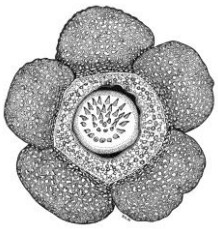

Botany 4600 Plant Ecology
CSU Stanislaus, Spring 2018

I. General Information

Professor:	Dr. Michael Fleming
Office:	Naraghi 269
Office Hours:	, or by appointment
Phone:	(209) 664-6923
Email:	mfleming1@csustan.edu
Class Sessions:	MWF 1:00–1:50 in Bizzini 208 (aka C 208)
Labs:	M 2:30–4:50 in Naraghi 211 (aka N-211)
Required Text:	*The Ecology of Plants, 2nd ed*. by Gurevitch, Scheiner and Fox.

Course Description. Plant ecology is the study of the interrelationships between plants and their environments, with special emphasis on the structure, development, distribution and measurement of plant communities. This course satisfies the ecology elective for the biology major, and is split roughly into thirds that focus on the community concept, applications of the community concept, and the societal importance of plant communities, respectively. Most of our focus will be on wild plant communities, but we will also cover some material dealing with ecology of agricultural systems. ***Prerequisites****: BIOL 1150, CHEM 1110, or equivalent.* ***Strongly recommended****: one semester of statistics (ex: MATH 1600, 1610 or 4640).*

Course Objectives. After completing this course you should be able to:

1. *Demonstrate your ability to think like an ecologist;*
2. *Speak & write coherently about ecology with biologists and non-biologists alike;*
3. *Apply ecological knowledge to make informed decisions in your life.*

More specific to ecology, you should be able to articulate how:

1. *All living things arise from a common ancestor.*
2. *Species evolve over time, and new species can arise when allele frequencies change due to mutation, natural selection, gene flow, and genetic drift.*
3. *Fitness (an individual's ability to survive and reproduce) is environment-specific, and depends on both biotic and abiotic factors.*
4. *Natural selection has favored structures whose shape and composition contribute to their ecological function.*
5. *Competition, mutualism, and other interactions are mediated by each species' morphological, physiological, and behavioral traits.*
6. *Biological molecules, genes, cells, tissues, organs, individuals, populations, communities and ecosystems interact to form complex systems.*
7. *Cells/organs/organisms have multiple mechanisms to perceive and respond to changing environmental conditions.*
8. *Energy and matter flow between organisms and the abiotic environment.*
9. *The size and structure of populations and communities are dynamic. A species' abundance and distribution is limited by available resources and by interactions between biotic and abiotic factors.*
10. *Ecosystems are not isolated and static; within ecosystems interactions among individuals and the environment form networks, and changes in one or more nodes of an ecological network can cause changes in other nodes, either directly or indirectly.*

As learners and citizens of this class you should be able to:

1. *Practice self-assessment and reflection while developing the necessary study skills for success in science coursework.*

2. *Use scientific inquiry as a means of understanding the natural world.*
3. *Make connections between the facts of science and its relevance to broader societal issues.*
4. *Demonstrate a professional and respectful manner when communicating and working with peers, instructors, and staff, as practice for success in the workplace and community.*

The mission statement and program learning objectives for the Biological Sciences department can be found here: https://www.csustan.edu/biology.

Announcements. Check BlackBoard for updates, lecture slides, study guides, etc.

My Teaching Philosophy. My teaching philosophy is grounded in high expectations, accountability, and belief in appropriate behavior conducive to learning. Five principles guide my teaching philosophy:

1. All students can become lifelong learners.
2. Significant change requires significant commitment and time.
3. Struggle is a necessary and important part of life.
4. Students must accept responsibility for their learning progress.
5. I will never do for students what students can do for themselves.

That said, I will work hard and appeal to multiple learning preferences to help you succeed in this course. Hopefully we'll also have a few laughs as we go along.

Class Participation. Please arrive to class on time and ready to learn. At this level you should attend every class session; there is plenty of research that shows final grades are positively correlated with attendance. Assignments are due at the start of class (or on your way out if we did it in class). You will talk and work frequently in small groups, and sometimes present your ideas to the entire class. Most importantly, please do not disrupt the learning environment, rights, and property of others. All gadgets not conducive to learning in the course, such as cell phones, music devices, etc. should be turned off during class. Be honest, hold yourself accountable for your actions, and hold me accountable for mine.

Respectful Classroom Atmosphere. This class is a "judgment-free zone" at all times. This means that when you disagree with somebody's opinion on a subject, you do not have the right to sling insults, raise your voice, or criticize them. I most certainly encourage disagreement on controversial topics, and conversations are livelier if people do disagree on a subject. However, polite civil disagreement and outright hostility are two very different things. I will not tolerate hostility in the classroom, and anyone participating in this behavior will be escorted out of the room and not allowed to return for the rest of the class period.

