

Biology 3470
Plant Physiology and Biotechnology

Fall 2009
Course outline

1. COURSE INFORMATION

Instructor:

D. Law, CB 4018
phone 343-8277, dlaw@lakeheadu.ca
Office hours: Wednesdays 9:30 to 10:30 AM, otherwise by appointment.
Class time:

AT 2005, 5:30 - 7:00 pm, Tuesdays and Thursdays

Lab info:

CB 3010B, 11:30 AM - 2:30 PM, Mondays (starting Monday, Sept. 14)

Course website:

On WebCT. Login via the WebCT homepage or MyInfo.
The website will have the latest course updates and information.

Textbook:

Hopkins WG, Huner NPA Introduction to plant physiology, Wiley. Either:

- 3rd ed. (2004), ISBN-10: 0-471-38915-3 or
- 4th ed. (2009), ISBN-13: 978-0-470-24766-2

Available at the campus bookstore or from amazon.ca and other retailers.

2. COURSE OUTLINE

2.1. Course objectives

By the end of this course, you will possess the following knowledge:

A. Scientific concepts:

- An in-depth understanding of key processes of plant physiology and biochemistry at an advanced level. Examples include:
 - Photosynthesis and gas exchange
 - Water and nutrient transport and utilization
 - Energy metabolism
 - Carbon partitioning
 - Flowering and reproduction
 - Plant growth regulators and their roles as signaling molecules
 - Plant responses to stress
- A practical understanding of the cardinal importance of plant metabolism in the biosphere
- Knowledge of how plant metabolism may be manipulated to make products of high agronomic value
- Comprehension of the ethics and realities of plant biotechnology

B. Practical scientific techniques:

How to perform the following:

- Experimental design
- Plant tissue culture
- Sterile technique
- Hydroponic culture of plants
- Manipulation of shoot and root growth using plant growth regulators
- Statistical interpretation of results

C. Broader learner outcomes:

Comprehension of how to execute the following:

- Write a scientific paper in the proper format
- Design of scientific experiments that are meaningful for community stakeholders and translate the results from them to be of use to stakeholders in the community (a/k/a Community Service Learning)
- Read, interpret and extract useful information from a primary scientific journal article and discuss it with your peers

2.2. Marking scheme

The lab component will count for 35% of the course's marks and the lecture component 65%, as follows:

Component number x each % = total %

A. Laboratory

- . Mini lab reports 3 5 15
- . Large lab report 1 10 10
- Paper presentation 1 7.5 7.5
- Discussion participation 1 2.5 2.5

B. Lecture

- . Participation 5
- . Midterm exam 20
- . Final exam 40

TOTAL 100%

Note that 5% of the course's marks are allocated to participation in lecture and will be assessed in-class using the i>clicker and other methods. I>clicker marks will be equally allocated for attendance and for correct answers.

The i>clickers are available in the bookstore. Please register your i>clicker online before the first class. Additional information on the technology will be given in the first class.

2.3. Lecture schedule and important dates

Note that the schedule is tentative and subject to change.

Lecture Day Date Subject Text ref, 3rd edn

1, 2 Thurs 10-Sep Introduction; Water and water relations 10; 11.1 to 11.4

3 Tues 15-Sep Plant cell bioenergetics I 2

3 Thurs 17-Sep Plant cell bioenergetics II 2

4 Tues 22-Sep Mineral nutrition 12

5 Thurs 24-Sep N assimilation I 8

Tues 29-Sep N assimilation II 8

6 Thurs 1-Oct Water transport: the xylem 11.5 to end
chapter 11

7 Tues 6-Oct Phloem transport I 6.3 to 6.9

Thurs 8-Oct Phloem transport II 6.3 to 6.9

8 Tues 13-Oct Light sensing and phytochrome 17

Thurs 15-Oct Finish lectures, part 1 / Review for mid-term

Tues 20-Oct Mid-term (at regular lecture time; covers
material up to and including lecture 8)

9 Thurs 22-Oct Photosynthesis - light-dependent reactions I 3, 4

10 Tues 27-Oct Light-dependent reactions II 3, 4

11 Thurs 29-Oct Photosynthesis - light-independent reactions 5.5 to end
chapter 5

12 Tues 3-Nov Starch and sugar synthesis 6.1, 6.2

13 Thurs 5-Nov Respiration 7

14 Tues 10-Nov Plant growth regulators 16

15 Thurs 12-Nov Genes and gene regulation 14.1-14.2; 14.4-14.5

16 Tues 17-Nov Signal transduction 14.3; 18.1

17 Thurs 19-Nov Flowering and reproduction; Terminator
technology

14.5.5-14.5.6;

19.3; pdf handout

18 Tues 24-Nov Stress responses 21

19 Thurs 26-Nov Plant productivity 9

20 Tues 1-Dec Plant biotechnology 23

2.4. Material placed on reserve

The following plant science textbooks have been placed on reserve in the library for this course.

The Hopkins and Huner text is intended as a general introductory textbook and can lack detail in certain areas. These texts are useful for their depth on certain plant science topics.

1. Plant physiology, Hans Mohr. (QK 711.2 M6413 1995).
2. Introduction to plant physiology. Hopkins and Huner (course textbook) 3rd ed. (QK 711.2 H67 2004).
3. Plant physiology. Salisbury and Ross, 3rd ed. (QK 711.2 S23 1985). The classic plant phys text.
4. Biochemistry & molecular biology of plants. Bob B. Buchanan, Wilhelm Gruissem, Russell L. Jones, eds. (QK 861 B45 2000).

Note also that I have many other texts that I may be willing to lend out; see me to discuss.

2.5. Statement on academic dishonesty

The full version of Lakehead University's policy on academic dishonesty is available here:

<http://calendar.lakeheadu.ca/current/contents/regulations/univregsIXacdishon.htm>

1. This policy makes up part of the Code of Student Behaviour and Disciplinary Procedures. All students in this course should read this policy and become familiar with it.

In summary, the penalty for plagiarism or cheating on any part of this or any other course is zero for the work where the student is caught. Serious or repeated plagiarism, including cheating on an examination or test, will result in a mark of zero for the course and may result in expulsion from the University.

For the purposes of this course, there are in particular two places where cheating may occur:

- (a) using written or electronic notes or conferring with another person in a test or examination, and
- (b) handing in a written lab report that is in whole or in part not the student's own work.

Academic dishonesty for any of these areas will result in a mark of zero for the work concerned. Rest assured that the course instructors will take every precaution to ensure that potential cheaters are caught and subjected to the appropriate penalty.