

BIOLOGY 4411/5411**EVOLUTION OF VASCULAR PLANTS****DR. UPCHURCH****SPRING 2008**

Lecture 6:30-7:45 pm MW, SUPP (Supple) 239

Lab 8:00-9:15 pm MW, SUPP (Supple) 239

Tentative **lecture and examination schedule**

DATE	LECTURE TOPIC	READINGS (Bell & Helmsley)
14 January	Introduction to course	None
16 January	Basic vascular plant structure	Handout (G. & F., p. 11–22)
21 January	No class, Martin Luther King Day	
23 January	Basic sporophyte: Vegetative morphology	Handout (G. & F., p. 23–33)
28 January	Basic sporophyte: Vegetative anatomy	Handout (G. & F., p. 33–47)
30 January	Sporangia and spores	Handout (G. & F., p. 49–55)
4 February	Gametangia and embryos	Handout (G. & F., p. 57–74)
6 February	Homology and phylogeny	Handout
11 February	LECTURE EXAM 1	
13 February	A primer on paleobotany	Handouts
18 February	The bryophytes	102–134
20 February	Early vascular plants and other polysporangiates	135–141, 161–162
25 February	Lycopsida-1: Lycopodiales and <i>Selaginella</i>	148–159
27 February	Lycopsida-2: <i>Isoetes</i> and fossils	142–148, 159–161
3 March	Psilopsida: The enigma	183–188
5 March	Sphenopsida	162–171
10-16 March	SPRING BREAK, NO CLASSES	
17 March	Ferns: Introduction, eusporangiate ferns	172–173, 176–183
19 March	Leptosporangiate ferns: General features, diversity	188–212
24 March	Leptosporangiate ferns: Diversity	188–217
26 March	LECTURE EXAM 2	
31 March	Seed reproduction	Handout (G. & F., 327–334)
2 April	Progymnosperms and early seed plants	218–226
7 April	Cycadopsida	244–252
9 April	Ginkgopsida	226–228, 241–244
14 April	Coniferopsida: General features, reproduction	226–241
16 April	Coniferopsida: Diversity	226–241
21 April	Gnetopsida	259–268
23 April	Magnoliopsida-1: General features	269–292
28 April	Magnoliopsida-2: Reproductive cycle	285–300
30 April	FINAL EXAM (non-comprehensive), 8:00-10:30 P.M., WEDNESDAY	

LABORATORY SCHEDULE

DATE	LABORATORY TOPIC
14 January	No Laboratory
16 January	Microscopy
21 January	No lab, Martin Luther King Day
23 January	Vegetative sporophyte: Morphology
28 January	Vegetative sporophyte: Anatomy
30 January	Sporangia and spores
4 February	Gametangia and embryos
6 February	Phylogenetic inference: Cladistics
11 February	No lab, lecture exam 1
13 February	A paleobotany primer
18 February	Bryophytes
20 February	Early vascular plants and other polysporangiates
25 February	Lycopsida-1
27 February	Lycopsida-2
3 March	Psilopsida
5 March	Lab Exam 1
10-16 March	SPRING BREAK, NO CLASSES
17 March	Sphenopsida, Eusporangiate ferns
19 March	Leptosporangiate ferns-1
24 March	Leptosporangiate ferns-2
26 March	No lab, Lecture exam 2
31 March	Seed reproduction
2 April	Progymnosperms and early seed plants
7 April	Cycadopsida
9 April	Ginkgopsida and Cordaitales
14 April	Coniferopsida: General features
16 April	Conifer diversity
21 April	Gnetopsida
23 April	Angiosperms: The flower
28 April	Lab Exam 2

Biology 4411/5411 Morphology of Vascular Plants Dr. Upchurch

Lecture: 6:30-7:45 p.m. MW, 239 SUPP
Lab: 8:00-9:15 p.m. MW, 239 SUPP
Office: 338 SUPP
Office Hours: Before or after class
 By appointment, or just come on by!

REQUIRED READINGS

Green Plants, by Adrian Bell and Alan Hemsley, 2nd Edition

OPTIONAL READINGS

Morphology and Evolution of Vascular Plants, by Ernest Gifford and Adriance Foster—
Library reserve

Paleobotany and the Evolution of Plants, 2nd ed., by Wilson Stewart & Gar Rothwell—
Library reserve

Numerous other items on reserve

My lectures are taken largely from the required readings. However, the optional readings may treat a topic more lucidly and provide a different perspective from your text. In addition, outside readings increase your depth of knowledge, which could translate into a better grade.

One problem encountered by some students in plant morphology is the text. Textbook writing varies in quality and style, and some students find a particular book easier to read than others. Please explore the volumes on reserve to find the book that best suits you. However, please be familiar with the required readings as well.

COURSE OBJECTIVES

Biology 411 has four major objectives.

1. To provide the student with an overview of diversity in vascular plants at the level of order, class, and phylum.
2. To provide the student with a basic understanding of structure in vascular plants.
3. To provide the student with an understanding of the life cycle in plants and its evolutionary modifications.
4. To demonstrate past diversity in vascular plants through the selective discussion and examination of fossils.

STATEMENT OF PURPOSE

Biology 4411/5411 is a four-hour course that surveys the major groups of vascular plants and discusses their evolutionary history. Three major topics are discussed. First, the structure and life cycles of vascular plants are discussed to provide an overview of vascular plant structure and life history. Second, the divisions of vascular plants are surveyed to provide a detailed understanding of vascular plant diversity, starting with the most primitive divisions and ending with the most evolutionarily derived. Evolutionary relationships between divisions are discussed. Third, basic features of vascular plant structure are described to provide an overview of structural evolution.

