

Biol 696: Theory and Principles in Ecology, Spring 2009 (3 units)
Lectures: T Th 2:00-2:50 pm, SH 142(Storm Hall)
Discussion: Th 10:00-10:50am SH 144 (Storm Hall)

Instructors			
Dr. Doug Deutschman	PS 150A	ddeutschman@sciences.sdsu.edu	By appointment
Dr. Janet Franklin	PS145	janet@sciences.sdsu.edu 594 5491	M 3-4pm in LS104B and by appointment
Dr. Walt Oechel	PS 240B	oechel@sciences.sdsu.edu	By appointment
Rebecca Lewison	PS 157	rlewison@sciences.sdsu.edu	By appointment (please email me to set up a time)

Course description

Biol 745 is the second semester of the graduate core course for the Ecology Program Area. In this semester, we continue our exploration of the field of ecology, focusing specifically on community and ecosystem ecology (foodwebs, landscapes, ecosystems, biogeochemistry), conservation/applied ecology (climate change, anthropogenic impacts on natural systems). Course materials will explore primary literature to examine a comprehensive set of contemporary approaches and applications. As with Biol 645, the focus of this course is to develop critical thinking, analysis, improve writing skills and facilitate productive discussion.

Course objectives

The key objectives of this course are to:

- Continue to explore a range of fields and subdisciplines within Ecology
- Improve written presentation and organization of ideas
- Promote critical thinking and discussion
- Provide experience leading and facilitating discussions
- Promote responsible and constructive review skills

Learning outcomes

At the completion of this course students will be able to:

- Identify and explain foundational concepts in community and ecosystem ecology
- Link and give examples of historical and current research (paradigms, methods, experimental design, hypotheses)
- Communicate information effectively orally and in writing about fundamental concepts in community and ecosystem ecology to both scientific and general audiences
- Formulate a scientific argument and support it with appropriate evidence from scientific literature
- Communicate scientific research and results effectively to a non-science audience
- Demonstrate the ability to critique scientific articles professionally

- Select a topic and explain its relevance in writing to an ongoing research area in community or ecosystem ecology, by reviewing, analyzing, and integrating relevant information

Course format

2 weekly lectures (50 mins). Roughly half of the lectures will be given by instructors and the second half will be given by guest lecturers with expertise in areas directly relevant to our graduate program. (Note a few modifications to this schedule, with two discussion and one lecture in some weeks)

1 weekly discussion (50 mins). Instructors will moderate discussion. Each student will be required to lead and facilitate at least 1 discussion throughout the semester.

Contents/topics

The course will cover four topic areas (not strictly in this order).

- **Communities: structure and Function** covers fundamentals of community ecology, food webs, trophic dynamics, biodiversity, multi-species conservation.
- **Community cycles and process** covers global change, terrestrial carbon and nitrogen cycles, biogeochemical and ocean cycling.
- **Communities & Ecosystems: monitoring and management** covers large-scale patterns, ecological economics, policy and management.
- **Natural Systems in Focus** will integrate and synthesize concepts covered throughout the class by focusing on a specific systems (artic, forest, kelp forests, reefs, chaparral/coastal sage, and rocky intertidal).

Assignments & Grading

Students will graded on the following:

- 1) 2 writing assignments (10 pgs) on topics to be provided by instructors
- 2) Formal peer reviews of one written assignment
- 3) Discussion leading (1/semester)
- 4) Discussion facilitating (1/semester)
- 5) Final exam (Written – will count towards JDPE qualifying exams)

Course materials

Primary literature. All required readings will be posted on Blackboard (and some is also in FOE = *Foundations of Ecology*).

Expectations for Discussion

All students are expected to arrive each week prepared to participate in active and informed discussion. Discussion participation is a important component of your grade.

Each week there will be a discussion **Reviewer** and a discussion **Facilitator**. The role of the discussion **Reviewer** is to provide the context and set the stage for the discussion. To do this, the reviewer will be expected to give a clear synopsis of the papers, and a brief history or background of the topic. Aim for this to be between 3-5 mins, not much longer.

