COURSE: Fundamentals of Plant Pathology

Department Plant Science Course Number: PLNT 3570 - A01

UNIVERSITY OF MANITOBA

Faculty of Agricultural and Food Sciences

Academic Session: Winter 2021 (Jan 18th-April 16th) **Credit Hours**: 03

Prerequisites and how they apply to this course: BIOL 2260 or the former 1.221 Biology of Fungi and Lichens or permission/consent from the professor.

Classroom location: Not applicable this year due to the covid19 pandemic. The course will be offered remotely.

Class Hours: Tuesdays and Thursdays 10:00 to11:15 am

Lab/Seminar location: Online **Lab/Seminar/Hours**: Wed 2:30 to 5:15pm

Lab Teaching Assistant: James De Castro

E-Mail addresses: decastr4@myumanitoba.ca

Office Hours: TBA

Department Office Location: 222 Plant Science **Phone Number:** 204-474-8221

Instructor information

Name: Dr. Ahmed Abdelmagid, Research Associate.

Office Location: 207 Plant Science

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Course Philosophy and Students' Learning Responsibilities

This course is an introduction to the science of plant pathology. Topics include causal agents of plant diseases, symptoms and diagnosis, modes of infection and spread, effects of the environment on disease development, and methods of disease control. The course will also cover plant's defense mechanisms, and conventional and novel control strategies. Students have the responsibility in learning the fundamentals in plant pathology through the use of the **required textbook (Plant Pathology by G. Agrios–5thEdition)**, lecture notes, and lab materials. The students are particularly required to understand the concepts, and theories and some memorization (botanical and pathogen scientific names, etc.).

Why this course is useful?

This course will offer a background of concepts, and theories in plant pathology, its principles, and practical applications to disease management. This course is extremely important for undergraduate students who may want to further their studies in plant pathology, molecular plant pathology, breeding or mycology majors, or do postgraduate studies leading to Masters and Doctoral degrees in plant pathology.

Who should take this course?

Students interested in plant pathology, and host-pathogen interactions should take this course. This course will offer a sound background for undergraduate students who may want to further their studies in plant pathology, molecular plant pathology, breeding or mycology majors, or do postgraduate studies leading to Masters and/or Doctoral degrees in plant pathology.

How this course fits into the curriculum:

The students will be introduced to economically important diseases in the prairies they may encounter on crop plants and horticultural trees, the causal organisms, reproductive structures, and how the environment and the host could contribute to the success of a pathogen and its infection process. This fits extremely well with the curriculum as the course will go through the areas of learning through basic and molecular approaches giving the students the needed background for their Plant Biotechnology degree.

Course Description:

This course is an introduction to the science of plant pathology. Topics include causal agents of plant diseases, symptoms and diagnoses, modes of infection and spread, effects of the environment on disease development, and methods of disease control. This course is a pre-requisite form for more advanced courses in plant pathology.

Instructional Methods:

PLNT 3570 will be taught through online lectures by the instructor, guest lecturers, and through the textbook. Videos and other instructional materials such as live plant specimens will be used to demonstrate concepts, diseases, and management practices.

Course Objectives

The main objective of the course is to help the students to understand the principles of host-pathogen interactions and how diseases occur in plants; the defense mechanisms plants have against plant pathogens and how other microorganisms and humans have been able to manipulate the host-pathogen interaction to reduce and manage diseases.

Learning Outcomes

Learning outcomes assist students to i) identify the knowledge, skills, attitudes, and personal attributes expected of them to successfully complete their program of studies; ii) facilitate to develop of learning goals and objectives in their courses and programs, in prioritizing and focusing the learning experiences, and in the selection of appropriate assessment tools and; iii) potential students and outside agencies to assess the quality of our academic programs. These learning outcomes areas include: Scholar, Content and technical expertise, Social accountability, Communicator, and Professional

Description of Examinations:

Exams will have both multiple choice and long answer questions (Midterm and Final exams). Lab reports are based on assignments handed to students after each lab.

Description of Assignments:

Assignments are based on labs.

Assignment Due Dates:

Each assignment is due on the date of the next lab session. That would be one week from the time the assignment is handed over unless a different date is mentioned by the TA or the instructor.

Grade Evaluation:

a) Mid-Term exam 1..... 15% (ONLINE EXAM: February 25th, 2021)
b) Attending online Lectures …….. 10% (see page 5 of this handout for schedule)
c) Lab reports..... 15% (10 assignments - due each week)
d) Mid Term exam 2..... 15% (ONLINE EXAM: March 30th, 2021)
e) Lab Final exam… 15% (ONLINE EXAM: March 31st, 2021)
f) ONLINE Group presentation …….. 10% (to be scheduled)
g) Final Exam……. 20% (to be Scheduled)

Important Dates: Voluntary withdrawal date: March 31, 2021.
Winter Term break (no classes): Feb 16 to 19, 2021.
Louis Riel Day (University closed): Feb 15, 2021.

Evaluative feedback will be provided to the students prior to the withdrawal date.

Text (Required): Plant Pathology (Fifth Edition) 2005 by G.N. Agrios (from Bookstore)

Supplementary Reading (recommended to read for articles that may be of use to the course material).

