

**Biology 206 – General Botany  
Fall 2013**

*"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*

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**Instructor information**

Dr. Ross A. McCauley

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Office hours: R 10:10 a.m. – 12:10 p.m., T 12:20 p.m. – 1:15 p.m., MTR 1:25 p.m. – 2:20 p.m.

**Teaching Assistant**

Margie Girton

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**Course information**

**Meeting time and place:** Lecture MWF 10:10-11:05 a.m., 107 EBH; Lab T 8:00-11:05 a.m., 440 Berndt Hall

**Required text:**

Mauseth, J. D. 2014. Botany: An Introduction to Plant Biology, 5<sup>th</sup> Ed. Jones & Bartlett Learning: Burlington, MA. ISBN 978-1-4496-6580-7

Available as e-text rental via CourseSmart (<http://www.coursesmart.com/botany-book-alone/james-d-mauseth-university-of-texas-austin/dp/9781284021813>) (Note: Past students told me this was difficult to use)

**Course Website:** <http://moodle.fortlewis.edu>

The course website contains all of the course lecture materials, copies of all labs and weekly homework 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.

**Prerequisite:** BIO 113, minimum grade of C-

**Course Description:**

In General Botany we will focus on understanding the structure, function, and diversity of plants and the importance they play in our world. We will begin with coverage of the functional connections among higher plant anatomy, morphology and physiology. We will then explore the evolution and diversity of the plant kingdom focusing on the unique features and a comparison of life history traits and evolution of Bryophytes, Ferns, Gymnosperms and Angiosperms and the ecological patterns and basic relationships plants maintain.

**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. Make connections between basic plant science and modern issues of invasive species, global change, biotechnology, biodiversity, etc.
8. Understand basic patterns of plant diversity and the ecosystem services that this diversity serves to maintain.

9. Gain an appreciation for the complexity, diversity, and functionality of plants. (i.e. I want you know that plants are really cool!)

### Course Evaluation

Grades will be determined *roughly* according to the following percentage values:

Exams (4 @ 100 pts each)	43%
Lab Reports (2 @ 75 pts each)	16%
Lab activities	10%
Term paper/project (160 pts total)	17%
Chapter review questions (10 @ 10 pts each)	10%
Other	2%

Your grade will mostly be a sum of the earned points you have accrued throughout the semester. 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 percentage 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. Late submissions on large assignments (papers, lab reports) will be accepted after the due date however the final grade will be reduced by 10% for each day the assignment is late.

Extra credit will be available on a limited basis and will be awarded for attendance and submission of a short synopsis of an approved seminar. I will announce any such opportunities at the appropriate time. Submission of your synopsis will be via Moodle.

### Specific Requirements

#### Exams:

We will have a total of four exams, including the 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. Material from both lecture and lab will be covered on exams. The final will be similar in scope to the other exams however it will have a comprehensive portion.

#### 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.

Lab reports: You will be required to complete two short lab reports in the form of a scientific manuscript. These lab reports will be required for the labs “Phenotypic plasticity in tree canopy leaves” and “Comparison of C<sub>3</sub> and C<sub>4</sub> plants under low and elevated CO<sub>2</sub>”. Both reports will require proper presentation of data, analysis of that data, and references. I will provide specific instructions on the format and data requirements later.

Lab assignments: Laboratories not requiring a write-up will require the completing and turning in of the lab activity. This may be drawings of structures, answers to questions, etc. These will vary from week to week.

#### Chapter Review Questions:

Each week (except weeks with exams) you will be assigned a selection of the end of the chapter review questions in Mauseth to answer on Moodle. You will have one week to complete these questions – late completed questions will not be accepted. The selected questions will be those I deem the most relevant for you to know and will assist in your studying for exams.

**Term project:** The term project will be the single largest grade in this class. You will be focusing research on a particular plant structure, adaptation, or process. Your research will require you to answer five questions: What? (The structure or process in detail) Where? (Its location in the cell, organ, or whole plant level) When? (Developmental stage, time of year, response to particular environmental condition) Why? (Function – physiological or ecological) and How? (Mechanism) Such structures or processes could include for example snap-traps in carnivorous plants, salt bladders in halophytic plants, cone serotiny in Lodgepole Pine, seed dormancy in seed banks, etc. I encourage you to start researching potential topics soon and I encourage you to meet with me if you are having trouble identifying a topic.

