

Botany 241 – Systematic Botany

Spring 2001

Schedule

Lecture	Life Sciences 277	1:30–2:20
Lab Section 01	Life Sciences 456	2:30–4:20
Lab Section 02	Life Sciences 456	10:30–12:20

Textbooks (required)

- 1) Vascular Plant Taxonomy by D. R. Walters and D. J. Keil.
- 2) Flora of the Pacific Northwest by C. L. Hitchcock and A. Cronquist.
- 3) Lab Manual by RJMG

Additional handouts will be provided in class as needed. For some topics, supplementary material can be found on World Wide Web sites; site addresses will be provided as needed.

Objectives

The two main goals are 1) to introduce you to several topics in plant evolution and systematics, and 2) to survey the diversity of vascular plant families found in the northern United States, with specific examples representing this region.

The word "systematics" covers several different aspects of the study of biodiversity. Topics we will cover include: uses of systematic information; overview of plant diversification (species definitions, changes within populations, speciation); nomenclature (naming of plants); phylogenetics (the study of evolutionary relationships among plants); recognition of a selection of temperate North American plant families; identification of genera and/or species using keys.

Grading – Laboratory and lecture grades will contribute equally to your final grade.

Lecture

1.	Hour exams	4 exams, 50 points each	200 points
2.	Final exam	1 exam, 100 points	100 points

Lab

3.	Lab exams	2 exams, 100 points each	200 points
4.	Lab quizzes	16 quizzes, 5 points each, 2 lowest quizzes dropped	70 points
5.	Phylogeny exercise	20 points	20 points
6.	Instructor assessment	10 points	10 points

Total 600 points

Grading Scale

<u>Percentage</u>	<u>Points</u>	<u>Grade</u>
89.5–100	537–600	A
79.5–89.4	477–536	B
69.5–79.4	417–476	C
59.5–69.4	357–416	D
0–59.4	0–356	F

The lecture final exam will cover the entire semester, but half of the exam (50 out of 100 points) will focus on the lectures following exam 4.

Laboratory exams are practical exams, based on material that you will have seen in lab. The second laboratory exam will cover only the second half of the semester. Laboratory quizzes will include mostly written questions. They will cover material seen since the previous quiz, and will include one question on the **current week's lab** (i.e., you will have to read the lab handout before arriving in the lab). The two lowest quiz grades will be dropped; these include scores of zero on missed quizzes. Quizzes will be given right at the beginning of lab; if you arrive late, you can not make up the quiz.

Absence From Exams

Exams must be taken on scheduled dates. Make-up exams will be allowed if written notice of illness, family emergency, or conflict involving an official University function is provided at least 24 hours before the scheduled exam. All make-up exams must be completed within one week of the scheduled exam date.

Spelling Policy

Correct spelling is required for all scientific names of plants, and for all **boldface** terms in lab and class handouts. Up to one-half credit will be deducted if scientific names or boldface terms are misspelled on quizzes and exams. I will follow the same rules for you; if at any time I misspell a scientific name or a **boldface** word in lecture or in the lab manual, the *first* person to notify me about it will get a bonus point. This also applies to assigned web sites, your textbook, and handouts. (Remember: bonus points are *only* for scientific names or for terms that have appeared in boldface on lab and class handouts.)

Final Exam Policy

The policy of the Department of Biological Sciences does not allow for final exams to be taken early. The final exam *must* be taken during finals week.

Regrading

Exam keys will be posted within a few days following the exam, both inside and outside of the lab. Check your answers against the key, and make sure that the points on your exam have been added correctly. If you feel that a question on your exam has been graded unfairly, or if you have lost points because of an adding mistake, see me as soon as possible, but no later than one week after the exam.

Laboratory Fees

Laboratory fees will be reimbursed to students who drop the course within the first two weeks of classes.

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Lecture Schedule – Spring 2001

