

Physiological Ecology (Bio 31): Spring 2015

Course description and grading policy

Instructor: Matt Ayres (LSC 125, 6-2788).
Office hours: Monday and Thursday 16:00-17:00 or by arrangement.

Laboratory Coordinator: Craig Layne

Graduate Assistant: Andrew Vacca. Office hours to be arranged

Undergraduate TAs: Annia Fagan (Monday lab), Maya DeGroote (Tuesday lab)

Book to purchase: Heinrich, B. 2003. Winter World: The Ingenuity of Animal Survival. Harper-Collins.

Meeting times: Lecture: Tuesday and Thursday 10:00-11:50 (10A) in LSC 105.
Laboratory: Mon or Tues 15:00-19:00 in LSC 104.
Overnight field trip to Second College Grant on 2nd weekend (11-12 Apr; recommended but not required; departing early Saturday, returning late aft Sunday).

Course website: www.dartmouth.edu/~bio31; some materials will also be posted on [Canvas](#).

Course overview: What factors determine the distribution and abundance of organisms? 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. Prerequisite: at least one of Biol 12-16.

Grading policy: Grading will be based on two midterm examinations, a comprehensive final exam, and laboratory activities (including an independent research project). Note that midterm exams are on the evenings of 23 April and 19 May at 19:00. Late exams will not be given except under extraordinary circumstances that are discussed with the professor by phone or in person prior to the exam. Late laboratory assignments will be penalized 10% per day up to a maximum of 30% penalty. I encourage students with disabilities of any kind to discuss them with me so that appropriate accommodations can be made.

Overall grading allocation for course

Item	%
1st midterm	20
2nd midterm	20
Final exam	30
Laboratory	30
Total	100

Grading allocation for laboratory component

Lab activities	Poin ts
Research questions from trip to 2 nd Grant	10
Hypothesis generation exercise	10
RP-1: Insect growth and metabolism	20
Modeling exercise	10
RP-2: Plant physiological ecology	20
Literature critique #1	10
Literature critique #2	10
Literature critique #3	10
Student Initiated Research Project proposal	10
Student Initiated Research Project	40

Physiological Ecology (Bio 31): Syllabus and Lab Schedule for Spring 2015

Lecture Topic	Readings ^{a, b}
History, domain, and approaches of physiological ecology	H Ch 1-10;
Animal Physiological Ecology	H Ch 11-20
Primary metabolism	
Acquisition of energy and nutrients	
FIRST MIDTERM EXAM (23 April at 19:00).....	
Environmental challenges	
• Temperature	
• Gas relations	H Ch 21-25
• Water availability	
• Toxins and anthropogenic effects	
Communication	
Plant Physiological Ecology	
Primary metabolism	
Acquisition of energy and nutrients	
Environmental challenges	
• Temperature	
• Gas relations	
• Water availability	
SECOND MIDTERM EXAM (19 May at 19:00).....	
• Toxins and anthropogenic effects	
Growth and resource allocation	
Future of Physiological Ecology	

^a "H" refer to Heinrich, Winter World.

^b Will be supplemented with other readings as announced in class.

Week	Laboratory Activities
6 April	Hypothesis generation exercises (verbal presentation at end of lab; <u>write-up due in lab next week</u>).
13 April	Research Problem #1: Insect growth and metabolism (write-up due in lab week of 27 Apr).
11-12 Apr	Field trip to Second College Grant. Forest and stream ecology; winter ecology; development of research questions (<u>exercise due in 1st lab after trip</u>)
20 April	Literature critique #1 (<u>written critique due in lab</u>). RP #1, cont.: Practicum in data analysis and presentation.
27 April	Research Problem #2: Plant physiological ecology (<u>write-up due in lab week on 11 May</u>).
4 May	Week 5: RP #2, cont. Modeling exercise (<u>due in lab next week</u>).
11 May	Verbal proposal presentation for Student Initiated Research Projects (public poster presentation at end of term).
18 May	Literature critique #2 (<u>written critique due in lab</u>). SIRP, cont. Refined written proposal due in lab.
25 May	SIRP, cont. No regular labs on account of Memorial Day. Instead both sections meet during x-hour for short joint lab on Wed 27 May at 3:00 . Literature critique #3 (<u>written critique due in lab</u>). Data presentation to peers
8 June??	Public poster presentations of Student Initiated Research Projects.