

**The University of Manitoba**  
**Faculty of Agricultural and Food Sciences**



**Course Title:** Advanced Plant Physiology

**Department:** Plant Science

**Course Number:** PLNT 7612

**Academic Session:** Winter 2011

**Credit Hours:** 3

**Hours:** 9:00 - 12:00 pm (Tuesdays)

**Location:** 218 Agriculture Building

### **Instructor Information**

**Instructor:** Dr. Belay Ayele

**Office Location:** Room 111 Agriculture Building

**Research Lab Location:** Room 112 Crop Technology Center, 194 Dafoe Road

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**Office Hours:** 10:00 - 11:00 am (Thursdays)

### **Course Philosophy**

#### **Students' Learning Responsibilities**

Students are expected to attend all class meetings officially designated for the course. They are also expected to read topics in review/research articles assigned to them and make a class presentation, and provide a one-page written critique of the topic. As class discussions are the core components of the course, it is essential that students come well prepared to actively engage.

#### **Why This Course is Useful?**

This course is designed to enrich students' knowledge of plant physiology with a range of contemporary and emerging aspects of the subject. The course is useful to strengthen students' analytical and higher order thinking skills with respect to plant physiological processes and mechanisms.

#### **Who Should Take This Course?**

The course has considerable value to graduate students in preparation for advanced research and teaching positions in diverse areas of specialization in plant science. The course builds on the basic concepts discussed in foundation courses in the area of plant/crop physiology, expanding their knowledge in the physiological aspects of plant growth, development, and its interaction with the surrounding environment.

## Course Description/Objectives

**Instructional Methods:** Oral class presentations and discussions. Students will be assigned or pick review articles that will focus on current research topics in the area of plant physiology, and are required to present it to their peers and lead the discussion. The presentation should be based on the concepts from the key original research papers referenced by the review author(s). The class will meet once a week for a period of ~3 hours in which an assigned/selected topic will be presented by a student in the first ~1 hour. The presentation will be followed by class discussion (~2 hours with a break of 15 minutes) to review key points of the article. The instructor will facilitate the discussion.

**General Course Objectives:** The goal of this course is to give students a greater understanding on the significance of major discoveries of physiological mechanisms that regulate plant growth and mediate its response to the environment.

**Learning Outcomes:** On completion of the course, students are expected to have the ability to think analytically and develop logical arguments with respect to plant physiological processes and mechanisms. They are also expected to have improved oral and written communication skills, and an in depth appreciation of specific topics in plant physiology.

### **Description of Oral Presentation**

Oral presentations in the advanced plant physiology course involve presentation of review articles, which are published to provide readers with an overview of recent progress in a particular topic by discussing the latest discoveries and summarizing the current state of knowledge. Each student will have a total of three presentations that focus on three different review articles. A review article for their first presentation will be assigned by the instructor. For the remaining two presentations, students pick a topic of their interest covered in review papers. To this end, each student will pick three review articles published in the 2008-2010 issues of major plant science journals, and submit the titles of the review articles, the authors, and the name of the journal to the instructor at the very beginning of the term. For each student, the instructor will assign two out of the three submitted review article topics and the respective dates for class presentation. Each presentation will focus on two or three prominent research articles highlighted by the author(s) of the review article, and students are expected to enrich their presentation with more in-depth scientific information from the other related reading materials. In order to better understand the review/research articles, students are also expected to look for relevant background materials from the web or appropriate text books. Presentations will be made using Power Point for which you will be provided with a computer and projector. The presenter of each topic is considered as the resource person, thus should be well prepared to answer any arising questions and lead the class discussions. Each student will cover a different topic in each assigned session.

### **Searching the Review/Research Articles**

A good way to start searching your topic of interest is to use the online databases of the University of Manitoba library at <http://sfxhosted.exlibrisgroup.com.proxy2.lib.umanitoba.ca/umanitoba/az>. The library

has online access to full text review/research articles from a number of journals in the area of plant physiology. Another way to find recent articles is the on-line search engine Web of Science; which is also available through the library. It is recommended that students pick review articles that represent current research questions including recent breakthroughs and controversial issues. Below is a partial list of the prominent journals that publish high impact review/research articles in diverse areas of plant science. Some of the journals in the list are specialized in publishing only review articles, such as the Annual Review of Plant Biology and Trends in Plant Science.

