

ADVANCES IN PLANT ECOPHYSIOLOGY

Instructor: Dr. R. R. Lada

Course description:

This course will address special topics of interest in Plant Ecophysiology. This course is designed to stimulate interest, critical thinking and investigative processes for the understanding of growth, development, distribution, acclimation and adaptation of plants that are influenced by their physiological ecology; the interaction with the climatological, physical, chemical and biological environments; the ecophysiological responses that are modulated by input and management factors. This course will also enhance knowledge on plant stress diagnostics, physiological mechanisms of acclimation and adaptation to various challenging abiotic and biotic stress factors. Agricultural practices and agroecosystem management will be related to the economic and environmental responsibilities. This course will use several "Participatory Learning" techniques.

Students are expected to develop critical thinking of topics of interest under the umbrella of Plant Ecophysiology, through various activities that include writing an opinion paper, term paper on a topic of student's interest and relevance to the course objectives and present to the class. Students are required to conduct a mini project to test a original hypothesis taking into consideration of infrastructure available on any aspect relating to Plant Ecophysiology. The results will be presented by the student at the end of the term along with a report using Plant physiology journal style.

Instruction Plan:**Course objectives:**

- To enhance understanding of recent advances in Plant Ecophysiology through a participatory learning process using critical thinking and scientific communication approaches.

Activities: Activities include lectures, practicum, class discussion on various topics, Opinion paper, preparing a critical review on a topic of student interest, student panel discussion, Seminar or a mini project.

Format of instruction: This course will use critical thinking technique and participatory learning techniques.

Role of instructor: Educate/evaluate/stimulate critical thinking

Work schedule: Theory: 3h a week Tuesdays and Thursdays (12:30-2:00). Practicum: Wednesdays (2-5pm).

Evaluation:

Quizes (two)	20
Mid-term examination	15
Opinion paper (1)	5
Critical Review (1)	20
Student panel discussion	10
Mini Project/Seminar	10
Lab Report	20

A. Critical Review**20 points**

Students may choose any topic under Plant growth and development, research and collect and analyze scientific information and write a review article as per the Annual Review of Plant Biology or Trends in Plant Science format. The review article must contain critical analysis of information, identifying gaps in science. Speculations are allowed within the boundaries of scientific possibility. Students are advised that while they are allowed to look at the history of development in science, focus on the developments over the past 10 years in the topic of interest. Students are encouraged to present pictorial models, as needed. Students are encouraged to look beyond the boundaries of what we currently know. The review article can be published either in Trends in Plant science or in Annual Review of Plant Physiology, if it meets the standards. It is advised not to exceed 5000 words.

B. Mini research project**20 points**

Students are required to develop an original hypothesis in the area of Plant growth and development and must fill a gap in our knowledge. Hypothesis must be scientifically sound, specific and simple, testable within the time frame, that can be examined using available infrastructure and must be relevant to the course. Students are required to prepare a one page proposal with Introduction, Hypothesis, Objective, Materials and Methods, and expected results. This must be submitted on or before October 01, 2010. Students are encouraged to discuss the hypothesis, experimental designs, approaches with the instructor. The students will conduct experiments to test the hypothesis, collect data and prepare a report not exceeding 2500 words with appropriate tables and figures and present in Plant Physiology format. This will allow publication in Plant Physiology. Students are allowed to conduct experiment or a portion of their thesis research for this assignment, but it is not allowed to produce the results from the experiments already conducted. Students are required to prepare a slide show and present their results in a public seminar for 15-20 min on the day agreed by all students. Students are required to present the report and the presentation in a CD for evaluation. Please contact your instructor for more information.

C. Student panel discussion**10 points**

The objective of student panel discussion is to provide an opportunity to discuss and debate on controversial topics in plant, crop and ecophysiology and enhance understanding on that issue. **In simple, to look at the other side of the coin or to look outside the box.** This will enhance our understanding of the subject matter in a holistic and enjoyable way rather than with a promoted bias.

The panel will consist of at least two students for each topic that will be constituted by them, for the topics below. Each of student panel will critically review the topic and one will speak in favor and another one against, in as much detail as possible, and be prepared for the discussion on the scheduled date. Audience will be your colleagues. Instructor will act as your moderator/mediator/resource person. Each of the discussion will be for 15 minutes at the beginning of the class. At the end of each of the panel discussion, there will be a summary of the discussion points. These discussion points or summary will form a part of the final examination.

Expectations:

- a. The student panel **MUST** come prepared for the discussion. Discussion has to be professional and not personal biased.
- b. The audience **MUST** come prepared to participate and discuss the issue.
- c. In evaluation, total professionalism must be adopted as per the criteria.

