

**BIOL 409/L/492J. Non-Flowering Plants.** The diversity of mosses, ferns, conifers, etc., their phylogeny, life cycles, ecological niches, biogeography, identification, and comparative biology.

**Instructors:** paul.wilson@csun.edu (818-677-2937; T & Th 3:00-4:30 Eucalyptus Hall 2102 or anytime Live Oak Hall 1323).

**Spring Break and other trips:** There will be a week-long trip over spring break. To compensate for this time, there are three other weeks when we will not meet. There are two other trips, and class may be dismissed late on those days.

### Tentative Schedule

- 23 Jan Land plant overview. Tour greenhouse and plant organs in lab. Learn how to map characters on a phylogeny.
- 30 Jan Lecture on bryophyte ecology. Discuss Kimmerer pp. 1-34. Learn how to infer phylogenies. Look at sex organs of bryophytes. How to label herbarium specimens, e.g., for your collection.
- 6 Feb Bryophyte reproductive biology. Discuss K pp. 35-51. Species boundaries. Choose paper topic.
- 13 Feb Learn local bryophytes. Write Key. Discuss K pp. 62-90. Pteridophyte life cycles. Greenhouse ferns, Lycopods, *Equisetum*, *Psilotum*.
- 20 Feb ~NO CLASS COMPENSATING FOR BIG TRIP~ Hint, this would be a great day to do your collection.
- 27 Feb Test 1. Discuss pp. K 111-124. Lecture on allopolyploidy in pteridophytes. Do exercise with *Polystichum* to study hybrid inference.
- 6 Mar Discuss pp. K 141-150, 156-162. Lecture on fern diversity. Greenhouse work. A good day to show me how your collection is progressing.
- 13 Mar Field trip to Santa Monica Mts weather permitting (otherwise switch with 20 Mar). Discuss Moran Ch's 1, 2, 4
- 20 Mar Paper Due. Discuss M Ch's 6, 7. Phenetics above the species level using chielanthoid ferns. Scanning electron microscopy. Data in systematics.
- 27 Mar ~ NO CLASS COMPENSATING FOR BIG TRIP~ If you haven't done it yet, you should get serious about your collection.
- 3-8 Apr **Big trip up north.** Discuss M Ch's 8, 9, 16, 17. Apr 3 Sequoia National Park (no showers). 4-5 San Joaquin Experimental Range. 6-7 Big Basin State Park. Drive home on the 8<sup>th</sup>.
- 17 Apr Test 2. Discuss M Ch's 18,19,20,21. Lecture introducing seed life cycles. Look at gymnosperm sex organs. Adaptive correlation. Last chance for help identifying things in your collection.
- 24 Apr Collection due. Study collections in lab. Discuss M Ch's 29,30. The analyses of clines. Write key to conifers of the San Gabriel Mountains.
- 1 May ~ NO CLASS COMPENSATING FOR BIG TRIP~
- 8 May Revision of paper due. Field trip to San Gabriel Mts. We may be home late. Dress in layers. Discuss M Ch's 23,24,25,27. I sum up diversity in the non-flowering plants as a review. I talk about comparing your collections.
- 15 May Test 3.

*Prerequisite*—Biol. 106 and 106L are prerequisites for this course. If you feel rusty, you should re-read your 106 text concerning (1) meiosis and fertilization, (2) plant life cycles, and (3) major groups of plants. Although I will review quickly before extending my

treatment of these topics, having the 106 coverage fresh in your mind will make the rest of the class much less frustrating. There's no reason to start behind!

*Readings*— We will read two books written for a popular audience: (1) Robin Kimmerer's *Gathering Moss*; and (2) Robin Moran's *A Natural History of Ferns*. For each week's readings, you should abstract the science out of the reading and/or write some questions and comments. The main idea here is that you have something scientific to discuss from the readings. You will write it down on paper so that I will have something to grade, even if you are a quiet person. (3) You will also probably want to buy a copy of Malcolm, Malcolm, Shevock & Norris's guide to California mosses.

*Packet* — You will have to purchase a course packet that has diagrams and brief summaries of the lectures and lab exercises.