<u>Date</u>	<u>Topic</u>	<u>Reading* (Walters&Keil)</u>
January	Tu 16 Introduction to Systematics	3–8,59–63,525–526
January	Th 18 Speciation I – What is a species? Models of speciation	—
January	Tu 23 Speciation II – Mechanisms. How do populations change?	—
January	Th 25 Phylogenetics I – What is a phylogeny, and where do we get the data?	525–536
January	Tu 30 Phylogenetics II – How do we use data to get a phylogeny?	489–503
February	Th 1 Phylogenetics III – Rooting and interpreting phylogenetic trees	—
February	Tu 6 EXAM I	
February	Th 8 Nomenclature and the Linnaean hierarchy	13–24
February	Tu 13 Early land plant evolution	—
February	Th 15 Ferns and fern allies	93–99, 105–108
February	Tu 20 Ferns	109–116
February	Th 22 Gymnosperms I – Survey of diversity	125–138
February	Tu 27 Gymnosperms II – Focus on conifers. Are yews conifers?	134–138
March	Th 1 EXAM II	
March	Tu 6 Introduction to angiosperms – pollination syndromes	—
March	Th 8 Angiosperm Families I – Basal flowering plants. Monocotyledons vs. dicotyledons - how clear is the distinction?	179–190,397–398
March	Tu 13 Angiosperm Families II – Early dicots – Ranunculaceae, Berberidaceae, Papaveraceae (incl. Fumarioideae)	191–197
March	Th 15 Angiosperm Families III – Caryophyllidae (Centrosperms): Caryophyllaceae, Cactaceae	349,358–360,365–367
March	Tu 20 <i>Spring Break</i>	
March	Th 22 <i>Spring Break</i>	
March	Tu 27 Angiosperm Families IV – Dilleniidae: Ericaceae (incl. Monotropoideae, Pyroloideae), Violaceae, Brassicaceae	317,332–333,338–342
March	Th 29 EXAM III	
April	Tu 3 Angiosperm Families V – "Amentiferae" (an artificial group) – Salicaceae, Betulaceae	336–337,390–392
April	Th 5 Angiosperm Families VI – Rosidae Ia: Rosaceae, Saxifragaceae	203,217–223
April	Tu 10 Angiosperm Families VII – Rosidae Ib – Fabaceae, Onagraceae	224–227,230–231
April	Th 12 Angiosperm Families VIII – Rosidae II: Aceraceae, Geraniaceae, Apiaceae	250–251,256–259
April	Tu 17 Angiosperm Families IX – Asteridae I: Polemoniaceae, Lamiaceae, Scrophulariaceae	265,279–280,285–288
April	Th 19 Angiosperm Families X – Asteridae II: Asteraceae, (Dipsacaceae)	301–312
April	Tu 24 Exam IV	
April	Th 26 Angiosperm Families XI – Monocots I: Lilioids – Iridaceae, Amaryllidaceae, and Liliaceae. Also: Lemnaceae	418–425,403
May	Tu 1 Angiosperm Families XII – Monocots II: "Graminoids" – Poaceae, Cyperaceae, Juncaceae	435,441–453
May	Th 3 Angiosperm Families XIII – Solanaceae, a member of the summer flora, and Convolvulaceae	277–278,268
May	Tu 8 Carnivorous plants I	—
May	Th 10 Carnivorous plants II	—
May	W 16 Final Exam, 1:00–3:00	

*Supplementary material will be provided as needed

NOTE: The order in which we cover the angiosperm plant families may not exactly follow the list above. Which families we cover, and when, is partly dictated by the weather, which determines what plant material will be available for lab. Therefore, the order and content of the "Angiosperm Plant Families" list may change.

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Laboratory Schedule – Spring 2001

<u>Date</u>		<u>Lab#</u>	<u>Topic</u>	<u>Reading (in addition to lab manual)*</u>
January	Tu 16		No lab	
January	Th 18	1	Introduction to Lab	---
January	Tu 23	2	Tour and use of the ID herbarium, Herbarium specimen basics	67-77
January	Th 25	3	Angiosperm overview I – Vegetative structures	29-43
January	Tu 30	4	Angiosperm overview II – Flowers I Floral formulas and diagrams	143-155, 167-172
February	Th 1	Q 5	Introduction to keys	49-55
February	Tu 6	6	Angiosperm overview III – Flowers II Floral diversity, keying	F
February	Th 8	Q 6	Angiosperm overview IV – Flowers III Floral diversity, keying	F
February	Tu 13	Q 7	Angiosperm overview V – Fruits and inflorescences	155-165
February	Th 15	8	Creating a data set	---
February	Tu 20	Q 9	Ferns and fern allies	93-99, 105-108, F
February	Th 22	10	Ferns	109-116, F
February	Tu 27	Q 11	Gymnosperm families I – Survey	125-138
March	Th 1	12	Gymnosperm families II – Campus walk	134-138, F
March	Tu 6	Q 13	Keying gymnosperms I	F
March	Th 8	Q 13	Keying gymnosperms II – Practice	F
March	Tu 13	—	Lab exam review – no new material	
March	Th 15	—	LABORATORY EXAMINATION I	
March	Tu 20	—	Spring Break	
March	Th 22	—	Spring Break	
March	Tu 27	Q 14	Basal flowering plants, and early "true dicots" – Ranunculaceae, Berberidaceae, Papaveraceae	179-197, F
March	Th 29	15	Caryophyllaceae, Cactaceae	349, 358-360, 365-367, F
April	Tu 3	Q 16	Ericaceae, Violaceae, Brassicaceae	317, 332-333, 338-342, F
April	Th 5	17	"Amentiferae" – Salicaceae, Betulaceae	336-337, 390-392, F
April	Tu 10	Q 18	Rosidae Ia: Rosaceae, Saxifragaceae	203, 217-223, F
April	Th 12	Q 19	Rosidae Ib: Fabaceae, Onagraceae. (Plus some keying practice)	224-227, 230-231, F
April	Tu 17	Q 20	Rosidae II: Aceraceae, Geraniaceae, Apiaceae,	250-251, 256-259, F
April	Th 19	Q 21	Asteridae I – Polemoniaceae, Lamiaceae, Scrophulariaceae	265, 279-280, 285-288, F
April	Tu 24	22	Asteridae II: Asteraceae. (Dipsacaceae)	301-312, F
April	Th 26	Q —	Practice keying for species ID	F
May	Tu 1	Q 23	Monocots I – Lilioids	418-425, 403, F
May	Th 3	Q 24	Monocots II – Graminoids	435, 441-453, F
May	Tu 8	—	Lab Exam Review	F
May	Th 10	—	LABORATORY EXAMINATION II	