### **Partial List of Journals Publishing Review/Research Articles**

Annual Review of Plant Biology  
Trends in Plant Science  
Current Opinion in Plant Biology  
Critical Reviews in Plant Sciences  
The Plant Cell  
The Plant Journal  
Plant Physiology  
Plant Cell and Environment

Once you have your topic of interest, it is recommended that you formulate a specific question/hypothesis just like what you do with your thesis project. For example, if you wish to choose my favorite topic “plant hormone”, it is too broad of a topic to be addressed in detail within the time allotted for your presentation. Therefore, you are expected to define the topic not only to a specific hormone but also to a particular aspect of that hormone. An example of such a specific topic could be “auxin biosynthesis and its role in plant development”. In summary, you should focus in picking a topic with enough background material that will make your presentation concise and interesting to the audience. It is always suggested that you consult the abstract of the article of your interest to have a preliminary sense of its content. After having the candidate articles for your topic, you can make use of the following questions to pick an article(s) among your choices.

Which review paper/research article is in support of answering my question?  
Are there alternative questions/hypotheses in the topic of my interest?  
If so, what are the alternative questions or hypotheses?  
Does the topic address current research questions?  
Is the topic controversial or generally agreed?  
Does the paper represent a recent breakthrough?

### **Format of Class Presentations**

Your presentation should consist of the following:

1. **Introduction:** this section should put the research article in perspective by including background information on the current status of knowledge on the topic and justification for the research. In this section you should answer questions like what is the focus of the article in the context of the review. What are the hypotheses tested or questions answered?

2. **Results and Discussions:** The presenter should focus on significant findings of the research. You should be able to integrate the approaches used with the key finding(s). Results should be presented in graphs and diagrams. In cases when it is impossible to have the results in those formats, you can use a bulleted list. It is important that you discuss what is new about the finding, why it is significant, and how it will advance the current knowledge on the topic.
3. **Conclusions:** In this part of your presentation, you should highlight the main conclusion of the work.
4. **Future Directions:** The presenter should identify the current gap in knowledge of the subject, and the logical next step to fill in that gap.

### **Description of Examinations**

There will no be written exams.

### **Description of Assignments**

Written critiques of the article(s) should include rationale, major findings of the paper, most important conclusions and your evaluation of the significance of the work. Moreover, you are required to compose two questions from the article(s), which can be used to initiate a discussion in the class, and you should answer those questions concisely by including the key points you want to discuss. The weekly critique (including the two questions and their answers) should fit in a single page and be formatted for single line space in 12 point Times New Roman font. In preparing your questions for class discussion, avoid "Yes or No" questions as they halt discussion. You should also avoid too broad questions such as "what do you think about assimilate partitioning?" as they are too open ended. It is recommended that you formulate questions that are open enough to have a few possible right answers, yet closed enough to be approached. For example, you might ask "What are the major physiological mechanisms underlying assimilate translocation in plants?"

### **Assignment due Dates and Place**

The written critiques of the articles are due in the class on the day of presentation.

### **Grade Evaluation**

I try to get all your work graded within a week after submission/completion. Your final grade will be determined by the following:

Quality of class presentations	40%
Written critiques of review/research articles	35%
Participation in class discussion	25%
<b>Total</b>	<b>100%</b>

**Grading Scale**

Letter Grade	Numerical Scale	Letter Grade	Numerical Scale	Letter Grade	Numerical Scale
A+	≥90 %	B	70-74 %	D	50-56 %
A	80-89 %	C+	65-69 %	F	< 50 %
B+	75-79 %	C	57-64 %		

**Course Policies**

The presenter has to email the title of the article(s), author(s) and name of the journal to the instructor two weeks prior to the presentation date using the following format.

**Bomblies K** (2010) Doomed Lovers: Mechanisms of Isolation and Incompatibility in Plants. *Annu Rev Plant Biol* **61**: 109-124

Students can access the references to the upcoming presentation at least 10 days before the scheduled date of presentation on the JUMP website (<https://jump.umanitoba.ca/cp/login/>).

**Missed and Late Assignments**

Missed assignments or assignments not submitted by the due date will receive a zero grade.