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BIOO 433.01: Plant Physiology

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BIOO 433 - PLANT PHYSIOLOGY – SPRING 2019 - LECTURE SYLLABUS

Instructor Information

Dr. Anna Sala, NS Annex 101; anna.sala@umontana.edu

Meeting time and room

Tuesdays, Thursdays 11:00-12:20 LA 338

Recommended Text

1. Taiz, Zeiger, Møller, Murphy. Fundamentals of Plant Physiology. Oxford. 2018

Office Hours

Thursday 2-4 PM or by appointment via email (please, write BIOO433 in subject)

Electronic Resources

Moodle

Course Description

This course is an introduction to the physiological processes underlying plant growth and development and plant responses to the environment.

Learning Outcomes

1. Explain how plant growth (increase in size) differs from that of animals
2. Explain the major distinctions between plant and animal cells
3. Explain the reasons why plants need water and what they do to remain hydrated
4. Explain why plants need nutrients and the different strategies they use to get them
5. Explain in general terms the process of photosynthesis and the goal of alternative photosynthetic pathways
6. Provide examples of how plants manage to integrate function at the whole plant level despite the lack of a coordinating system like a brain.
7. Provide examples of how plants sense their environment
8. Appreciate the relevance of the physiology of plants in ecology and agriculture
9. Integrate and synthesize scientific information on the physiology of plants

Course Structure

The course consists of two 1 h 20 min lectures per week. Depending on student demand, additional discussion sessions may be scheduled. From past experience, students benefit a lot from discussion sessions. Because we do not follow any particular textbook (I only recommend one), ***class attendance is fundamental and mandatory for this course.***

Communication

I often give updates about the class via email and I will use your UM email address. Please, make sure to check it often and/or link it to the email address you commonly use. Feel free to write me via email, but please ***write BIOO433 in the subject so I do not erase it.***

Grading

Homework

There will be ***five homework assignments (20 points each)***. Assignments generally consist of reading papers and/or interpreting data. ***The assignment dates (below) are tentative,*** depending on progress over the material. ***Assignments are due one week after they are handed out.*** Students will lose 10% of the grade per day late.

Exams

- We will have ***two regular session exams (100 points each) and a final exam (150 points).*** ***The final exam is partially comprehensive.***
- Exams generally consist of ***short answer questions.*** ***Exam answers should give evidence of both knowledge and understanding.*** I often write some open-ended questions in exams. Students do not like these because they have to use their own criteria for how to approach the question, justify their choice of approach and provide enough information to address it based on their approach.
- ***As in real life, 'good enough' is not enough. If you aim for an A, your work needs to be excellent on all accounts (content, evidence of understanding and writing).***
- ***Make-up exams will be permitted only with compelling and supported reasons.*** No make-up exams will be permitted without arrangements prior to the scheduled exam. ***No early final exams will be given,*** so make any travel plans accordingly.
- Only students registered with DSS (see below) will be considered for disability accommodation during exams. Please contact me one week before each exam if you require any service through DSS.

Review

Graduate students are also required to write a review paper (5 pages maximum) on a topic in plant physiology related to their graduate research. ***These papers must be turned in the last day of class (50 points).***

Type of Assignment	Points
Exam 1	100
Exam 2	100
Final Exam	150
Assignments (5 @ 20 pts)	100
Total Undergraduate	450
Review Paper (Graduate)	50
Total Graduate	500

Letter grade assignments are as usual: A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69 and F < 60%.

Students taking the laboratory course

Students taking the lecture (450 points, undergraduate; 500 graduate) and the lab (180 points) should view them as a single 4-credit course and may opt to receive the same combined grade for both courses where the lab is ca. 30% of the grade.

Teaching style

My philosophy is to cover some topics in depth and just brush over other topics.

I emphasize on understanding, critical thinking and integration of core concepts. Facts, however, are relevant for the understanding of core concepts.

