EEMB/ES 171 Ecosystem Processes  
Fall Quarter 2017

Overview
Ecosystems are defined by the interactions among the plants, animals, microorganisms and abiotic, environmental features that affect them. This course will cover the flows of energy, carbon, and nutrients within ecosystems, tracing the key processes that define ecosystem function. Through the course, we will develop the connections between organisms, abiotic factors and ecosystem processes. The effects of environmental change on ecosystem processes will be highlighted.

Professor: Joshua Schimel  
Office: Noble Hall 1008  
e-mail: Schimel@lifeci.ucsb.edu  
Office Hours: 9:00 – 10:30 Tuesdays or either just come by or contact me by e-mail.

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<tr>
<th>TAs:</th>
<th>Shannon Hagerty</th>
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<tr>
<td>Office:</td>
<td>Noble Hall 1111</td>
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<tr>
<td>e-mail:</td>
<td><a href="mailto:shannon.hagerty@lifesci.ucsb.edu">shannon.hagerty@lifesci.ucsb.edu</a></td>
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<td>Office Hours:</td>
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Readings
  Either the 2nd ed. (2012) by Chapin, Matson, & Vitousek.  
  or the 1st ed. (2002) by Chapin, Matson, & Mooney.  
  I will place several copies of this book on reserve in the Library.
- Additional articles posted on Gaucho Space

Evaluation
Tests (35 %): 10 % for each in-class quiz, 15 % for the final.

Problem sets (30%):  
Two of them 15% each (see separate sheet for guidelines)

Section (35 %):  
Attendance and Participation: 15 %  
*Attendance means being on time: If you are more than 10 minutes late, you will lose half attendance credit that day. More than 20 minutes late will mean no credit.*  
Five research paper write ups: 20 % (see separate sheet for guidelines)
Class rules

1. I **expect** you to attend class. Even though my powerpoints will be available, if you think that you will get what you need from them without attending lectures, you are almost certainly wrong. My visual materials are outlines and illustrations. *Exception: Problem sets are due in class.*

2. I **require** you to attend section. These involve hands-on exercises and participation is a must. If you don’t attend section, your grade will directly suffer. It is not possible to pass the class without attending and participating in sections.

3. You must go to the section you are registered in. If you must miss a section meeting, talk to the TA and see if you can attend a different one.

4. Problem sets are due **in class** on the day listed. Any problem set handed in after class that day will be considered late and will be marked down 10%. Problem sets handed in on subsequent days will be marked down an additional 10% per day.

5. There will be no make-up exams. If you have a true problem that will prevent you from being there, talk to me (Josh Schimel) *as soon as possible.* I am willing to make alternate arrangements (e.g. using the average of other tests) for reasonable situations, but I get to define what I consider “reasonable.”

6. If you miss section or a test because of an emergency, contact the Professor or TA as soon as it becomes physically possible for you to do so (office, e-mail, whatever works). We will only consider excusing absences after-the-fact for a documented emergency: health, accident, family crisis, etc. I will require certified documentation of the emergency. The likelihood that I will be willing to excuse an absence drops substantially with each day that passes.

7. I understand that things happen and that there are good reasons why you may need to miss class activities—I am willing and sometimes happy to work with you to facilitate these. But if you want me to treat you with respect by facilitating your activities, start by treating me with respect by coming to discuss the issue *as early as possible.* The old saying “it’s always easier to get forgiven than to get permission” is **not** true in this class. It will always be easier to get permission than forgiven.

8. Cheating and plagiarism are serious forms of academic misconduct and will not be tolerated. University policies for academic misconduct are strict, and the results of cheating and/or plagiarism can be a failing grade; in extreme cases it can lead to expulsion from the University. The definition of plagiarism is available at the Office of Judicial Affairs. We are required to report **all** cases of alleged cheating.

These policies are deliberately strict. To be fair to students who come to class and who do the work, I must honor their efforts by not allowing other students to skirt by. But if you respect me by working hard and honestly, I will return the favor and try to help with your problems.

*Remember: I make the rules so I get to make exceptions to them.*
Structure of Discussion Sections

Overall, your grade from section accounts for 35% of the total class grade. A total of 25% is based on the quality of the discussion section write ups and on the presentation of one of the “additional” recent papers from the primary literature.

In most discussion sections there will be several activities, with short review sessions the week before the first quiz and before each problem set is due:

Some mix of:  
A. Discussion of a paper(s).  
B. Student presentation of one of the “extra” papers.  
C. Exercise.  
D. Review for quiz/problem set.

