

Syllabus BIEB 174 "Ecosystems and Global Change"
Fall quarter 2011
Lectures T/Th 8-9:20a.m. Warren Lecture Hall 2005
Final exam Wednesday December 6th 8-10:59 a.m. location TBA

Faculty:

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Teaching Assistants:

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Discussion sections: Mondays 6-6:50 p.m. & Tuesdays 7-7:50 p.m., Center 207
Office hours: Tuesdays 9:30-10:30 a.m., 1208 Muir Biology
Christina Bonsell, cecbonsell@ucsd.edu
Discussion section: Tuesday 6-6:50 p.m. Center 207
Office hours: Mondays 9-10 a.m., Mandeville Box Office (near coffee cart)
Sarah Kim, slk001@ucsd.edu
Discussion section: Monday 9-9:50 a.m. Center 207
Office hours: Monday 10-11 a.m., Perks
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Discussion section: Mondays 7-7:50 p.m. Center 207
Office hours: Mondays 3:30-4:30 p.m., Mandeville Box Office (near coffee cart)

Course description:

This course will teach the principles of terrestrial ecosystem ecology, and will use examples from recent research to help students understand how global environmental changes are altering processes from leaf-level ecophysiology to global-scale cycling of carbon, water and nutrients.

Why you should take this course:

In recent decades human activities have altered ecosystems around the globe, through changes in climate, land use, and nutrient cycling. Understanding the impacts of these global changes requires a background in ecosystem ecology. Ecosystem ecology is a field that scales phenomena from physiological processes within plant leaves, to global biogeochemical cycles of carbon, nitrogen and water. "Ecosystems and Global Change," will teach the fundamental concepts of ecosystem ecology, while using examples from current research in the field of environmental science. Thus, the course is designed to fulfill two primary goals: providing depth to students who want training in ecosystem science in an upper division course towards their EBE major, and providing breadth in environmental science to students in other science majors.

Prerequisites

BILD 2 & 3. This is an upper division course and will build on concepts from the introductory course series. While not required, introductory chemistry and physics courses will be helpful. Basic algebra is also required (simple equations, ratios).

Textbook

The course uses an excellent and inexpensive textbook (\$50 new, \$40 used, in paperback): "Principles of Terrestrial Ecosystem Ecology" by Chapin, Matson & Mooney (2002), Springer. Six copies are available on reserve in the Biomedical Library.

Lectures

Attendance in lectures is required to do well in this course. Lecture slides will be posted on TED by the evening before each lecture, but not all material presented verbally in lectures will be contained in these

slides. We will use iclickers in class, please purchase an iclicker from the bookstore and register it one of two ways: 1) log on to the BIEB 174 course on TED, click on “Tools” to the left, then click on “Register your iclicker remote ID.” Alternatively, 2) register using your email username (not PID) at www.iclicker.com. Both older and newer iclickers should work with the system, as long as it is the same brand sold in the bookstore. **Please turn off all cell phones at the start of lecture.**

Discussion sections:

Discussion sections are required, and are designed so that students can practice explaining the concepts they are learning in a way that is not possible in a large lecture setting. In discussion sections students will have the opportunity to think critically and creatively, and communicate ideas both verbally and in writing. Approximately 5-6 review questions per week will guide the discussions, which are listed below and found at the end of each chapter in the textbook. **The questions are due at the beginning of section in hard copy format (not electronic) – students that arrive with a sheet of blank paper are welcome to stay to learn and participate, but will not get credit for that week.** While discussion sections offer a chance to ask questions and explore the weekly concepts more deeply, the lecture materials *will not be summarized again in discussion sections*. Discussion sections begin meeting Monday September 26th. **You must enroll in a section at: <https://sections.ucsd.edu/>**

Expectations

This is an upper division course, and will build on concepts gained in lower division courses. Ideally you will find it challenging but not overwhelming. As a 4 credit course, the expected time requirement is 12 hours per week (4 hours in lecture/discussion section and 8 hours of outside reading/studying). Please plan this amount of time in your weekly schedule so that you feel prepared for lecture/discussion and confident for your exams.

Academic integrity

Academic integrity is taken extremely seriously at all universities, and UCSD is no exception. Any student caught cheating will fail the course. Please note that because iClickers will be used for formal assessment related to student grades, it is considered a serious infraction to answer iClicker questions for another student using their iClicker, and would lead to both students failing the course. For information on academic integrity at UCSD:

<http://www.senate.ucsd.edu/manual/appendices/app2.htm>

Grading & Assessment:

Assessment reinforces the ideas presented over the quarter, and allows students to gauge their progress in the subject. More information about these assessments will be discussed in lecture/discussion sections.

