

Plant Physiology PLNT/BIOL 3400



University of Manitoba

**Faculty of Agricultural and Food Sciences
Department of Plant Science**

**Faculty of Sciences
Department of Biological Sciences**

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COURSE DETAILS

Course Title & Number: Plant Physiology PLNT/BIOL 3400

Number of Credit Hours: 3

Class Times & Days of Week: Class: 12:30 pm - 1:20 pm MWF, Lab: 2:30-5:30 MT

Location for classes/labs/tutorials: on line delivery via Zoom

Instructor Contact Information

Instructor(s) Name: Dr. Stasolla and Dr. Renault

Preferred form of Address : name

Office Location: Stasolla (Agriculture Bld. 225); Renault (Duff Roblin, W479)

Office hours availability: please email instructor

Course Delivery: The course will be delivered on line- via Zoom. Students are expected to download the Zoom App (free) to participate to classes and labs. Lectures and class will be synchronous.

Course Description

An integrative view of major physiological processes in plants, spanning the biochemical, cellular, tissue, organ and whole plant levels of organization. The focus will be on photosynthesis, respiration, plant water relations, plant mineral nutrition, and the role of hormonal and extrinsic factors in the regulation of plant growth.

PLNT 3400 – BIOL 3400 is a key course in plant biology because it explores how physiological processes affect plant behavior. Therefore in order to understand how plants respond to the

environment it is important to appreciate plant physiology. Any student interested in having a general knowledge in plant biology should take this course

The course, which covers basic physiological processes related to vegetative and reproductive growth of plants, is important for understanding how plants “work”. Therefore it complements information covered by other disciplines of the curriculum, including agronomy, plant pathology, plant ecology, genetics and breeding

Course information

The course will cover the following aspects/events

I – Photosynthesis

- The capture of light energy and its conversion into organic compounds
- Photorespiration and photosynthetic processes
- Photosynthetic efficiency: C₃ and C₄ plants
- Solute transport and assimilate partitioning

II – Respiration

- Function of respiration
- Factors affecting respiration

III – Control of growth and development

- Plant hormones: Auxins, gibberellins, cytokinins, abscisic acid and ethylene

IV – Plant water relations

- Properties of water
- Water potentials
- Water transport in plants
- Transpiration

V – Mineral nutrition

- Essential elements
- The soil: reservoir of nutrients
- Membrane transport processes
- Nutrient uptake and transport
- Function and deficiency symptoms

VI– External factors and plant growth

Plant movements (tropisms and nastic responses)
Measuring time

The course information will be reviewed in more details during the first day of class.

Course goals

The goals of the course are

- 1) to make students aware of basic aspects of plant physiology and appreciate how structure relates to function
- 2) to encourage a multidisciplinary approach to understand plant behavior.
- 3) to understand how any plant response and behavior is governed by plant physiology
- 4) to have an appreciation of how biological processes interact to trigger a response

Learning outcomes

- 1) Ability to critically analyze and summarize scientific information
- 2) Ability to deliver information effectively through written communication
- 3) Creativity in testing specific hypothesis using a multidisciplinary approach
- 4) Ability to prioritize information

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UM Learn), or any website, unless an exception to the Copyright Act applies or written permission has been confirmed. For more information, see the University's Copyright Office website at <http://umanitoba.ca/copyright/> or contact um_copyright@umanitoba.ca.

Recording Class Lectures

Dr. Renault and Dr. Stasolla and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission Dr. Renault and Stasolla. Course materials (both paper and digital) are for the participant's private study and research.

Textbook

L.Taiz and E. Zeiger, Plant Physiology, Fifth Edition, 2010 (required), and lab handouts created by instructors
(required)

Course technology

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. The student can use all technology in classroom setting only for educational purposes approved by instructor and/or the University of Manitoba Student Accessibility Services. Student should not participate in personal direct electronic messaging / posting activities (e-mail, texting, video or voice chat, wikis, blogs, social networking (e.g. Facebook) online and offline “gaming” during scheduled class time. If student is on call (emergency) the student should switch his/her cell phone on vibrate mode and leave the classroom before using it.

Class communication

The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit:

https://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html

Please note that all communication between myself and you as a student must comply with the electronic communication with student policy

(http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html). You are required to obtain and use your U of M email account for all communication between yourself and the university.

Expectations

Students are expected to join Zoom at least 5 minutes prior to the start of the class. The instructors will start Zoom meeting 10 minutes before class. The instructor will be available for 10 minutes prior to class time and after, if requested. We will treat you with respect and would appreciate the same courtesy in return. See Respectful Work and Learning Environment Policy.

A large part of our teaching practice includes the use of questions in class. I expect students to respond but I do not expect perfection.

All students are required to respect copyright as per Canada's Copyright Act. Staff and students play a key role in the University's copyright compliance as we balance user rights for educational purposes with the rights of content creators from around the world. The Copyright Office provides copyright resources and support for all members of the University of Manitoba community. Visit <http://umanitoba.ca/copyright> for more information.