When there is a paper to be discussed, the paper and a set of questions posted on GauchoSpace.  
A) Read the paper beforehand.  
B) Type up and print out short answers to the questions—no more than 2 pages. The write ups are due at the beginning of discussion section (NO exceptions). Write ups will not be accepted late.

The write ups are each scored out of 10 points, with grading based on both the intellectual quality of the answers and the quality of the writing. We look for grammatical sentences and a well constructed, thoughtful discussion.

Recent Published Research Papers:  
Students will form groups of 4-5 students, and each group will be responsible for presenting one of the additional papers that I’ve set up on Gauchospace for each week discussion. Groups will pick one of those papers to present in section. Whereas the papers I assign for everyone to read are often review articles or sometimes “classic” papers that helped frame the current thinking, the additional recent papers will all be recently published work that targets similar ideas but presents some of the newest work on that topic.

Groups will be expected to present the core points of the recent work (what’s the scientific problem, what’s their central question/hypothesis, what are the key findings, what did the authors learn—their conclusions) and to help the TA guide the discussion of how thinking has changed and on the significance of the work.

See write up criteria on Gauchospace for specific guidelines.

When there is an exercise, we will hand out appropriate materials in section.

The remaining 10% of total class grade from discussion will be from attendance and participation.

• .. Are you there?  
• .. Do you contribute regularly to discussion?  
• .. Are your contributions substantive and do they show that you have read the material and understand it?
Schedule

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<tr>
<th>Week 0</th>
<th>Overview of class</th>
<th>(Friday Sept. 29)</th>
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<td>Why care about ecosystem processes?</td>
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*There will be no discussion sections on Sept. 22/23.*

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<tr>
<th>Week 1</th>
<th>Overview of Ecosystem Ecology</th>
<th>(Oct. 2 – Oct. 6)</th>
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<td>How do we study them? Importance of scale.</td>
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Read:  *Chapin et al. Chapter 1. The Ecosystem Concept*

Section (Thursday/Friday Sept. 29/30):
- 1st day introductions, expectations by TA.
- Exercise on scaling (*available during Section*).

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<tr>
<th>Week 2</th>
<th>Structure of ecosystems</th>
<th>(Oct. 9 – 13)</th>
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<td>Ecosystem components. What is exchanged between them? Introduction to the C cycle.</td>
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Read: Chapin et al. Chapter 3. Geology and Soils

Section:

Due: *Paper write up, in beginning of section*

**Problem set 1 handed out**

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<tr>
<th>Week 3</th>
<th>C-cycle, photosynthesis and C-allocation</th>
<th>(Oct. 16 - 20)</th>
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|        | Read: Chapin et al. Chapter 5. Carbon input to terrestrial ecosystems  
Chapter 6. Plant Carbon budgets (GPP, NPP, NEP)  
Control over productivity  
Effects of allocation |

Section:

Due: *Paper write up, in beginning of section.*
Week 4  C-cycle- allocation and control over plant productivity (Oct. 23 - 27)

Read: Chapin et al. Chapter 8 Nutrient uptake

Section: Problem Set working and review

Week 5  Decomposition: the fate of all biological material  (Oct. 30 – Nov. 3)

Read: Chapin et al. Chapter 7. Terrestrial Decomposition

Due: Problem set #1, beginning of class Monday

QUIZ # 1 Monday Oct. 30

Discussion session: Paper

Week 6  Soil Organic Matter  (Nov. 6 – Nov. 8)

Read: Chapin et al. Chapter 7. Terrestrial Decomposition

Section:

Due: Paper write up, in class on Wednesday
There will be no discussion sections since Friday is a holiday.

Week 7  Nitrogen cycle  (Nov. 13 – Nov. 17)


Discussion session: Paper.

Due: Paper write up, in beginning of section

Problem set 2 handed out
Week 8      Linking to N and C other nutrient cycles  (Nov. 20 – Nov. 22)

Read: Chapin et al. Chapter 13 (2nd ed. or Chapter 15 1st ed). Changes in the Earth System

Week 9      Scaling up to the landscape  (Nov. 27 – Dec. 1)

Read: Chapin et al. Chapter 14. Landscape heterogeneity and ecosystem dynamics

Discussion session: problem set review

QUIZ #2 Monday Nov. 27
Thanksgiving Thursday & Friday (no discussion sections!)

Week 10     Integration, Synthesis, and Review  (Dec. 4 – Dec. 8)


Discussion session: Papers

Due: Paper write up, in beginning of section

Due: Problem set #2, beginning of class Monday

Final Exam: Wednesday, December 13. 4 – 7 PM