Evaluation:

Peers will evaluate based on

- a. Depth of knowledge of individuals in presenting their perspectives
- b. Ability to address a question
- c. A format for this evaluation will be as below
- d. Upon any controversy, instructor will determine the points.
Individuals in a group will earn equal points

E. Opinion Paper

5 points

The purpose of the opinion paper assignment is to kindle original thinking in any area of interest and to inspire ability to write a letter to editor of any magazine or dailies or peer reviewed journals on any issue or subject matter in deliberately and confidently expressing your opinion.

Please feel free to select any topic of your interest and write in your own words and express your opinion. This may be based on your reading, observation, thought or research on any issue relating to the course objective. It is preferred to keep your opinion within the perspective of the course mandate. But need not necessarily limited to the course content. The opinion paper can be to a maximum of one page, single-spaced with an appropriate title. Points will be awarded for the original thinking of an issue, critical synthesis of thoughts, the message and the suggestions or strength of opinion, the language.

Please contact the instructor if you have any question.

All the opinion paper must be in print form and submitted on the **November 19, 2010**.

F. Seminar

The Purpose: *The objectives of seminars are to develop an understanding on the topic area, kindle interest, original thinking and critical analysis, explore new ideas to enhance further understanding of the subject matter, and to stimulate audience and address challenging questions.*

Seminar is a part of requirement of this course. You may choose any two of the scientific papers. Your task is to read and review it carefully. (You may exchange articles with your colleagues but please inform the instructor).

1. Choose your own topic of interest in the area.
2. Go to the library and search of relevant, recent (within the past 5 years) scientific article/review from an appropriate journal.
3. Read, analyze, research relevant topics if needed and develop a feel to the issue and research.
4. Prepare a **slide show** relating to the topic. Slide show must contain your critical analysis of the paper/topic, the purpose of the study, background information, appropriateness of experimentation and procedures. Present the results succinctly and derive your own conclusions. Critically evaluate this paper and discuss its relevance to an understanding of crop adaptation.
5. Prepare a **one-page summary** of the most important aspects of the paper and distribute it to the class.
6. Prepare a brief (10 min) **oral presentation** on the paper; this will be evaluated in class.
7. **A copy of the article, slide show in a CD to be submitted at the end of the slide show.**
(Please let the instructor know if you do not wish your slide show to be used and mark it on your CD or a memory stick or email me . Provide your name and student ID and a short title of the presentation on your CD.

Marking: Your presentation will be evaluated by the class and the instructor. The class is expected to adopt total professionalism based on the criteria in marking colleagues. The final decision however will rest with the instructor.

Criteria:

i) Quality of slides	20
ii) Critical analysis	20
iii) Clarity in presentation	20
iv) Establishing link with crop adaptation	10
v) Ability to address and answer questions	10
v) Research summary	20

Each of the seminars will be evaluated for 100 marks and adjusted to 10%

F. Lab Report

20 points

You will be provided a Lab Manual and the experiments are described in that manual. Students are expected to complete the experiment during the lab hours and submit to the Lab instructor for assessment on the dates provided.

Dates to remember:

September 22	Term paper topic selection
October 12	Quiz #1
October 21	Student panel discussion
October 28	Take home mid term exam
November 5	Mid-term exam return
November 16	Quiz#2
November 19	Opinion paper due
November 30	Term paper due
November 30 th & December 02	Seminar presentation

Classes and Activities:

Lecture Schedule – Classes begin Sept 8, Wednesday 2010

Dates	Activities
9 th September	About the course
14 th September	Evolution and ecological adaptation of plants
16 th September	Secret life of plants – movie and discussion
21 th September	Introductory thoughts on physiological plant ecology
23 th September	Climate change and predicted impacts on crop growth, development and yield
28 th September	Photosynthetic adaptation and yield ecology
30 th September	Photosynthetic adaptation and yield ecology
05 th October	Crop responses and mechanism of adaptation to water deficits
07 th October	Crop responses and mechanism of adaptation to water deficits
12th October	Quiz I/ Ecophysiological implications and adaptation to light
14 th October	Ecophysiology and adaptation of Cereals- Special Lecture
19 th October	Ecophysiology and adaptation of potatoes – Special Lecture
21st October	Student Panel Discussion
26 th October	Ecophysiology and adaptation of wild blueberries – Special Lecture
28th October	Plant Microbial Interactions – Special Lecture Take home Midterm
2 nd November	Environmental adaptation and ecology of yield
4 th November	Physiology of Crop Adaptation

9 th November	Crop responses and mechanism of adaptation to low and freezing temperature
11th November	Remembrance Day – No Class
16 th November	Quiz II/ Crop responses and adaptation to high temperature
18 th November	Ecophysiology and mechanism of adaptation to flooding
23 th November	Crop responses and mechanism of adaptation to salinity
25 th November	Class Seminar
30 th November	Class Seminar
2rd December	Final discussion on All topics