At the end of the discussion the reviewer will also spend two or three minutes summarizing the take home messages and conclusions of the discussion. This should be a summary of what the discussion concluded and covered, not what you thought about the paper before coming to the discussion.

The role of the **Facilitator** is to keep the discussion lively and inclusive. Have a list of thought provoking questions ready to stir up the crowd; that means open ended questions designed to engage discussion participants. The facilitator is in charge of encouraging quiet students to engage, even if they do not volunteer, and working to keep the contributions balanced among the participants.

Writing assignments

There will be two writing assignments for this class. Both will explore current topics in community or ecosystem ecology. The objective for the papers is to review, analyze, and synthesize the topics of the course. One of the papers will be a traditional term paper, and the second will be written as a contribution to Wikipedia. This will give students an opportunity to write for both a scientific and a more general audience. All writing assignments will be formally reviewed by two of your peers. Paper topics need to be approved instructors and students will be asked to submit outlines.

Course schedule

Wk	Date	D	Time	Topic	Reading	Lecturer
1	22-Jan	Th	10-1050am	NO DISCUSSION		
1	22-Jan	Th	2-250pm	Course Introduction		Janet Franklin
1	27-Jan	Tu	2-250pm	Lg scale pattern: Species distributions	Hutchinson (1957) Cold Spr. Harbor In FOE	Janet Franklin
2	29-Jan	Th	10-1050am	DISCUSSION: Predicting species occurrences	Austin (2002) Ecol. Mod.	DISCUSSION
2	29-Jan	Th	2-250pm	Detecting & describing large scale patterns: Fire	Schoennagel et al. (2004) BioScience	Janet Franklin
2	03-Feb	Tu	2-250pm	BONUS DISCUSSION: Fire Ecology	Bond and Migley (2001) TREE	Janet Franklin
3	05-Feb	Th	10-1050am	DISCUSSION: Large Scale Patterns: vegetation	Syphard et al. (2006) Ecol Applic	DISCUSSION
3	05-Feb	Th	2-250pm	Lg scale patterns: plant community dynamics	Watt (1947) J. Ecol. in FOE	Janet Franklin
3	10-Feb	Tu	2-250pm	Detecting & describing large scale patterns: Oceans	Ainsworth et al. (2008); Platt & Sathyendranath (2008)	Rebecca Lewison
4	12-Feb	Th	10-1050am	DISCUSSION: Ocean Patterns	Pauly & Watson (2005)	DISCUSSION
4	12-Feb	Th	2-250pm	Multi-species conservation	Franklin et al. submitted (MSCP MS)	Janet Franklin
4	17-Feb	Tu	2-250pm	Terrestrial nitrogen cycle	Vitousek & Howarth (1991)	Kathy Williams
5	19-Feb	Th	10-1050am	Biogeochemical cycling (Special Lecture Time)	Likens et al. (1970) Ecol. Monogr. In FOE; MacKenzie (1999)	Chun-Ta Lai
5	19-Feb	Th	2-250pm	DISCUSSION: Nitrogen Cycle (Special disc. time)	Ganeshram et al. (2002) (see also Altabet et al. 2002)	DISCUSSION
5	24-Feb	Tu	2-250pm	Biogeochemical cycling	Pagani (2005); MacKenzie (1999)	Chun-Ta Lai
6	26-Feb	Th	10-1050am	DISCUSSION: Biogeochemical cycles	Altabet et al. (2002)	DISCUSSION
6	26-Feb	Th	2-250pm	Ocean and coastal biogeochemical cycling	TBA	TBA
6	03-Mar	Tu	2-250pm	Ocean carbon Fluxes	Sulzman (2000)	Walt Oechel
7	05-Mar	Th	10-1050am	DISCUSSION: Global Change, Drivers	Sabine et al. (2004), Takahashi et al. (2002)	DISCUSSION
7	05-Mar	Th	2-250pm	Terrestrial carbon cycle	Sulzman (2000)	Walt Oechel
7	05-Mar	Th		FIRST PAPER DUE		
7	10-Mar	Tu	2-250pm	Global change	IPCC 2007. Summar for Policy Makers	Walt Oechel
8	12-Mar	Th	10-1050am	DISCUSSION: Global Change Impacts and Feedbacks	IPCC 2007. Summar for Policy Makers	DISCUSSION
8	12-Mar	Th	2-250pm	Global change	Oechel et al. (1993, 1994)	Walt Oechel
8	17-Mar	Tu	2-250pm	Community composition & structure: assembly, succession	Cowles (Botanical Gazette - 1899 - Parts 1-4 in FOE); Gates (Botanical Gazette - 1926)	Doug Deutschman
9	19-Mar	Th	10-1050am	DISCUSSION: Community structure	Edwards EA and K Miyanishi (2008) Ecol Let 11(5)419-431.	DISCUSSION