20% Midterm exam Oct 6th (Chapters 1-4)

20% Midterm exam Oct 25th (Chapters 5-8)

20% Midterm exam Nov. 10th (Chapters 9-12)

20% Final exam Dec 6th (Chapters 13,15& 16, special topics, and cumulative across the quarter)

5% Lecture participation

Assessed via iClicker questions, answers do not need to be correct, this is a learning activity, full credit will be given if at least 75% of questions are answered in at least 75% of lectures (starting October 3rd), this allows flexibility for late adds, illnesses or other emergencies. Partial credit given proportionally for attendance below this threshold.

15% Discussion Section

10% Weekly review questions from the end of each chapter in the text (written answers must be completed before arriving in section, and will be turned in during section. Late turn-ins will not receive credit without documentation of illness or emergency)

5% Section participation (attendance & discussion, 0.5 points per section)

What will be on the exam? The exams will focus on material that has been presented during lectures, and material that is the focus of review questions. You do not need to know details from the reading that are not covered in the lectures. The format will consist of a mixture of multiple choice questions (like your clicker questions) and short answer questions (like your weekly review questions). Practice exams are not distributed.

Make up policy:

Please note that there will be no make-up exams. If you miss a midterm or final exam, then you will be required to submit documentation of illness or unavoidable emergency. Without such documentation, you will receive zero points for that assessment. For missed midterms, and with valid documentation, the proportion of your grade that is based on your final exam will be increased to cover the assessment that was missed. For a missed final exam and with valid documentation, you will be expected to take the final orally or you will receive an incomplete for the course. Students wishing to have questions from exams re-graded need to submit a written request specifying the questions in dispute and the reason for the re-grade, realizing that the entire exam will be re-evaluated.

If you miss discussion section due to a documented illness or emergency, you must submit your review questions in person or by email to your TA email by the end of the week to have full credit. If you miss a discussion section for any other reason, you have the option of completing an extra assignment in addition to your weekly review questions to receive full credit (only one time during the quarter). To avail yourself of this option, attend any research seminar at UCSD and write a short summary of the seminar (no more than one page, be sure to list the name of the seminar speaker, and the time and location that they spoke). Turn this into your TA along with your completed review questions. See lists of seminars at:

<http://biology.ucsd.edu/publicinfo/sdn?action=seminarlist&etype=A>

http://scrippseducation.ucsd.edu/Calendar_and_Events/Seminars/

How to do well in the course

1. Focus on the big picture. Ecosystems are dynamic and exciting, if you can cultivate a curiosity about how they work, the material will be more interesting to you, and will “stick in your head.”
2. Attend lecture ready to focus on the material. You can skim the chapter before coming to lecture if that will help you to absorb the material, but don’t try to read it completely as there is much more depth in the reading than will be covered in the lectures.
3. After lecture, look at the review questions associated with the chapter covered, and use both your lecture notes and the chapter to help you answer the questions. Plan to spend 8 hours a week reading, studying, and answering review questions.
4. Participate in discussion section, sharing your answer to the review questions with other students. Note when the TAs or other students add additional aspects to the answer that you didn’t think of. Your biggest challenge is to figure out what you don’t know. Daily clicker questions will also help you figure out where you need to focus your study.
5. After quizzes or midterms, make sure you look carefully at the answers on the key, and figure out if there are areas that you don’t understand. These items might return on the final exam.

Schedule of lectures, readings, and assessments:

Sep 22nd: Ch. 1 The Ecosystem Concept

Overview and history of ecosystem ecology; controls over ecosystem processes; human-caused changes in Earth’s ecosystems, ecosystems of the globe.

Sep 27th: Ch. 2 Ecosystems of the globe & Earth’s Climate System

Ecosystem distribution in relation to climate, Earth’s energy budget; atmosphere, oceans, landforms & vegetation contributions to climate; temporal variability in climate

Sept 29th: Ch. 3 Geology and Soils

Controls over soil formation & loss; soil profiles, horizons & classification; soil properties in relation to ecosystem functioning.

Oct 4th: Ch. 4 Terrestrial Water and Energy Balance

Ecosystem water inputs and losses; water movements among soil, roots, leaves, canopies; evapotranspiration and the energy balance

Oct 6th: **Midterm 1, Chapters 1-4**

Oct 11th Ch. 5 Carbon inputs to Terrestrial Ecosystems

Photosynthetic pathways (C3, C4, CAM); net photosynthesis in the leaf; limitation by light, CO₂, water and nitrogen; influence of temperatures, gross primary production (GPP) controls and measures.

