays:

Friday, October 12: Día de la Hispanidad

Wednesday, October 31: "Puente". No classes will be held.

Thursday, November 1: All Saint's Day. No classes will be held.

Thursday, December 6: Día de la Constitución Española. No classes will be held.



### Class Schedule

Week	Lecture topic	Activity
0	Course presentation and get to know each other	Classroom
1	Introduction to Ecology and the scientific methods.	Green house - Competition experiment ( <b>Sep 17, group Monday; Sep 14, group Tuesday</b> )
2	Earth's climate and soils: global patterns and local processes: Biomes	Climate diagram to be handed in the 3th and 4th of October
3	The soil as a living organisms	Soil Respiration lab-To be handed in 17 <sup>th</sup> and 18 <sup>th</sup> of October <b>Week tating Oct st</b>
4	Ecological crisis on Earth	Watch the movie 'Before the flood' and get ready for class discussion on the 15 <sup>th</sup> and 17 <sup>th</sup> of October
5	Climate change and the carbon-climate connection	Class discussion on Climate change
6	Adaptations of organisms to their environment. Effect of alien species	<b>Midterm 24th and 25<sup>th</sup> of October</b>
7	Population Ecology: Dispersal and distribution	Two lectures on dispersal and distribution and reading on the topic
8	Population growth and density	Distance Methods lab ( <b>Nov 5th, Monday group; Nov 6th, Tuesday group</b> ). Field activity to be handed in 21 <sup>st</sup> and 22 <sup>nd</sup> of November
9	Demography	Learn how to build Life Tables. Homework to be handed in 28 <sup>th</sup> and 29 <sup>th</sup> of November
10	Intra species competition, density dependence, regulation and equilibria	Lectures on species interactions. Students will watch videos on the topic to identify interactions that will be discussed in class
11	Inter species competition	Plant harvest and data collection. <b>Week starting November 26th. If you miss these two class days, you won't have data for the final project!!!!</b>
12	Community Ecology	Lecture on the topic and literature review done by students
13	Food webs and trophic cascades	Poster presentation on Food webs

The exact dates when assignments are due will be announced in class with plenty of time for 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.***