Your rights and responsibilities

As a student of the University of Manitoba you have rights and responsibilities. It is important for you to know what you can expect from the University as a student and to understand what the University expects from you. Become familiar with the policies and procedures of the University and the regulations that are specific to your faculty, college or school.

The [Academic Calendar](http://umanitoba.ca/student/records/academiccalendar.html) <http://umanitoba.ca/student/records/academiccalendar.html> is one important source of information. View the sections *University Policies and Procedures* and *General Academic Regulations*.

While all of the information contained in these two sections is important, the following information is highlighted.

- If you have questions about your grades, talk to your instructor. There is a process for term work and final **grade appeals**. Note that you have the right to access your final examination scripts. See the Registrar's Office website for more information including appeal deadline dates and the appeal form <http://umanitoba.ca/registrar/>
- You are expected to view the General Academic Regulation section within the Academic Calendar and specifically read the **Academic Integrity** regulation. Consult the course syllabus or ask your instructor for additional information about demonstrating academic integrity in your academic work. Visit the Academic Integrity Site for tools and support <http://umanitoba.ca/academicintegrity/> View the **Student Academic Misconduct** procedure for more information.
- The University is committed to a respectful work and learning environment. You have the right to be treated with respect and you are expected to conduct yourself in an appropriate respectful manner. Policies governing behavior include the:

Respectful Work and Learning Environment

http://umanitoba.ca/admin/governance/governing_documents/community/230.html

Student Discipline

http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html

and,

<http://umanitoba.ca/faculties/science/undergrad/resources/webdisciplinedocuments.html>

Support available to students

Writing and Learning Support

The Academic Learning Centre (ALC) offers services that may be helpful to you throughout your academic program. Through the ALC, you can meet with a learning specialist to discuss concerns such as time management, learning strategies, and test-taking strategies. The ALC also offers peer supported study groups called Supplemental Instruction (SI) for certain courses that students have typically found difficult. In these study groups, students have opportunities to ask questions, compare notes, discuss content, solve practice problems, and develop new study strategies in a group-learning format.

You can also meet one-to-one with a writing tutor who can give you feedback at any stage of the writing process, whether you are just beginning to work on a written assignment or already have a draft. If you are interested in meeting with a writing tutor, reserve your appointment two to three days in advance of the time you would like to meet. Also, plan to meet with a writing tutor a few days before your paper is due so that you have time to work with the tutor's feedback.

These Academic Learning Centre services are free for U of M students. For more information, please visit the Academic Learning Centre website at:

<http://umanitoba.ca/student/academiclearning/>

You can also contact the Academic Learning Centre by calling 204-480-1481 or by visiting 201 Tier Building.

University of Manitoba Libraries (UML)

As the primary contact for all research needs, your liaison librarian can play a vital role when completing academic papers and assignments. Liaisons can answer questions about managing citations, or locating appropriate resources, and will address any other concerns you may have, regarding the research process. Liaisons can be contacted by email or phone, and are also available to meet with you in-person. A complete list of liaison librarians can be found by subject: <http://bit.ly/WcEbA1> or name: <http://bit.ly/1tJ0bB4>. In addition, general library assistance is provided in person at 19 University Libraries, located on both the Fort Garry and Bannatyne campuses, as well as in many Winnipeg hospitals. For a listing of all libraries, please consult the following: <http://bit.ly/1sXe6RA>. When working remotely, students can also receive help online, via the Ask-a-Librarian chat found on the Libraries' homepage: www.umanitoba.ca/libraries.

Student Counselling Centre

Contact SCC if you are concerned about any aspect of your mental health, including anxiety, stress, or depression, or for help with relationships or other life concerns. SCC offers crisis services as well as individual, couple, and group counselling. *Student Counselling Centre:*

<http://umanitoba.ca/student/counselling/index.html>

474 University Centre or S207 Medical Services

(204) 474-8592

Student Support Case Management

Contact the Student Support Case Management team if you are concerned about yourself or another student and don't know where to turn. SSCM helps connect students with on and off campus resources, provides safety planning, and offers other supports, including consultation, educational workshops, and referral to the STATIS threat assessment team.

Student Support Intake Assistant <http://umanitoba.ca/student/case-manager/index.html>

520 University Centre

(204) 474-7423

University Health Service

Contact UHS for any medical concerns, including mental health problems. UHS offers a full range of medical services to students, including psychiatric consultation.

University Health Service <http://umanitoba.ca/student/health/>

104 University Centre, Fort Garry Campus

(204) 474-8411 (Business hours or after hours/urgent calls)

Health and Wellness

Contact our Health and Wellness Educator if you are interested in information on a broad range of health topics, including physical and mental health concerns, alcohol and substance use harms, and sexual assault.

