Biology 206 – General Botany
Winter 2012

"Botany I rank with the most valuable sciences, whether we consider its subjects as furnishing the principal subsistence of life to man and beast, delicious varieties for our tables, refreshments from our orchards, the adornments of our flower borders, shade and perfume of our groves, materials for our buildings, or medicaments for our bodies."

-Thomas Jefferson

Instructor information
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Office hours: M, W, F 11:15 am-12:10 pm, R 9:05 am-12:10 pm and by appointment

Course information
Meeting time and place: Lecture MWF 10:10-11:05 a.m., 440 Berndt Hall; Lab T 1:25-4:30 p.m., 440 Berndt Hall

Required text:
Nabors, M.W. 2004. Introduction to Botany. Pearson/Benjamin Cummings: San Francisco, CA.

Course Website: http://moodle.fortlewis.edu

The course website contains all of the course lecture materials and copies of all labs and some assignments as well as updates to the schedule. I will also upload at the appropriate time review sheets for all exams approximately one week before the exam. Additionally you will find various resources and internet links for botany that I feel are interesting and relevant to our course content.

Prerequisites: BIO 113

Course Description:
In General Botany we will focus on understanding the structure, function, and diversity of plants. The first part of the course will focus on the functional connections among higher plant anatomy, morphology and physiology. The later part will constitute an evolutionary survey of the plant kingdom from its origins in the green algae and continuing through the bryophytes, ferns, gymnosperms and angiosperms, focusing on the diversity in each group and the comparisons of life history traits among them.

Secondarily we will be working to expand your skills as a scientist, particularly those toward interpreting, writing and researching scientific material and your presentation and statistical analysis of original data.

Objectives:

1. Be able to identify the unique cellular structures of plants.
2. Understand plant metabolism, particularly photosynthesis
3. Demonstrate an understanding of the relationship between plant tissues and plant growth.
4. Understand the diversity present within the plant kingdom and be able to discuss evolutionary trends among the various groups.
5. Understand the concept of alternation of generations and how this relates to evolution of major plant groups.
6. Understand life cycles and the concept of homology.
7. Gain an appreciation for the complexity, diversity, and functionality of plants.
8. Make connections between basic plant science and modern issues of invasive species, global change, biotechnology, biodiversity, etc.

Course Evaluation

Grades will be determined roughly according to the following point values:

Exams (4 @ 100 pts. each)	400 pts.
Quizzes (6 @ 20 pts each)	120
Lab Reports (2 @ 75 pts each)	150
Term paper	100
Other	≈100
Total	≈870

Your grade will mostly be a sum of the earned points you have accrued throughout the semester with the following exceptions. I will drop the single lowest quiz score and replace that with the highest. Thus if you get a 40% on one quiz at anytime and a 100% on another quiz at some other time, the 40% will be replaced by a 100%. There will be no make-up quizzes. So if you miss a quiz you will receive a 0% which will then become your lowest quiz score. Make-up lecture exams may be scheduled within 5 days of the original exam date ONLY in the case of a legitimate absence. If you miss an exam for a legitimate reason and are unable to make up the exam within 5 days the score on the final exam will be substituted for the missed exam score. Legitimate absences will include any absence with a letter documenting that absence from the appropriate college official, be a documented medical excuse, or be a documented religious observance. If you miss for an illegitimate reason then you will receive a zero for that particular exam.

Extra credit will be available on a limited basis and will be awarded for attendance at approved seminars. I will announce any such opportunities at the appropriate time.

Specific Requirements

Lecture exams: We will have three in-class exams and a final. Exams will mostly include material covered since the last exam. That said it is quite possible that later exams will include some material from earlier sections as we build on more complex topics. All exams will be a mix of multiple choice, short answer, diagrams, and essay questions. The final will be ½ a fourth lecture exam and ½ cumulative.

Lab Information:

The lab in this course will serve to supplement and provide hands-on experience with botanical concepts or processes and organisms. These labs will vary from descriptive to experimental in nature. Some topics will only be covered in lab while others will be covered in both lecture and lab. For the descriptive labs you need to observe samples, make sketches, and/or answer questions regarding the activities. Some experimental labs will require your preparation of short laboratory reports. Labs will be provided one day before the scheduled lab and you will be expected to have read the laboratory prior to class.