Evolution. "Respect for data, comfort in faith." Someone much wiser than me told me this long ago. If you can live by it then you'll be fine in this class. Evolution and natural selection are central tenets of biology and will be critical aspects of this course, openly discussed and referred to frequently.

Math. Every ecologist uses math and statistics. In this course you will use math as it applies to ecology. This will include making and interpreting graphs, calculating averages and variation around an average, using t-tests, ANOVA, linear regression and ordination. I will help you and there will be chances to practice. NOTE: a laptop computer and/or scientific calculator is a very good tool for this class.

II. Assignments, Exams and Grading

Exams. We will have two midterms and one comprehensive final exam. Exams will consist of diagram interpretation and open response questions. Please plan ahead and be in class on exam days. Requests for early or make-up exams must be submitted *in writing* prior to the scheduled exam with evidence of your

hardship. If you miss an exam and have to make it up you will also need to provide some evidence of hardship. **No makeup exams will be given after graded exams have been returned to the class.**

Primary Literature. Periodically throughout the semester we will have in-class group discussions stemming from readings in primary literature. Some readings and subsequent discussions will require more work than others (depends on the length and rigor of the paper). No opportunities for makeup discussions will be given, but if you miss one I encourage you to talk about the paper with a friend or with me outside of class. These readings/discussions are designed to provide opportunities for you to explore plant ecology research, discuss complicated concepts and terminology, and teach each other.

Labs. The laboratory and lecture are generally integrated, and each lab period will have a special emphasis that (hopefully!) further illustrates concepts introduced in lecture. I am a firm believer in reinforcing concepts learned in lecture with activities in lab that illustrate these concepts. Labs will often NOT have an accompanying lab report; rather, lab grades are based on (1) participation and (2) the term project that you and your team design, implement, analyze, write up and report to the rest of the class. Any take-home work stemming from a lab constitutes "participation" and will be due the next week at the beginning of lab. You can only get credit for a lab if you are present in lab—there are no make-up labs. Lab activities will include, but are not limited to, greenhouse and bio-ag area work, plant identification, statistical methods relevant to analyzing plant community data, and field trips.

Grades. There are 550 points possible in this course distributed as follows:

Activity/Assignment		**Points**	**% of Total Points**
MIDTERM EXAMS	*(100 x 2 exams)*	*200*	*36%*
FINAL EXAM		*150*	*27%*
PRIMARY LITERATURE DISCUSSION (10 pts. x 3 weeks)		*30*	*6%*
LAB TERM PROJECT	*(30 pts. presentation, 70 pts. paper)*	*100*	*18%*
LAB PARTICIPATION	*(5pts. weekly)*	*70*	*13%*
TOTAL		***550***	***100%***

I calculate grades as a function of grade point average (GPA) where A=4.0 and D=1.0 (I will show you an example of this in class). Students find this method fair and equitable. **I give + and – grades** as follows:

4.0-3.8 = A	3.7-3.6 = A-	3.5-3.3 = B+	3.2-3.0 = B	2.9-2.6 = B-	2.5-2.3 = C+
2.2-2.0 = C	1.9-1.6 = C-	1.5-1.3 = D+	1.2-1.0 = D	0.9-below = F	

While there may be a few opportunities for extra credit (announced in class only), there are generally no other points to contribute toward final grades other than those available from the activities and assignments listed above. I do not offer "extra work" as a means to get more points after you see your final grade. Surprisingly, I get asked to do this a lot! The answer is always "no".

Important Dates. The last day to add the class is Feb. 7th. Census Date is Feb. 21st. This is the last day to drop the course. Note there is no CR/NC option for this course; it is offered with letter grade option only. **Unless I have made a mistake in calculating grades or to replace an incomplete, I will not change grades once final grades have been submitted.**

Cheating and Plagiarism. Don't do it! Your work should reflect your own effort and words. Any verified instance of cheating and/or plagiarism will be unpleasant for all involved. At minimum, verified instances of cheating or plagiarism will result in the offending student receiving an automatic F in the course and being referred to the Dean of Students for further disciplinary action.

Recording Lectures and Special Accommodations. This course is ADA accessible. Students with documented disabilities should seek special accommodations for all classes through the Disability Resource Services office on campus (L-165). If DRS notifies me that you require ADA accommodations then you will receive them. Examples of ADA accommodations include extra time for exams, permission to record lectures, and note-taking assistance. If you record my class in any form (video, audio, still pictures, etc.) without accommodation from DRS, that constitutes intellectual property theft and will be unpleasant for all involved. NOTE: Student athletes who will miss class for games/matches should have their coach contact me, and I will accommodate your schedule by allowing alternate test dates and/or excusing points missed in class.