Journals: Phytopathology, Plant Pathology, Plant Disease, Can. J Plant Pathology, Molecular Plant Pathology, Molecular Plant Microbe Interactions, European Journal of Plant Pathology.

Additional Materials:

Additionally you are encouraged to read and view material on authentic plant disease websites on the net.

Course Policies:

Late Assignments: The student will lose marks that are assigned for each assignment unless handed over on time.

Missed Assignments: The student will lose marks that are assigned for each assignment if an assignment is missed. If there is a valid reason, (i.e. medical in nature) the student needs to meet (online) with the instructor to discuss this, and if it was for any medical reasons, hand over a medical certificate signed by an authorized medical professional.

Missed Exams: The student will lose marks that are assigned for each exam if an exam is missed. If there is a valid reason, the student needs to meet with the instructor to discuss this, and if it was for any medical reasons, hand over a medical certificate signed by an authorized medical professional. Then the marks will be added to the next exam and graded accordingly. The students may not miss the second midterm exam as there would be no choice in adding marks at that time. The lecture series (10%) and the group presentations (10%) that the students would do should also not be missed. A percentage will be deducted for the classes missed during the presentations, without a valid reason (need to take permission prior to).

Academic Integrity:

Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty. Cheating in examinations or tests may take the form of copying from another student or bringing unauthorized materials in to the exam room. Exam cheating can also include exam impersonation. A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty. Students should acquaint themselves with the University's policy on plagiarism, cheating, exam impersonation and duplicate submission (seeSection7, p.29 in the University of Manitoba Under graduate Calendar 09/10).

Use of Third Party Detection and Submission Tools

Electronic detection tools may be used to screen assignments in cases of suspected plagiarism.

Policies and resources available to students at the University of Manitoba

Please be sure to review schedule "A" that is available at UM Learn "content section". This schedule lists all academic supports available to the students at the University of Mnaitoba.

Course Content:

Topics to be Covered:

1 Jan 19	Introduction to plant pathology: Intro to plant diseases and diagnosis, Koch's postulates
2 Jan 21	Disease development and influence of environment
3 Jan 26	Disease epidemiology and forecasting
4 Jan 28	Disease management
5 Feb 02	Bacteria, Phytoplasma
6 Feb 04	Plasmodiophora: Clubroot and nematodes
7 Feb 09	Fungal diseases: Ascomycetes FHB, Blackleg, Sclerotinia
8 Feb 11	Fungal diseases: Deuteromycetes
9 Feb 16	Basidiomycetes and higher parasitic plants (Winter break, no classes)
10 Feb 18	Oomycetes and diseases caused by them (Winter break, no classes)
11 Feb 23	Viruses, viroids and protozoa

12 Feb 25	MID-TERM1
13 March 02	How pathogens attack
14 March 04	How plants defend themselves?
15 March 09	Hyper sensitive response (HR)and phytoalexins
16 March 11	Induced systemic resistance (ISR)and Systemic acquired resistance(SAR)
17 March 16	Hormone crosstalk in plant defense
18 March 18	Circadian rhythm of hormones in plants and relation to disease symptoms
19 March 23	HOST-PATHOGEN INTERACTION:PAMP triggered immunity(PTI)and Effector triggered
20 March 25	How can we study HOST-PATHOGEN INTERACTION DISCUSSION
21 March 30	MID-TERM2
22 April 1st	Invite lecturer TBA (last lecture)

Lab Topics Covered

Lab	Topics Covered
1	Identification of plant diseases (symptoms) KOCH postulates– Isolation of plant pathogens from diseased samples (soybean stems and roots).
2	Discussion and experiment to determine impact of environment on disease (Sclerotinia stem rot).
3	Preparation of pure cultures of pathogens and record results from lab 2.
4	Identify certain plant diseases and disorders.
5	Nematode: Visualization and identification of plant pathogenic nematodes.
6	Basidiomycetes: A look under the microscope at spores from the genera Puccinia.
7	Deuteromycetes: A look under the microscope at spores
8	Viruses in plants: A lecture tutorial
9	How can we study host pathogen interactions : A look at plant defense gene expression during infection using quantitative real time PCR.

*The schedule will be followed as much as possible. However, this schedule is not set in stone.

Student Presentations:10%

Each student will be given a topic to cover in a period of 45 minutes in the early period of the course. The grade will depend on the effort the student has put to make a good presentation (PowerPoint), the content of the slides, and on the accuracy of the information. Students are encouraged to share other material related to their topic covered with the class. Each student should bring over the power point presentation to the professor at least one week before class so he can go through and see if the material is appropriate and change/add if necessary. The topics will be:

1. Bacteria, and phytoplasma (TBA)
2. Plasmodiophora: Clubroot; nematodes (TBA)
3. Fungal diseases: Ascomycetes (TBA)
4. Fungal diseases: Deuteromycetes (TBA)
5. Fungal diseases: Basidiomycetes (TBA)
6. Oomycetes and diseases caused by them (TBA)
7. Viruses, viroids (TBA)

We will have a "lottery Draw" to select and assign the topics on the first week of class.