



SYLLABUS

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Teaching Language
BIO	458	Ecological Physiology	3	2	2	0	3-5	BIO 353	7	English

A. Course Description

This course is an exploration of environmental effects on fundamental physiological processes in plants and animals. Abiotic factors such as temperature and water availability interact with biotic forces such as predation, herbivory, and competition to constrain the ability of organisms to survive, grow, and reproduce. Physiological solutions that allow success in one environment may preclude it in another. This course seeks to build up from physiological principles to understand characteristics of populations, communities, and ecosystems.

B. Course Outcomes

At the end of this course the student will be able to:

1. Demonstrate the major approaches to physiological ecology, including their differences and common threads.
2. Demonstrate an understanding of the ecological principles.
3. Demonstrate an understanding of basic physiological ecology issues.
4. Explain the application of laboratory physiological methods to physiological ecology.
5. Describe how individual-level physiology affects and is affected by ecological phenomena across the diversity of life (both plants and animals).
6. Explain the physiological linkages across levels of biological organization.
7. Demonstrate how, in the context of evolution, organisms exhibit similarities and differences in their basic physiology.
8. Demonstrate how basic principles of physiology may inform students' individual research.
9. Understand the physical aspects of the environment with which plants interact.
10. Develop an awareness of what constitutes the field of plant physiological ecology and the issues to which knowledge in this area can be applied such as land use and habitat modifications, bioremediation, invasive species and global environmental change.
11. Improve skills in critically evaluating primary literature.
12. Provide opportunities to discuss topics in plant physiological ecology based on the analysis of the literature, lecture information and other supplemental readings.



C. References:

Required Textbook

- *Lambers H, Chapin III FS, Pons TL. (2008). Plant Physiological Ecology. Springer-Verlag. ISBN-13: 978-0387783406.*
- *Hill, Wyse, and Anderson, (2012). Animal Physiology, 3rd edition (Sinauer).*

Other references:

- *William H. Karasov and Carlos Martinez del Rio. (2007) Physiological Ecology: How Animals Process Energy, Nutrients and Toxins.*
- CD containing programs special for physiological ecology methods for plants and animals.

Course Website: Google Classroom Webpage: <http://www.imamm.org/>

D. Topics Outline

D1. Theoretical Topics

1. Introduction to Physiological Ecology.
2. Energetics 1: The Basics of Metabolism.
3. Energetics 2: Survival, Growth and Reproduction.
4. Thermal Biology 1: Temperature Effects on Biological Rates/Times.
5. Thermal Biology II: Temperature adaptation and acclimatization.
6. Water and Osmotic Balance I: Plants and Animals.
7. Water and Osmotic Balance II.
8. Nutritional Ecology I: Feeding and digestion.
9. Nutritional Ecology I: Ecological Stoichiometry.
10. Stress and Organism Function.
11. Stress and Life History.
12. Sensory Physiology I.
13. Sensory Physiology II.

D2. Laboratories topics

1. Introduction, administrative issues, lab safety, hypothesis testing, data presentation
2. Metabolic oxygen consumption of avian embryos I
3. Energy balance
4. Metabolic oxygen consumption of avian embryos II



5. Metabolic oxygen consumption analysis
6. Characterization of skeletal muscle fiber
7. Tardigrades: cute, cuddly and almost indestructible
8. Species diversity I
9. Species diversity II
10. Osmoregulation
11. Harvest nutrient
12. Comparative analysis of eggshell calcium composition
13. Comparative analysis of eggshell calcium composition II
14. Population and Growth analysis

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes: & Homework:** During the semester.
- **Final Lab:** 15th week
- **Final Exam:** 15th - 16th week.

Your course grade will be based on your semester work as follows:

Midterm 1: 15 %	Midterm 2: 15 %	Final Exam: 40 %	Final Lab Exam: 20%
Quizzes, Homework, Attendance & Participation: 10 %			

The grading distribution:

A ⁺	A	B ⁺	B	C ⁺	C	D ⁺	D	F
[95, 100]	[90, 95]	[85, 90]	[80, 85]	[75, 80]	[70, 75]	[65, 70]	[60, 65]	[0, 60]



G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

[Executive Rules for Study Regulations and Exams](#)

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