Oct 13th: Ch. 6 Production Processes

Plant respiration; net primary production (NPP); allocation of growth to different tissues; tissue turnover; global distribution of biomass and NPP; net ecosystem production (NEP) and controls

Oct 18th: Ch. 7 Decomposition Processes

Biological breakdown of litter by bacterial, fungi and animals; Litter breakdown through chemical and physical processes; environmental and enzymatic controls over decomposition; long-term carbon storage in soils

Oct 20th: Ch. 8 Plant Nutrient Use

Macro- and micro-nutrient requirements for plant growth; nutrient movement in soils; uptake by plant roots & mycorrhizal symbionts; nutrient losses through senescence, leaching and herbivory

Oct 25th: **Midterm #2, covering chapters 5-8**

Oct 27th: Ch. 9 Terrestrial Nutrient Cycling

Nitrogen (N) inputs to ecosystems, biological N-fixation, N mineralization and pathways of loss; other nutrient cycles (Phosphorus, sulfur, essential cations); interactions among nutrient cycles. Human-caused N deposition, causes & consequences

Nov 1st : Ch. 10 Aquatic Carbon and Nutrient Cycling

Fundamental differences between terrestrial and aquatic ecosystems; carbon and nutrient cycling in oceans, lakes, rivers & streams

Nov 3rd: Ch. 11 Trophic Dynamics

Plant-based trophic systems versus detritus-based trophic systems; assimilation efficiencies; food webs and trophic cascades

Nov 8th : Ch. 12 Community Effects on Ecosystem Processes

The functional trait concept; species-effects on ecosystems, climate and disturbance regimes; relationship between biodiversity and ecosystem function

Nov 10th: **Midterm # 3, chapters 9-12**

Nov 15th : Ch. 13 Temporal Dynamics

Inter-annual versus long-term fluctuations in ecosystem processes; disturbance cycles and the successional process

Nov 17th: Ch. 15 Global Biogeochemical Cycles

Global carbon cycle and long-term changes in atmospheric CO₂; terrestrial carbon sinks; global nitrogen, phosphorus, sulfur and water cycles; consequences of human-alterations of global biogeochemical cycling

Nov. 22nd: Ch. 16 Managing and Sustaining Ecosystems

Concepts in ecosystem management: natural variability, resilience, stability; application for managing forests, fisheries, endangered species; ecological restoration; valuation of ecosystem goods and services

Nov 24th – no class, Thanksgiving Holiday

Nov 29th: Special topics: Climate Change, Policy, and Southern California Ecosystems

Reading: San Diego Focus 2050 report, pages 1-26, Summary for policy makers, IPCC Fourth Assessment Report

Dec 1st: Exam review in class

Dec 6th: 8-10:59 a.m. **Final exam**, Focus on Chapters 13, 15, 16, special topics, as well as critical thinking and integration of concepts from the whole quarter

Discussion section schedule

Sept 26-27	Review questions for Ch. 1-2 (p. 17 # 2 & 4; p. 45 # 3 & 9)
Oct 3-4	Review questions for Ch. 3-4 (p. 67 # 2 & 6; p. 96 #3, 5 & 6)
Oct 10-11	Review questions for Ch. 5 (p. 121 # 1, 2 & 6), and go over midterm exam answers
Oct 17-18	Review questions for Ch. 6-7 (p. 149 # 1, 6 & 10; p. 174 # 2, 3 & 6)
Oct 24-25	Review questions for Ch. 8 (p. 195 # 1, 12 & 13) plus midterm review
Oct 31-Nov 1	Review questions for Ch. 9-10 (p. 222, #4, 8 & 9; p. 242 # 1, 2 & 5)
Nov 7-8	Review questions for Ch. 11-12 (p. 263 # 1, 3 & 4; p. 277 # 2, 3, & 6)
Nov 14-15	Review questions for Ch. 13 (p. 303 # 4 & 5), and go over midterm answers
Nov 21-22	Review questions for Ch. 15-16 (p. 355 # 1, 3, 7, 8; p. 369 # 1, 2, 4, 5)
Nov 28-29	Review questions CA climate change, global climate change & IPCC (TBA)

Students with disabilities

Students requesting accommodations and services due to a disability for this course need to provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD), prior to eligibility for requests. Receipt of AFAs in advance is necessary for appropriate planning for the provision of reasonable accommodations. For more information, contact the OSD at (858) 534.4382 (V); (858) 534-9709 (TTY); osd@ucsd.edu, or <http://osd.ucsd.edu>.