My course provides an overview of extant and fossil plants. I treat diversity largely at the level of division, class, and order, and use individual species as representatives of higher taxa. The emphasis on higher levels of classification requires us to study groups that consist of only a few species but represent important phylogenetic lineages.

Fossil plants are discussed for two reasons. First, fossils often indicate that extant groups of plants represent relicts of groups that were once more diverse and ecologically important. Second, fossil plants preserve evolutionary stages that are no longer living and, hence, serve as "missing links" between extant groups. The inclusion of fossils is often critical to understanding the evolutionary origin of key structures and their patterns of change through time.

The lecture and laboratory provide an evolutionary overview of vascular plants. They also will sharpen your eye for plant structure and provide you with important skills in observing and understanding plants. By the end of this course you should be able to interpret structure on unknown plants. This skill is important for identifying unknown plants and understanding features of their growth and ecology.

EXPECTED OUTCOMES

A student completing Biology 4411/5411 will know and understand basic principles of plant morphology and reproduction, be familiar with the broad-scale evolution of plants, and have a greater appreciation for plant diversity and the importance of plants in the environment.

TEXAS STATE ENDORSES WINGSPREAD JOURNAL'S SEVEN PRINCIPLES FOR GOOD PRACTICE IN UNDERGRADUATE EDUCATION

1. Student-faculty contact
2. Cooperation among students
3. Active learning
4. Prompt feedback
5. Time on task
6. High expectations, and
7. Respect for diverse talents and ways of learning

LECTURE

Lecture and laboratory are given in tandem. In general, lecture precedes laboratory. However, on some evenings the class might be taught as a series of mini-lectures interspersed with laboratory exercises.

LABORATORY

Laboratories are available on Blackboard prior to the period. Please read each laboratory exercise in detail **before** coming to class. Each laboratory exercise has a purpose, a list of required terms, materials needed, an introduction, and a series of exercises. The lab manual and text should be read like the Encyclopedia Britannica, with the Macropedia and Micropedia. The lab exercises will give you an overview of the material, and the text(s) will provide detail.

Each laboratory exercise should take the full hour and fifteen minutes, possibly longer. This is based on class performance during the period from 1992 to 2003. **Do not be tempted to quickly look over the material and leave early.** This happened the last time I offered plant morphology (2005), and the class grades reflected this. Please put in the effort needed to master the material.

In laboratory I expect you to record your observations with line drawings. You will be instructed on how to make good line drawings in lab. You also may make photographs with digital cameras.

EXAMINATIONS

You will be tested over course material in two lecture exams, two laboratory exams, ten quizzes, and a final exam. Each lecture exam lasts up to one hour and fifteen minutes. This exam is writing intensive. Lecture exams invariably involve defining terms, drawing structures, distinguishing between related concepts, and writing essays. On lecture exams I expect you to have command of the basic facts and understand what these facts mean within the context of vascular plant evolution. For an example, on an exam I may ask you to define two leaf terms, draw and label three different leaf types, and discuss theories on the origin and evolution of leaves in lower vascular plants. For essays I usually provide a choice of questions to be answered.

Study questions are provided to help you study for essay exams and to indicate which concepts I consider to be most important. In addition, I will provide you with a handout that will help you prepare for an essay exam. Both of these are provided on Blackboard. Many essay questions are taken directly from the study questions.

Lab exams are given during the first part of the lab/lecture period. On evenings with lab exams, the lab exam is given first, and the lecture is given second. Lab exams are in short-answer format. A series of stations will be set up with material and questions. People will be allowed 1-2 minutes per station and moved in sequence for the first part of the exam. After that you can visit any station you want for a more extended period if needed.

Ten quizzes will be given during the course of the semester, usually at the beginning of a lecture period. Whenever possible, these quizzes will be given on weeks when there are no lecture or laboratory exams. Each quiz will be worth 10 points apiece, making a total of 100 points. Each quiz will cover material from the previous lectures and readings for the evening's lecture and laboratory. This gives you strong incentive to keep up with your readings. Each quiz will be unannounced. This gives you strong incentive to keep up regular attendance.

The quizzes will have word questions, draw and label questions, and practical questions. With the latter, I will show a picture of a structure and ask you to give me its name, or ask you to give me the name of the plant group.

Exams are scored as follows.

EXAM	POINTS
Lecture Exam 1	100
Lecture Exam 2	100
Lab Exam 1	100
Lab Exam 2	100
Weekly quizzes	100
Final Exam	100
Total Points	600

All lecture exams (including the final) are non-comprehensive. Please note that the lecture exams, quizzes, and final together are worth three times as much as the two lab exams combined.

Grades are assigned using the following guidelines.

A	90% or more
B	80-89%
C	70-79%
D	60-69%
F	59% or less

Final grades will not be posted. I will send you a copy of your final grade if you provide me with a stamped, self-addressed envelope. Texas State Law forbids giving out final grades over the telephone. I do not send out final grades over email.

GRADUATE STUDENTS

This course mixes undergraduate and graduate students. Graduate students will be given a separate exam that is more challenging and requires a higher level of comprehension.

I am glad that you signed up for this course. I look forward to having fun with you this semester and good luck!