Health and Wellness Educator <https://umanitoba.ca/student/health-wellness/welcome-about.html>

469 University Centre (204) 295-9032

Live Well @ UofM

For comprehensive information about the full range of health and wellness resources available on campus, visit the Live Well @ UofM site:

<http://umanitoba.ca/student/livewell/index.html>

Violent or Threatening Behaviour

http://umanitoba.ca/admin/governance/governing_documents/community/669.html

- If you experience **Sexual Assault** or know a member of the University community who has, it is important to know there is a policy that provides information about the supports available to those who disclose and outlines a process for reporting. The **Sexual Assault** policy may be found at: http://umanitoba.ca/admin/governance/governing_documents/community/230.html More information and resources can be found by reviewing the Sexual Assault site <http://umanitoba.ca/student/sexual-assault/>

For information about rights and responsibilities regarding **Intellectual Property** view the policy https://umanitoba.ca/admin/governance/governing_documents/community/235.html

For information on regulations that are specific to your academic program, read the section in the Academic Calendar and on the respective faculty/college/school web site <http://umanitoba.ca/faculties/>

Contact an **Academic Advisor** within our faculty/college or school for questions about your academic program and regulations <http://umanitoba.ca/academic-advisors/>

Student Advocacy

Contact Student Advocacy if you want to know more about your rights and responsibilities as a student, have questions about policies and procedures, and/or want support in dealing with academic or discipline concerns. <http://umanitoba.ca/student/advocacy/>

Students Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services <http://umanitoba.ca/student/saa/accessibility/>

520 University Centre

204 474 7423

Student_accessibility@umanitoba.ca

Students who are unable to meet a course requirement due to medical circumstances are currently not required to submit medical notes. However, students are required to contact their instructor or academic advisor by email to inform of the missed work and to make arrangements for extensions, deferrals, or make-up assignments. Please follow these guidelines if you are unable to meet an academic requirement for your courses. - Contact your instructor for term work such as a class, quiz, midterm/test, assignment, lab; - Contact an advisor in your faculty/college/school of registration for a missed final exam (scheduled in the final examination period); - Inform your instructor/advisor as soon as possible do not delay. Note for final exams, students must contact within 48 hours of the date of the final exam; and - Email your instructor/advisor from a U of M email address, and include your full name, student number, course number, and academic work that was missed.

Class schedule

This schedule is subject to change at the discretion of the instructor and/or based on the learning needs of the students but such changes are subject to Section 2.8 of the – ROASS- Procedure

Date	Class Content	Required Readings	Evaluation
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Sept 9- Sept 23	Photosynthesis	textbook	Mid-term and Final
Sept 25- Oct 7	Respiration	Textbook	Mid-term and Final
Oct 9- Oct 21	Control of growth and development	Textbook	Mid-term and final
Oct 23- Nov 6	Plant Water Relations	Textbook	Final
Nov 16- Nov 25	Mineral nutrition	Textbook	Final
Nov 27 – Dec 9	External factors and plant growth	Textbook	Final

Lab schedule

Date	Lab Content	Required Readings	Evaluation
Sept 28-29	Introduction tutorial (how to prepare figures and tables)	Lab handout	No

Oct 5-6	Photosynthesis	Textbook and lab handout	Individual or group lab assignment due Oct 19-20
Oct 19-20	Hormone I	Textbook and Lab handout	Group lab report Part I due Nov 2-3
Oct 26-27	Tutorial (how to write a report and work in groups)	Lab handout	Instructors will review the progress made
Nov 2-3	Hormone II	Textbook and Lab handout	Group lab report Part I due Nov 16-17
Nov 16-17	Water relation	Textbook and lab handout	Group lab report Part II due Nov 30-Dec1
Nov 23-24	Tutorial	Lab handout	Instructors will review the progress made
Nov 30-Dec1	Nutrient Deficiency-Mineral nutrition	Textbook and lab handout	demonstration

Attendance is compulsory.

Course evaluation methods

Due Date	Assessment Tool	Value of Final Grade
12:30 pm, Monday, Oct 23, 2020	Mid-Term Paper	15%
TBD	Final Exam	20%

Dec 11 th , 2020	Lecture Assignment	20%
See lab schedule	Lab assignment/reports	45%

Grading

Letter Grade	Percentage out of 100	Grade Point Range	Final Grade Point
A+	90-100	4.25-4.5	4.5
A	80-89	3.75-4.24	4.0
B+	74-79	3.25-3.74	3.5
B	68-73	2.75-3.24	3.0
C+	62-67	2.25-2.74	2.5
C	56-61	2.0-2.24	2.0
D	50-55	Less than 2.0	1.0
F	Less than 50		0

Reference style

Reference style should be according to journal **Physiologia Plantarum** (see Citations and References sections)

<http://physiologiaplantarum.org/instructions-for-manuscrip/>

Assignment description

The mid-term examination will cover material from the following topics: Photosynthesis, Respiration and Hormones. The final examination will cover material from all topics outlined in the course description section. Details on the format of the examinations will be provided in class.

Assignment grading time

Grades will be available 10 days after the completion of the respective assignment

Late submission policy and important dates

Late Assignments

A penalty of 20% per day will be applied for any late lab assignment or report

Missed Assignments

A 0% grade will be given for any missed lab assignment or report

Missed Exams

A 0% grade will be given for any missed exam

Voluntary withdrawal date

Last day for voluntary withdrawal is Nov 23rd 2020. Upon request students will be provided with verbal feedbacks about their performance.