Lab Quizzes: We will have six laboratory quizzes. These will be held at the beginning of lab and cover material from the previous week's lab (see schedule below for tested topics). Quizzes will require you to view and identify structures, specimens, etc.

Lab reports: You will be required to complete two short written laboratory reports during the semester. These will be written in the traditional format of a scientific journal article including discrete sections for introduction, methods, results, discussion, and literature cited. These will be required for our labs on Comparison of C_3 and C_4 plants under low and elevated CO_2 and Hormone regulation of dwarfism in *Brassica rapa*. I will provide specific requirements for these reports later.

Term paper: You will be required to complete a library research paper on a selected botanical topic. Your paper could be on a single plant species, a technique used in plant biology, or an important issue in plant science. Examples could include: a survey of the dye plants used by the Navajo people; RNA interference as a new tool in plant biotechnology; effects of climate change on the distribution of and composition of plant communities; plant to plant communication – is it a reality?; the origin and domestication of modern cotton; etc. Your paper will be required to be a minimum of 5 pages in length and include 10 references with no more than one of these being an internet source. Your topic will need to be approved prior to writing your complete report. For this you will need to turn in a paragraph length topic proposal and two cited references. More specific information on this assignment will be provided later.

Additional Study Resources:
A companion website for our textbook is available at http://www.botanyplace.com using the access key provided in the text. There will be additional internet study resources posted on Moodle.

Other Course policies
Academic Integrity:
The Biology Department upholds College policy on Academic Integrity. Therefore, students who commit acts of academic dishonesty (a.k.a. cheating, copying, plagiarizing):

1) on homework or other less major assignments, will receive a ZERO on the assignment in question, and will be reported to Academic Affairs.

2) on exams, major papers or reports will earn a ZERO and be automatically removed from the COURSE, and will be reported to Academic Affairs.

Any student who accumulates two reported incidents of dishonesty with the Academic Affairs office will have a formal hearing with the Academic Standards Committee and faces academic dismissal from the College.

Attendance:
While I do not take a daily role, regular attendance is expected – particularly if you want to do well. While I post much of our class material on Moodle not all lectures or activities are easily converted to a digital format. If you know you are going to miss class please let me know beforehand. If your absence results in your missing an exam, and is legitimate, the aforementioned policy stands.

Classroom conduct:
While I hope it goes without saying, please respect the rights of myself and your fellow classmates. If you are late try not to disturb everyone else. Additionally please leave mobile phones, pagers, iPods, etc, at home or turn them off and keep them stowed during class. I will not allow texting or checking of messages on any electronic device during class time. If this becomes a problem you will be asked to forfeit your device. Such activity is not only very disrespectful but also interferes with your ability to learn.

Drops:
The college deadline for dropping this class for it not to appear on your transcript is census date, January 24. Without exceptional circumstances (ie. death in family, hospitalization, etc.) I will not assign a grade of "W" on a drop slip after this date unless you are currently passing the course with a C or better.

Accommodations:
Students with disabilities who require reasonable accommodations to fully participate in course activities or meet course requirements must register with the Disability Services Office. If you qualify for services through the Disability office, bring your letter of accommodations to me as soon as possible so I can make the appropriate arrangements. Letters are available through Dian Jenkins, Coordinator of Disability Services, 280 Noble Hall, 247-7459.

