

# Agronomy 410W

## Crop Science

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Text: The Physiology of Crop Yield by R. Hay and J.R. Porter (Blackwell Publishing, 2006)  
Suggested text: Style for Students – Effective Writing in the Information Age by J.Schall (Outernet Publishing, LLC, 2002)

### Course goals:

1. To learn the basic concepts of crop physiology and the role of the environment on crop yields.
2. To develop critical thinking skills by solving challenge problems, reviewing journal articles and planning and conducting experiments related to course topics.
3. To develop and enhance communication skills through a variety writing assignments.

NOTE: IMPORTANT DATES ARE UNDERLINED!



- 17 Introduction
- 18 **Lab**  
**1. Informal discussion about course goals, including writing skills**  
**2. *Writing assignment 1 – letter to friend or relative describing this course (25 pts)***
- 19 General topic 1. Plant development and phenology: how crops fit their environment  
24 Plant development and phenology
- 25 **Lab**  
**1. Writing assignment 1 due**  
**2. Challenge problem to be presented in class and discussed during the lab period**  
**3. *Writing assignment 2 – summarize the discussion of the challenge problem (25 pts)***
- 26 Plant development and phenology  
New challenge problem assigned for discussion in laboratory on Feb. 1
- 29 Components of yield
- 31 Case histories: Influence of environment and management on crop development and phenology



### February

- 1 **Lab**  
**1. Writing assignment 2 due**  
**2. Discussion of challenge problem assigned on Jan. 26.**  
**3. Journal article handed out to class for discussion in laboratory on Feb. 8.**

**4. Writing assignment 3 – summarize the journal article emphasizing the strong/weak points of the article (bring to Feb. 8 class) (50 pts)**

**2 Quiz # 1 (100 pts)**

5 General topic 2. Interception of solar radiation by the canopy

7 Interception of solar radiation by the canopy

**8 Lab**

**1. Writing assignment 3 due**

**2. Laboratory exercise: Host-plant resistance in maize: genotypic differences in resistance to caterpillar feeding**

9 Development of the crop canopy: Leaf area index

12 Canopy architecture and the interception of solar radiation

14 Leaf photosynthesis and canopy properties

**15 Lab**

**1. Complete insect feeding bioassay**

**2. Writing assignment 4 –laboratory report for the experimental results (due next lab period – 50 pts)**

**16 Quiz # 2**

19 General topic 3. Photosynthesis

21 Photosynthetic efficiency

**22 Lab**

**1. Writing assignment 4 due**

**2. Discussion of results from the insect feeding bioassay.**

**3. Writing assignment 5 – write a newspaper article about the results of the experiment (50 pts).**

23 Photosynthetic processes

26 C4 photosynthesis mechanism

28 Environmental effects on photosynthesis



**March**

**1 Lab**

**1. Laboratory exercise: Host-plant resistance in maize: the role of leaf age/development on resistance to caterpillar feeding**

**2 Quiz #3 (100 pts)**

5 General topic 4. Photorespiration

7 Mechanism of photorespiration

**8 Lab**

**1. Complete laboratory exercise**

**2. Writing assignment 6 - Laboratory report for the experimental results due at the next lab period (50 pts).**

9 Environmental effects on respiration

**March 12 to 16 – Spring Break**

19 Respiration associated with crop processes  
21 Crop respiration in the future

**22 Lab**  
**1. Writing assignment 6 due**  
**2. Discussion of experimental results**  
**3. Writing assignment 7 – write 2 page preproposal to continue this study (50 pts).**

23 Exam #4 (100 pts)  
26 General topic 5. Partitioning of dry matter  
28 Source/Sink relationships

**29 Lab**  
**1. Writing assignment 7 due**  
**2. Groups work together to plan experiments for lab period on April 12**

30 Harvest index



**April**

2 Assimilate partitioning  
4 Assimilate partitioning

**5 Lab**  
**1. Discussion of feasibility of planned experiments, expected results and list of things needed to conduct the planned experiments**

6 **Quiz #5 (100 pts)**  
9 General topic 6. Factors limiting yield  
11 Water acquisition and use

**12 Lab**  
**1. Conduct planned experiments**

13 Nitrogen acquisition and use  
16 General topic 7. Physiology of crop quality  
18 Examples in wheat, soybean and canola

**19 Lab**  
**1. Collect data from planned experiments**  
**2. Writing assignment 8 – report of experimental results due on April 26 (50 pts)**

20 General topic 8. Simulation modeling of crops: the maize model  
Article assigned for discussion on April 26 in lab

23 **Quiz #6 (100 pts)**  
25 General topic 8: Future of crop physiology

26 **Lab**  
**1. Writing assignment 8 due**  
**2. Discussion of assigned article**

**3. Writing assignment 9 – 2000 word essay that describes crop production in Pennsylvania in 2056 (50 pts)**

- 27 Lowering inputs
- 30 Climate change



**May**

- 2 New crops
- 3 **Lab**  
**1. Writing assignment 9 due and discussion**  
**2. Review for final exam**
- 4 Potential for increasing crop photosynthesis and yield

**Final Exam: Comprehensive exam (200 pts)**

**Date to be announced later.**

**Grading:**

There will be 6 quizzes at 100 pts each for a total of 600 pts.

There will be 9 writing assignments for a total of 400 pts.

The final is 200 pts.

Class participation is 100 pts.

Total of 1300 points.

**Grade assignments.**

<b>A</b>	<b>&gt;95</b>
<b>A-</b>	<b>89-94</b>
<b>B+</b>	<b>86-88</b>
<b>B</b>	<b>82-85</b>
<b>B-</b>	<b>79-81</b>
<b>C+</b>	<b>75-78</b>
<b>C</b>	<b>69-74</b>
<b>D</b>	<b>64-68</b>
<b>F</b>	<b>&lt;64</b>