*Tests*— About half of each test will be a mixture of practical information from the labs like identifying plants and organs, definitional and short answer questions about the vocabulary. The other half will be essay questions about the readings, the lectures, and systematic methodology. There will be three such exams during the semester. The tests are mildly cumulative but definitely weighted toward material not previously on tests.

*Paper* – You will write a 1500-2000 word paper. Turn in two copies, one for me and one for a peer reviewer. After we review it, you will revise it, probably extensively. There will be more about this later, but basically I'm thinking it should be a translation of some technical papers into an article written for non-botanists such as would appear in a magazine like *Natural History* or *Discovery*.

*Collection and Site Survey* – You will make a collection of 30 species of bryophytes. These may all come from one location. If you can't get 30 from one location, add locations until you have 30 different species; however, you should go ahead and collect repeat specimens of the same species as they occur at your several locations. Be careful about taking notes on the microsite of each specimen and the mesosite of each location. Identify the specimens as best you can (typically to genus), and seek help where you are having difficulty. Not all specimens need to be identified, but I'll take off points if you don't put a name on something you ought to be able to figure out. Along with your labeled specimens, you should also turn in a spreadsheet with your data. The data from everyone's surveys will be put together for a group project. This is a major part of the field studies portion of the class.

*Transportation*. You must sign a waiver to go on field trips and ride in university vehicles. If you prefer, for most trips, you may drive your own cars and meet us at the site, but please car pool when feasible.

*Grades:*

Test 1 .....	15%
Test 2 .....	15%
Paper .....	15%

Test 3

Collection & site survey .....	15%
Questions & comments on readings.....	15%
Attendance & participation.....	10%

The grade for the lecture, lab and field studies will be the same. Possible grades are A, A-, B+, B, B-, C+, C, C-, D+, D, D-, and F. Ideally, 90% would be an A-, 80% would be a B-, and 70% would be a C-, but I will probably drop these thresholds. Generally, I aim at have A's go to people who I would think could go on to graduate or professional school, B's for students who are doing fine as an undergraduate, and C's for those whose work warns against going on to a master's program.

*Safety.* This is a moderately strenuous class, with a lot of hiking. It is not recommended if you have trouble getting around. If you have any medical condition that might cause a problem in the field—allergies to bees, diabetes, whatever—please tell me about it in writing and tell me what precautions may be taken. I will push the class to keep up with me when we are walking. This is because people tend to lolly-gag, chat, and smell the roses rather more than we have time for. You are responsible for using your own judgment as to what you are physically able to do, and if you don't think it is wise to do something, don't do it. Please tell me promptly if there is any problem. Then we can consult as to what to do.

*Biology Department Withdrawal Policy:* Unrestricted class withdrawals are permitted only until the end of the third week. Thereafter, requests to withdraw will be honored only when a verifiable serious and compelling reason exists and when there is no viable alternative to withdrawal. Poor performance is not an acceptable reason for dropping a class; in fact, you must be passing in order to withdraw. During the last three weeks of class, withdrawals will not be approved except when a student is withdrawing from all classes for verifiable medical reasons.

*Plagiarism and cheating:* Plagiarism is the taking of someone else's writing and presenting it as your own, for instance copying material from the www or from a published article into your paper (even a single sentence). I require that you express everything in your papers in your own words, except (rarely) for short quotations in quotations marks with a reference cited. Examples of cheating would be looking at someone else's paper during a test, at your own notes, at a field guide, or letting someone else look at your paper. All forms of plagiarism and cheating are expressly forbidden by University rules and will not be tolerated. Anyone one who plagiarizes or cheats will receive a zero grade for that assignment or test. In addition, a report will be filed that could be put on your permanent University record available to other universities and employers (see "Academic Dishonesty" in University catalog).

*Students with disabilities:* must register with the Center on Disabilities and complete a service agreement each semester. Staff within the Center will verify the existence of a disability based on the documentation provided and approved accommodations. Students who are approved for test taking accommodations must provide an Alternative Testing Form to their faculty member signed by a counselor in the Center on Disabilities prior to making testing arrangements. The Center on Disabilities is located in Bayramian Hall, room 110. Staff can be reached at 818-677-2684.