Tentative Lecture/Lab Schedule

Wk	Date	Topics	Reading
	Section I:	**Plant Structure: Anatomy, Morphology, Life Cycles**	
1	Jan. 9/11/13		
	Lecture	• Introduction: Why study plants? What makes a plant a plant? • What makes plant cells unique? Plant Cell Structure and Division • Plant cell types: Parenchyma, Collenchyma, Sclerenchyma	Chap. 1, 2, 3
	Lab	Supermarket Botany and Video: Private Life of Plants "It's a Jungle Out There"	
2	Jan. 16/18/20		
	Lecture	• Tissues and tissue systems: Ground, Dermal, and Vascular • Plant organography & primary growth • Plant organography & primary growth cont.	Chap. 3,4
	Lab	Plant Cells and Tissues	
3	Jan. 23/25/27		
	Lecture	• Secondary growth • Dendrochronology ○ Dendrochronology Overview • The plant life cycle – alternation of generations	Chap. 5, 6
	Lab	**Quiz: Cells and Tissues** Examination of the primary and secondary plant body	
4	Jan. 30 Feb. 1/3		
	Lecture	• Reproduction: spores, seeds, and fruits • Video: Private Life of Plants "The Birds & The Bees" **Friday: Exam I**	Chap. 6
	Lab	**Quiz: Primary and Secondary plant structure** Start plant life cycle experiment with *Ceratopteris richardii* Hormone regulation of dwarfism in *Brassica rapa* I: Seed Planting	
	Section II:	**Plant Functions: Physiology, Growth and Development**	
5	Feb. 6/8/10		
	Lecture	• Photosynthesis I - nature of light • Photosynthesis II - structure/function • Photosynthesis III - C_3, C_4 & CAM	Chap. 7 (review only), 8
	Lab	Effects of light quality on photosynthesis	
6	Feb. 13/15/17		
	Lecture	**Monday: Term Paper proposals due** • Respiration • Review lab – paper discussion ○ Gonzalez-Melar, M. et al., 2004. Plant respiration and elevated atmospheric CO_2 concentration: cellular responses and global significance. Annals of Botany 94: 647-656. • Transport processes: Piñon pine - juniper case study	Chap. 9, 10 Gonzalez-Melar, M. et al., 2004.
	Lab	Comparison of C_3 and C_4 plants under low and elevated CO_2	
7	Feb. 20/22/24		

	Lecture	• Water transport: Xylem • Carbohydrate translocation: Phloem • Plant growth responses: Hormones and trophisms	Chap. 10, 11
	Lab	Ecophysiology of transpiration and stomatal conductance	
8	Feb. 27/29 Mar. 2		
	Lecture	• Plant growth responses: Hormones and trophisms • Video: Private Life of Plants "Plant Politics" **Friday: Exam II**	Chap. 11
	Lab	Hormone regulation of dwarfism in *Brassica rapa* II: Final Data Collection	
Spring Break			
	Section III:	**Evolution and Diversity**	
10	Mar. 12/14/16		
	Lecture	• Evolution and classification of plants and plant-like organisms, phylogeny • Algae • Fungi	Chap. 15, 16 (skim only), 18, 19
	Lab	Algae and Fungi	
11	Mar. 19/21/23		
	Lecture	• Early evolution of land plants: Bryophyta, Hepatophyta, Anthocerophyta • Importance and uniqueness of Bryophytes ○ Saxena and Harinder. 2004. Uses of Bryophytes. Resonance 56-65. • Seedless vascular plants I: Early Evolution	Chap. 20, 21 Saxena and Harinder. 2004.
	Lab	**Quiz: Algae and Fungi** Bryophytes	
12	Mar. 26/28/30		
	Lecture	• Seedless vascular plants II: Lycophyta, Psilotophyta • Seedless vascular plants III: Sphenophyta, Pteridophyta **Friday: Exam III**	Chap. 21
	Lab	**Quiz: Bryophytes** Seedless Vascular Plants	
13	Apr. 2/4/6		

	Lecture	• Gymnosperms I: Cycadophyta, Ginkgophyta, Gnetophyta
		• Gymnosperms II: Coniferophyta
		• Unraveling the mystery of the Wollemi Pine
		  ○ Chambers, T.C. et al. 1998. Some morphological features of Wollemi pine (*Wollemia nobilis*: Araucariaceae) and their comparison to Cretaceous plant fossils. International Journal of Plant Sciences 159: 160-171.
		  ○ Peakall, R. et al. 2003. Comparative genetic study confirms exceptionally low genetic variation in the ancient and endangered relictual conifer, *Wollemia nobilis* (Araucariaceae). Molecular Ecology 12: 2331-2343.
			Chap. 22 Chambers, et al. 1998.; Peakall, R. et al. 2003.

	Lab	**Quiz: Seedless Vascular Plants** Gymnosperms and Introduction to botanical keys	
14	Apr. 9/11/13		
	Lecture	• Video: "First Flower" • Anthophyta, Carpel, Angiosperm life cycle • Embryological development; gametophytes	Chap. 23

	Lab	**Quiz: Gymnosperms** Angiosperms: Understanding floral and fruit diversity	
15	Apr. 16/18/20		
	Lecture	• Video: Private Life of Plants "Living Together" • Open lecture • Exam Review	
	Lab	TBA – Outdoors: weather dependent or Video: The Botany of Desire	
16	**Wed. 25 Apr.**	**Final Exam 9:45 – 11:45 a.m.**	