During the term you will be completing various assignments in support of the larger project designed to assist you with organizing information and critically analyzing scientific writing. These will ultimately result in your production of a polished paper at the end of the term.

a. Short topic description with annotated bibliography (20 pts) (Due Oct. 4)

This will consist of a 2-3 sentence description of your chosen topic and a list of 10 pertinent references (all properly cited) from the peer-reviewed literature. For each reference you should summarize in a few sentences the focus of the paper and how it relates to your central thesis. Your citation format must follow the form illustrated in the “Citing literature in Botany” resource posted on Moodle.

b. Outline (20 pts) (Due Oct. 18)

The outline will be a short organization of the ideas to be presented in your paper. It will consist of a title with sections addressing each of the five questions. The outline should not go in to depth but rather provide a quick synopsis of the answers to the questions to indicate how you are organizing your information.

c. First Draft (20 points for completing draft and performing peer review) (Due Nov. 8)

Your first draft of the essay must be 6 – 8 pages in length and include a title, a body of the text divided into the headings presented in your outline and using in-text citations, a summary or conclusion, and a literature cited section. You may include figures but these must be relevant to the content of the paper and include an appropriate figure caption – they should not be used to fill up space. **This first draft will not be graded. It will be reviewed by two of your peers who will provide you with constructive criticism to improve your final paper. A rubric will be provided to assist you in both preparing and reviewing drafts.**

Submission and review of drafts will take place via Moodle and will be anonymous. I will provide instructions later for proper document formatting and uploading.

d. Final Draft (100 pts) (Due Dec. 6)

Using the comments provided by your peers you will need to revise your paper. This should be a revision beyond the simple correction of grammatical errors. I encourage you to use your critical thinking skills to evaluate the peer comments and your own impressions of your work to make the essay the best it can be. I will review these drafts using the same rubric used in the peer review.

**Additional Study Resources:**

A companion website for our textbook is available (<http://www.jblearning.com>) using the access key provided in the text or by purchase for \$14.95. I will not require use of this website but it is an available resource for your studying of the material. 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. In labs FLC health and safety policies prohibit any food and beverage. Thus DO NOT bring any food or drink to lab. If you do you will be asked to finish it in the hall before coming back to class.

**Add/Drop policy:**

The last day to add the class is census date. Prior to this date you may drop the course at anytime with no grade being recorded. College policy states that not attending the first two class meetings will result in automatic disenrollment.

The last day to withdraw from FLC classes with a grade of “CW” (course withdrawal) is 4 pm Friday, October 25, 2013. This is a college-wide deadline that is not negotiable.

To withdraw from this course, go to the Registrar’s Office, Room 160, Miller Student Services Building before the course withdrawal deadline. They will help you through the process. You do not need my signature on the course withdrawal request form.

Starting Fall 2013, students have a life-time limit of three individual course withdrawals from FLC courses. If you have withdrawn from classes before Fall 2013, these will not count towards your lifetime limit. Also, withdrawing entirely from a semester (all classes) does not count against your lifetime “CW” limit. Semester withdrawal is handled under a different policy and procedure. Please refer to the Academic Policies section of the Fort Lewis College Catalog of Courses for more information about course and semester withdrawal policies and procedures.

**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	Lecture Topics	Reading/Assignment
	<b>Section I:</b>	<b>Plant Structure: Anatomy and Morphology</b>	
1	Sept. 2/4/6		
	Lecture	M: Introduction: Why study plants? W: Overview of the plant kingdom: What makes a plant a plant? F: What makes plant cells unique? Plant cell structure and division	Chap. 1, 3, 4 <b>Review Questions</b> <b>Plant Blindness short essay</b>
	Lab	Phenotypic plasticity in tree canopy leaves.	
2	Sept. 9/11/13		
	Lecture	M: Organs and tissues of the plant body (Ground, dermal, and vascular tissue systems) W: Internal organization of stems F: Growth and differentiation: Primary meristems	Chap. 5  <b>Review Questions</b>
	Lab	Plant Cells and Tissues	
3	Sept. 16/18/20		
	Lecture	M: Leaves W: Roots F: Secondary growth I: Tree coring technique (meet in Botany lab)	Chap. 6, 7, 8  <b>Review Questions</b>
	Lab	Structure of the herbaceous plant body	<b>Lab Report 1 rough draft due</b>
4	Sept. 23/25/27		
	Lecture	M: Secondary growth II: Structure and function of secondary meristems W: Wrap-up and review <b>F: Exam I</b>	Chap. 8
	Lab	Structure of the woody plant body and dendrochronology	
	<b>Section II:</b>	<b>Higher Plant Life Cycle and Reproduction</b>	
5	Sept. 30/Oct. 2/4		
	Lecture	M: The plant life cycle – alternation of generations W: Fertilization, double fertilization, and embryology F: Plant breeding systems: Pollination syndromes	Chap. 7  <b>Review Questions</b>  <b>F: Project Annotated Bibliography</b>
	Lab	Floral and fruit structures	
6	Oct. 7/9/11		
	Lecture	M: Breeding systems cont; outcrossing, inbreeding, apomixis and agamospermy W: Research Talk: Ecotypic segregation and reproductive biology of <i>Viola adunca</i> in the San Juan Mountains. F: Case Study: Reproductive Isolation in Columbines ( <i>Aquilegia</i> )	Chap. 7
	Lab	Vegetation analysis of the College Hill	<b>Lab Report 1 due</b>