Wk	Date	D	Time	Topic	Reading	Lecturer
9	19-Mar	Th	2-250pm	Food webs/trophic dynamics	Preston (Ecology - 1962 or in FOE), Patrick (Annals New York Acad Of Sci - 1963)	Doug Deutschman
9	24-Mar	Tu	2-250pm	Food webs/trophic dynamics	Hairston et al (Am Nat 1960 or FOE), Yodzis (Frontiers in Math Ecol 1994), Jasby et al (Limnol Ocean 1990)	Doug Deutschman
10	26-Mar	Th	10-1050am	DISCUSSION: Food webs/trophic dynamics	Pedersen et al Ecological Modelling (2008)	DISCUSSION
10	26-Mar	Th	2-250pm	Community process: stability & diversity links to function	Paine (Am Nat 1966 in FOE), May (Ecology - 1973)	Doug Deutschman
	31-Mar	T		SPRING BREAK		
	02-Apr	Th		SPRING BREAK		
10	07-Apr	Tu	2-250pm	Community complexity and biodiversity	Hector et al (Science 1999), Loreau & Hector (Nature 2001), Tilman et al (Science - 2001)	Doug Deutschman
11	09-Apr	Th	10-1050am	DISCUSSION: Stability & diversity	Becks and Arff (Ecology - 2008); Stachowicz et al (Ecology -2008)	DD
11	09-Apr	Th	2-250pm	Ecological Economics		Heidi Gjertsen (SWFSC)
11	14-Apr	Tu	2-250pm	Ecological Economics		Heidi Gjertsen (SWFSC)
12	16-Apr	Th	10-1050am	DISCUSSION: Ecological Economics		DISCUSSION
12	16-Apr	Th	2-250pm	Ecosystem Based Management		Matt Rahn
12	21-Apr	Tu	2-250pm	Restoration of Ecosystem Function		Tom Zink
13	23-Apr	Th	10-1050am	DISCUSSION: Ecotones & Interfaces		DISCUSSION
13	23-Apr	Th	2-250pm	California Shrublands: Chaparral, Sage Scrub	Westman (1981) Ecology; Keeley et al. (2005) Ecol Applic	Doug Deutschman
13	23-Apr	Th		SECOND PAPER DUE		
13	28-Apr	Tu	2-250pm	Temperate forests	Davis (Ecology 1969, in FOE), Pacala et al (Ecol Mono 1995)	Doug Deutschman
14	30-Apr	Th	10-1050am	DISCUSSION: Temperate forest modeling	Westman (1981) Ecology	DISCUSSION
14	30-Apr	Th	2-250pm	Saltmarsh Ecosystems		Brian Hentschel
14	05-May	Tu	2-250pm	Reefs		Todd Anderson
15	07-May	Th	10-1050am	DISCUSSION: Marine communities		DISCUSSION
15	07-May	Th	2-250pm	Estuaries II	Teal (Ecology 1962, in FOE) and Desmond et al (Estuaries - 2002)	Doug Deutschman
15	12-May	Tu	2-250pm	Rocky intertidal		Kevin Hovel
	21-May	Th	100-300pm	FINAL EXAM		