*Readings are from Walters and Keil, and largely overlap with class readings. Bring to lab: lab manual, pencil and eraser, and the Walters and Keil text. You will be doing a lot of drawing in the lab; all drawings are to be done **in pencil**. Bring your Flora of the Pacific Northwest when you see "F" in the "Reading" column. Scheduled quizzes are indicated by a **Q**.

Questions/Comments and Replies

I HATE plants! Why, oh why, is this course required for my major? I have no control over this; the requirements for your major were determined by your department. But now we are stuck with each other, so why not come by and talk to me about it? Tell me what you want to do, and I'll bet I can point out at least a few ways in which some of the topics we will cover in this class relate to your future plans. And we will probably both learn something in the process.

Isn't Botany 241 supposed to be a course in local plant identification? No; it is a general course in systematics. Even if we spent the entire semester doing nothing but memorizing plant names, we could cover only a fraction of the many hundreds of plant species found in the Pacific northwest. Furthermore, this memorization will become nearly useless if you move to another region of the country, where the species are different. You will learn to recognize many important plant families, and to key out genera and species within families; this is how working biologists learn to do field identification. Unlike species memorization, your family-recognition skills will be portable throughout most of the temperate northern hemisphere (and beyond, in many cases), and good keying skills will allow you to identify plants anywhere in the world, even if you have never seen them before.

Why don't we spend more time on plant ecology (or on crop plants, or weeds, or plant-animal interactions, etc., etc.)? Because this is a course in systematics, and as it is, there are many topics in systematics that we won't have time to cover at all. If you look around at UI or WSU, you will probably be able to find a course specifically designed to cover other plant-related topics, if you are interested learning more about them. I can help you if you like.

Why do we spend so much time learning definitions of annoying terms? Memorizing terminology is usually the most boring part of a course in a new discipline. However, it is impossible to read, learn, or teach about plants if you don't understand the words used to describe them. This is true of anything new topic you are trying to learn about, whether it's botany, jet engine repair, or baking. I KNOW how dull it is to memorize terms; I think it can be boring, too. I try to limit memorization to only the most important and/or commonly used terms.

Why don't we spend a lot more (or a lot less) time on review? I had General Botany four years ago (or just last semester). This class includes people with a wide diversity of backgrounds. Furthermore, some people took the prerequisite course very recently, while others had it years ago. While I do review some topics you covered in general botany, I cover them in more detail, so you can review and learn new things at the same time. There are always some people who wish for more review, while others think it is a waste of time. It is impossible to provide a level of review that is right for every person.

You lecture too fast. I do lecture quickly, but I watch you taking notes and I really do try to leave enough time. If you feel you are getting left behind, it is perfectly OK for you to ask me to slow down or to leave an overhead up for a little longer.

Will you provide outlines summarizing each lecture? No. I have tried this, and have found that many people end up doing WORSE, because they depend entirely on the handouts and miss a lot of class material.

Why do we have to use so much frozen plant material? Sometimes the important features are hard to see. I agree, but it is winter, and we are in Idaho, so we can't get much live plant material for at least the first couple of months of the semester. Therefore, we collect material in the previous spring and summer and freeze it for use in the course. Later in the semester, we will have fresh material for most of the families we cover. Pam and I will take the quality and quantity of available plant material into account when we figure out what you will be expected to know for your lab exam.

How come we didn't cover the [fill-in-the-blank] family? I heard that it is a very important family. There are many more families in the region than we can reasonably cover. I try to choose families that exhibit a variety of different features. I also focus on families for which living material is likely to be available early in the spring. Within these limits, some interesting families definitely get left out! Of course, if you want additional information (beyond what is in your text) about a family that we don't cover, I'll be happy to provide it for you.

I have other questions that are not listed here. If you have *any* question or concern about anything related to this course, stop by, send an e-mail, or call, and ASK.