

Course Title/Number	BSC 420/520: PLANT PHYSIOLOGY
Semester/Year	Spring 2014
Instructor	Marcia Harrison-Pitaniello
Days/Time	Lecture: TR 11:00 am - 12:15 pm; Laboratory: Monday 1:00 p.m. - 3:50 p.m.
Location	Lecture: Science 376; Lab: Science 108 and S381
Office	Office: Science 200A; Lab: Science 107
Phone	(304) 696-4867
E-Mail	harrison@marshall.edu
Office/Hours	Mondays, Wednesdays, and Fridays from 11:00 a.m.- 12:00 p.m.; Tuesdays and Wednesdays from 3:00 - 4:00 p.m., or by appointment
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/?page_id=802 for Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment. Assessment Day will be held on Tuesday, April 8 during the spring 2014 semester. Classes will NOT be cancelled on Assessment Day this year.

Course Description: From Catalog

<p>Plant Physiology. 4 hrs. Experimental study of plant life processes to include applicable biophysical and biochemical principles, water relations, molecular biology, stress physiology, and growth and development. 3 lec-3 lab. (PR: BSC 302 or 320 or 322 or 324) <i>Writing Intensive</i></p>
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Course Student Learning Outcomes	How students will practice each outcome in this Course	How student achievement of each outcome will be assessed in this Course
Students will analyze problems that integrate basic processes involved in plant physiology at the whole plant, biochemical, and molecular levels.	Students will receive assigned textbook readings and lecture preparation assignments. In-class exercises will review chapter content.	Student discussion during lectures will be a component of the participation grade. Exams questions will include problems associated with basic plant physiology processes.
Students will read, interpret, and evaluate current research papers in plant physiology.	Students will read and discuss articles as part of the lecture work.	Exams questions will include problems associated with the publications reviewed in class. Background reading will be a component of the independent projects.
Students will evaluate current online and laboratory resources through weekly laboratory exercises.	Laboratory exercises will provide overview of basic skills and hands-on use of equipment used in plant physiology research.	Graded lab work will include laboratory preparation, data analysis, and summary in a graded laboratory notebook.
Students will prepare videos suitable for effective teaching of plant biology principles in high-school or undergraduate biology courses.	Students will collect time-lapse images and background material and design videos as part of the laboratory work.	Video content and design will be a component of the laboratory grade.
Students will design, conduct, analyze, and present independent experiments in plant physiology.	Students will use the laboratory skills to design laboratory experiments, including an independent project.	Graded project proposal, data analysis, and poster presentation will be components of the lab grade.
Students' skills in various types of scientific writing and in its presentation will improve.	Writing is included in the laboratory notebook entries, exams, and project poster presentations.	Writing will be assessed in every aspect of the course.

Required Texts, Additional Reading, and Other Materials

1. Plant Physiology, 2010, Taiz and Zeiger, 5th edition [required]
2. Optional: Lab notebook and 3-ring binder [for protocols and references]
3. On-line lab notebook at LabArchives (<https://mynotebook.labarchives.com/login>).
4. Additional material will be available on MUOnline and at <http://science.marshall.edu/harrison/bsc420.htm>

Course Requirements / Due Dates

- 1) **Exams:** Exams will include written responses in the form of short answer, essay questions and data analysis.
Exam 1: Thursday. Feb. 13
Exam 2: Thursday. March 27
Exam 3: Thurs. 5/8 at 10:15 am (according to the Spring 2014 exam schedule)
- 2) **Laboratory evaluation:** The lab grade requires completion of the laboratory prep, in-lab work, data analysis, and data summary as entered in the students' laboratory notebook. Notebooks will be evaluated and graded throughout the semester.
- 3) **Independent projects:** *A formal poster presentation of your independent research projects is required. **Written guidelines for all aspects of the project will be distributed on MUOnline.** Drafts of the abstract and poster will be peer-reviewed and reviewed by the instructor prior to the submission of the final document. The proposal, abstract, and poster will all require the submission of at least one draft each prior to the deadlines listed below.*
Proposal [20 pts] : To your LabArchives notebook by midnight March 14
Abstract [20 pts] : April 9 – on –line submission for Sigma Xi Research Day
Poster contribution [60 pts]: April 28 for presentation at Sigma Xi Research on May 2
Note: Beginning in the Spring 2014 semester, all WI designated courses are being asked to add assignments from your WI designated courses to the General Education Assessment Repository (GEAR; www.marshall.edu/gear) for the purpose of assessing the university's Communication Fluency outcome and preparing for the HLC accreditation visit in 2015. The final poster presentation will be used as part of this assessment. Students will be instructed how to submit your poster to GEAR at the end of the semester.
- 4) **Class participation:** Students will be asked to prepare for lecture content, participate in class discussion, write, and work on problems and case-studies during class time. The participation grade will depend on attendance and contribution to the class discussion.

Grading Policy

<u>Graded material:</u>	<u>Grading scale:</u>
Lecture exams 300 points	A = 100–90% (500-450 points)
Laboratory work 60 points	B = 89–80% (449-400 points)
Independent project 100 points	C = 79–70% (399-350 points)
<u>Class participation 40 points</u>	D = 69–60% (349-300 points)
Total points 500	F = <60% (less than 299 points)

Lecture exams: Exams will consist of a combination of short essays, short answers questions, and problems. Coverage will include the lecture and lab material for the dates prior to the exam and after the previous exam (for exams 2 and 3). A study guide will be posted on MUOnline at least one week prior to the exam. Students are welcome to work on the study guide and submit part for review. ***Make-up exams will be given for excused absences reported before the scheduled exam.***

Laboratory evaluation: Lab work grade will be based on lab work presented in your laboratory notebook entries.