III. Field Trip

We will be in the field during the semester, mostly around campus during lab. In the past, one significant part of the class was our field trip to Red Hills, a serpentine soil site with many endemic plants, where we surveyed plant communities there and used those data (and prior class data from the same site) to explore a plant ecology question and write a formal scientific paper. This semester I am considering a different course of action, but I want input from students before I make a firm decision. More details provided in class.

IV. Study Skills

The following suggestions may help you succeed in this and other classes. 1. **Read** the chapter(s)/papers before class and bring questions you have to class. 2. **Attend** class. 3. **Complete all assignments** and turn them in on time. 4. **Take notes** in a way that is intuitive to you, even if you have to use a lot of paper. 5. **Join a study group** with like-minded individuals. 6. **Study** for the exams sooner than the night before or morning of the exam. 7. **Go to bed early** the night before and get up early the day of exams. 8. **Learn how you learn** and then stick with a preference or process that is successful for you.

Learning takes time and is difficult (impossible?) to do in a single session before an exam. Form a study group that meets regularly so you can talk about new concepts and review terminology with your colleagues. When studying for exams, focus primarily on lecture/lab notes and concepts emphasized in in-class and lab activities; readings are useful background information with lots of relevant examples of concepts discussed in class. Students who study in groups tend to do better than those that study alone.

V. Graduate Students

If you are taking this course as a graduate student, then extra work is required. Please set up a time to talk to me about additional graduate-level work.

VI. Tentative Schedule (subject to change)

Week (Monday date)	*Lecture Topic(s) & Guiding Questions*	*Readings (before class)*	*Lab (Monday afternoons)*
1 (Jan. 22) ***First class is Jan. 26***	Introduction – *how and why study plant ecology?*	n/a	
2 (Jan. 29) ***No class Fri. Feb. 2nd***	Evolution – *how do plants adapt to their environments?* Community Concept – *abstract or concrete?*	Ch. 6 Ch. 1 & 9 (pp. 205-212)	Greenhouse → set up competition experiment
3 (Feb. 5)	Environmental Gradients – *what physiological features allow plants to live in different habitats?* Climate – *what are the major climate zones and drivers of climate?*	Ch. 2 - 4 (skim these) Ch. 17	Plant ID
4 (Feb. 12)	Biomes – *What constitutes a biome?* Indicator Species – *can the presence or absence of certain plant species tell you anything about that landscape?*	Ch. 18 Ch. 8	Theory and practice of sampling communities

5 (Feb. 19)	Populations – *what can the growth or decline of species populations tell us about the nature of the plant community?*	Ch. 5	Statistical Methods 1 – the basics (mean, SD, types of graphs, t-tests, ANOVAs)
6 (Feb. 26)	Competition – *how do plants win or lose?* Herbivory – *plants can't run from herbivores, so how do they defend themselves?* **EXAM 1 FRIDAY MAR. 2**	Ch. 10 Ch. 11	Statistical Methods 2 – Regression Analysis
7 (Mar. 5)	Nature of Communities – *so, all this means what then?* Ordination Methods 1 – *how can we find patterns in a big messy data set about plants?*	Ch. 9 (pp. 212-end) Ch. 15	Process plants & enter data from competition experiment
8 (Mar. 12)	Ordination Methods 2 – *how can we find patterns in a big messy data set about plants and environmental factors?*	Ch. 15	Share data from competition experiment
9 (Mar. 19)	Succession – *how do plant communities recover after disturbance?*	Ch. 12	Statistical Methods 3 – Indirect Ordination
10 (Mar. 26) - **FIELD TRIP 3/30 (FRI.)**	Landscape Ecology – *what happens when plants move from here to there, and how do they do this?*	Ch. 16	Field trip prep, gear, logistics, data sheets
11 (Apr. 2)	*Spring Break!*	*n/a*	*Do something fun!*
12 (Apr. 9)	Lessons From Succession – *how can plant community ecology help me manage on-the-ground restoration projects?* **EXAM 2 FRIDAY APR. 13**	Ch. 12 (review), 13	Statistical Methods 4 – Direct Ordination
13 (Apr. 16)	Restoration Ecology – *what are some examples of habitat restoration?*	Ch. 12 (review), 8	Process soil from RH, begin entering/formatting data
14 (Apr. 23)	Plants and People – *do plants and humans depend on each other?* Climate Change – *what evidence suggests the climate is changing?*	Ch. 21	Data analysis
15 (Apr 30)	Human Effects – *what is the breadth and scope of the human signature on the planet?*	Ch. 21, 19	Work on reports
16 (May 7) - **no class Fri. May 11th (Warrior Day)**	Extinction – *if I remove a single bolt from my car every day, what will eventually happen?* Good News For a Change! – *what can I do, and why should I even care to try?*	Ch. 19 Special topic not in text	Work on reports
17 (May 14) **Final exams begin Thur. 5/17.**	Review	Review	Reports
18 (May 21)	**FINAL EXAM = WED. MAY 23rd, 11:15 - 1:15**