7	Oct. 14/16/18		
	Lecture	M: Reproductive Isolation in Columbines ( <i>Aquilegia</i> ) continued. W: Wrap-up and review <b>F: Exam II</b>	<b>F: Project Outline</b>
	Lab	Palynology and Pollination, Video: Private Life of Plants "The Birds & The Bees"	
	<b>Section III:</b>	<b>Plant Functions: Physiology, Growth and Development</b>	
8	Oct. 21/23/25		
	Lecture	M: Photosynthesis I – overview and light reaction W: Photosynthesis II – dark reaction – C <sub>3</sub> , C <sub>4</sub> & CAM F: Respiration and the balance of productivity	Chap. 10, 11 <b>Review Questions</b>
	Lab	Comparison of C <sub>3</sub> and C <sub>4</sub> plants under low and elevated CO <sub>2</sub>	
9	Oct. 28/30/Nov. 1		
	Lecture	M: Water transport: Xylem: Piñon pine - juniper case study W: Finish xylem function; Carbohydrate translocation: Phloem F: Plant nutrition: soil, essential elements, mycorrhizae, nodulation	Chap. 12, 13 <b>Review Questions</b>
	Lab	Ecophysiology of transpiration, stomatal conductance and leaf architecture	
10	Nov. 4/6/8		
	Lecture	M: Regulation of growth and development: Hormones W: Response to external stimuli: Tropisms F: Vernalization, flower induction and floral organization	Chap. 14 <b>Review Questions</b> <b>F: Project Rough Draft Turned in for Peer Review</b>
	Lab	Plant Biotechnology and Genetically modified foods I	Chap15 (p. 381-382)
11	Nov. 11/13/15		
	Lecture	M: Video: "What Plants Talk About" W: Wrap-up and review <b>F: Exam III</b>	
	Lab	Plant Biotechnology and Genetically modified foods II	
	<b>Section IV</b>	<b>Evolution of Plant Diversity</b>	
12	Nov. 18/20/22		
	Lecture	M: Non-vascular plants: Bryophyta, Hepatophyta, Anthocerothyta W: Tracheophytes: Seedless vascular plants I: Early Evolution, Homospory vs. heterospory, microphylls and megaphylls F: Seedless vascular plants II: Lycophyta, ArthropHYTA, Pteridophyta	Chap. 20, 21 <b>Review Questions</b>
	Lab	Bryophytes and Seedless Vascular Plants	<b>Lab Report 2 due</b>
<b>Thanksgiving Break!</b>			
14	Dec. 2/4/6		
	Lecture	M: Gymnosperms I: Progymnospermophyta and Pteridospermophyta and the origin of the seed habit;	Chap. 22 <b>Review</b>

		Cycadophyta, Ginkgophyta, Gnetophyta W: Gymnosperms II: Coniferophyta F: Angiosperms I: Life history characters	<b>Questions</b> <b>F: Project Final</b> <b>Draft</b>
	Lab	Gymnosperms	
15	Dec. 9/11/13		
	Lecture	<i>Dr. M. at NSF-IDigBio meeting, Tallahassee, FL (M-Th.)</i> M: Angiosperms II: Origins: Video: "First Flower" W: Video: "The Shamans Apprentice" F: Last Lecture	Chap. 23  <b>Review</b> <b>Questions</b>
	Lab	No lab	
16	<b>Wed. Dec. 18</b>	<b>Final Exam 9:45 – 11:45 a.m.</b>	