My lectures rely strongly on interaction with students. Students are strongly encouraged to ask questions at any time during class. Questions may be to either clarify concepts covered in class or to discuss any other issues related to Plant Physiology (fun discussions often arise this way). Although class discussions are very good, they also compromise our ability to move forward with the material and we invariably get behind schedule. This is acceptable to a point and I try to find a happy medium where we can have discussions but at the same time cover most of the material. This is why ***the class schedule is only tentative.***

I will ***post earlier lectures*** so it is easy for you to take notes. I also post ***study guides*** and, when necessary, new material used in class ***before each exam on Moodle.***

What to expect

This is an intense course that covers the most fundamental, core concepts in plant physiology. Realistically, there is much more material than we can cover in one semester.

This course requires commitment. Studying the day before the exam will most likely not be enough. Students generally like this course, but they invariably say that it is hard. Two main reasons make it hard: 1) there is an incredible amount of basic, core material; and 2) the material is inherently difficult and complex because it deals with thermodynamics, organic chemistry, cellular biology, molecular biology and a long array of disciplines that are not always intuitive. My point is not to discourage students, but simply to alert students that they will need commitment. If you prepare correctly, you have a high chance to do well.

Some recommendations

1. Print lectures ahead of time and take good notes in class.
2. At the end of each main topic rewrite your notes (with an emphasis on integration and understanding) according to your own style of learning.
3. Go over the review questions (there may be up to 100 or so per topic!) and have a sense of how easily you could answer them. If you are having a hard time for most of the questions, then you may need to revise your notes and study more. If you can answer most of the questions you are well prepared.
4. To help nail down the most important core concepts, try to summarize all your notes before a given exam into a 1 or 2 page condensed summary. This really forces you to focus and extract the core concepts.
5. If, after studying, there are questions which you still do not know how to answer, then come and see me during office hours or make an appointment.
6. Set study groups to go over material and study questions. It can be very fun (sort of an academic trivia) and productive.

Depending on student demand, we may dedicate some office hours to discussing questions as a group.

Adds, drops and changes of grade

I will follow [university policies on drops, adds, and changes of grade](#), which sets deadlines and dates after which course changes are not automatically approved. Requests to drop a course or change the grade basis to benefit a student's grade point average will not be approved. A grade of C or higher will be considered passing for the P/NP option.

Disability modifications

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and [Disability Services for Students](#). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Tentative schedule

The following is a tentative schedule. However, *exam dates will not change*.

Week	Dates	Topic	Chapter
1	Jan. 10	Introduction, Characteristics of plants	1
2	Jan. 15	Plant and Cell Architecture	1
	Jan. 17	Plant and Cell Architecture	1
3	Jan. 22	Water and Plant Cells	2
	Jan. 24	Water and Plant Cells Homework	2
4	Jan. 29	Water Balance	3
	Jan. 31	Water Balance	3
5	Feb. 5	EXAM 1	
	Feb. 7	Mineral nutrition	4
6	Feb. 12	Mineral nutrition	4
	Feb. 14	Assimilation of Inorganic Nutrients	5
7	Feb. 19	Assimilation of Inorganic Nutrients	5
	Feb. 21	Solute Transport Homework	6
8	Feb. 26	Photosynthesis: light reactions.	7
	Feb. 28	Photosynthesis: light reactions	7
9	Mar. 5	Photosynthesis: dark reactions.	8
	Mar. 7	Photosynthesis: dark reactions	8
10	Mar. 12	Photosynthesis: Ecology Homework	9
	Mar. 14	EXAM 2	
11	Mar. 19	Phloem transport.	10
	Mar. 21	Respiration	11
12	Mar. 26-28	SPRING BREAK	
13	Apr. 2	Signals and Signal Transduction	12
	Apr. 4	Signals from Light Homework	13
14	Apr. 9	Seeds, Germination & Establishment	15
	Apr. 11	Vegetative Growth & Senescence	16
15	Apr. 16	Flowering & Fruit Development	17
	Apr. 18	Biotic Interactions	18
16	Apr. 23	Abiotic Stress Homework	19
	Apr. 25	Catch up	
	May 02	FINAL EXAM (8:10-10:10)	