Student's independent project: Each student will design and perform an independent project. The project may be a component of a team or class project to be presented at the Marshall University Sigma Xi Research Day on May 2. The project grade will be comprised of the proposal [20 pts], abstract [20 pts], and poster contribution [60 pts].

Class participation: Readings, class preparation, and class participation grade will be based on lecture and lab attendance

and overall class contribution according to the following system: -2 points per unexcused lecture absence; -5 points per unexcused lab absence. If needed, labs can be made up by arrangement with the instructor. Note: The lecture schedule is meant as a guide to the basic textbook coverage. The amount of lecture time on each topic will vary (i.e., topics which include discussion of a research article will require more class time). *Lecture preparation and coverage will be posted on the preceding Friday by 5:00 pm on MUOnline.*

Graduate student additional requirements: Graduate students will have one additional take-home assignment associated with each exam and are required to propose one additional experiment for their independent projects.

Attendance Policy

Attendance in lectures and laboratory exercises is integrated into your grade. You are responsible for any material missed by being absent. Absences from exams or quizzes due to illness, death in the family, or institutional activities will be excused with the appropriate notification from Marshall University Student Affairs Office (MSC2W38, 696-6422). Class and/or lab will be cancelled due to inclement weather according to the policy described at http://www.marshall.edu/academic-affairs/?page_id=802.

Laboratory Policies

1. Safety: All students must complete a safety tutorial during the first lab session.
2. Living organisms: Living organisms used in this course include microbes, cell cultures, excised tissues, and plants. Proper handling of living material and microbes will be discussed in the appropriate labs.
3. Make-up labs are not possible beyond the week the lab is normally scheduled. Absences will result in loss of credit for that lab. Students are encouraged to attend a different laboratory section, with permission of the instructor.
4. Completion of the laboratory analysis will be part of your laboratory grade. Data analyses include calculations, graphing, and statistical analyses (regression equations and t-test) will be evaluated as part of your lab grade. Make sure you have a personal copy of data and graphs for each laboratory exercise.

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Office Hours: Mondays, Wednesdays, and Fridays from 11:00 a.m. - 12:00 p.m.; Tuesdays and Wednesdays from 3:00 - 4:00 p.m., or by appointment

Week	Dates	Lab Schedule	Lecture topics
1	1/13-1/17	Lab 1: Lab notebooks; Lab safety tutorial; Review plant physiology YouTube videos; Image capture and plant time-lapse imaging	Chapter 1: Plant tissue structures and adaptations
2	1/20-1/24	Lab 2: Collect time-lapse images of plant growth [ongoing during the week]	Chapter 2: Nuclear Genome and Ploidy
3	1/27-1/31	Lab 3: Lab notebook set-up; ImageJ – working with image series, making movies, measuring plant growth or movement. Bring your laptop to lab.	Chapter 2: Plant Genomics – Tools for Studying Gene Function; Genetic Modifications of Crop Plants [“Frankenfoods”]
4	2/3-2/7	Lab 4: Arabidopsis growth protocol; Arabidopsis mutants and their analysis; Introduction to transgenic plants	Chapters 3: Water and Plant Cells
5	2/10-2/14	Lab 5: DNA extraction and PCR set-up for GMO analysis and <i>Arabidopsis</i> knock-out mutants.	Chapter 4: Water Balance in Plants Chapter 5: Mineral Nutrition [<i>Plant MD; research article*</i>]
6	2/17-2/21	Lab 6: PCR gel analysis; Research proposal brainstorming session.	Exam 1: Thursday, Feb. 13
7	2/24-2/28	Lab 7: More plant growth considerations and Greenhouse 101	Chapters 7-9: Topics in photosynthesis
8	3/3-3/7	Lab 8: Ethylene analysis	Chapter 13: Secondary Metabolism and Plant Defense [<i>research article</i>]
9	3/10-3/14	Lab 9: Confocal/fluorescence microscopy Project proposal submissions to your LabArchives notebook (by midnight March 14)	Chapter 17: Phototropism and Light Control of Plant Development [<i>research article</i>]
	3/17-3/21	Spring Break-no class	Exam 2: Thursday. March 27
10	3/24-3/28	Lab 10: Begin Independent Projects	
	3/28	Last Day to Drop an Individual Course	
11	3/31-4/4	Lab 11: Abstract draft; Independent projects	Chapter 25: The Control of Flowering [with parts of Chapter 20: Gibberellins and Chapter 22: Ethylene]
12	4/7-4/11	Lab 12: Poster draft; Independent projects Abstracts due by on-line submission by April 9	Chapter 26: Abiotic Stress responses [<i>research article</i>]
13	4/14-4/18	Lab 13: Poster draft; Independent projects	Project-related research articles
14	4/21-4/25	Lab 14: Poster draft; Independent projects-poster preparation	
15	4/28-5/2	Lab 15: Final poster preparation and printing; lab clean-up May 3: Sigma Xi Research Day	5/2: Exam 3 review Exam 3: 10:15 May 8
	5/8	Exam 3: 10:15 a.m.	

- Indicates that these topics may include discussion of research articles.