



**COURSE: Fundamentals of Plant Pathology**

**Course Number: PLNT 3570 - A01**

**Academic Session: Winter 2022 (Jan 25<sup>th</sup> - April 25<sup>th</sup>)**

**Credit Hours: 03**

**Prerequisites: BIOL 1030 or permission/consent from the instructor.**

**Classroom location: The course will be offered remotely.**

**Class Hours: Tuesday and Thursday, 10:00am - 11:15 am**

**Lab/Seminar location: Online**

**Lab/Seminar/Hours: Wednesday, 2:30 - 5:15pm**

### **Instructor information**

**Name: Dr. Fouad Daayf, Professor**

**Office Location: 107 Plant Science**

**Email Address: [Fouad.Daayf@umanitoba.ca](mailto:Fouad.Daayf@umanitoba.ca)**

**Lab Teaching Assistant: Mehrdad Mohammadiani**

**E-Mail addresses: [mohamm70@myumanitoba.ca](mailto:mohamm70@myumanitoba.ca)**

**Office Hours: Students can use email to contact instructors.**

**Department Office Location: 222 Plant Science**

**Phone Number: 204-474-8221**

## **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 - 5<sup>th</sup> Edition)**, 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 will be used to demonstrate concepts, diseases, and management practices.

### **Course Objectives**

The main objective of the course is to help the students 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:**

<b>Assessment</b>	<b>Value (%)</b>	<b>Notes</b>
Mid-Term exam 1	15%	Online
Lab reports	15%	
Mid Term exam 2	15%	Online
Lab Final exam	15%	Online
Paper presentation	20%	Online
Final Exam	20%	Online

**Important Dates:** See University Calendar

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

**Supplementary Reading** (recommended reading 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 (see Section 7, p.29 in the University of Manitoba Undergraduate 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**

Schedule "A" that is available at UM Learn "content section" lists all academic supports available for the students at the University of Manitoba.

### **Course Content:**

Tentative list of topics to be covered:

Introduction to plant pathology: Intro to plant diseases and diagnosis, Koch's postulates
Disease development and influence of environment
Disease epidemiology and forecasting
Disease management
Bacteria, Phytoplasma
Plasmodiophora: Clubroot and nematodes
Fungal diseases: Ascomycetes FHB, Blackleg, Sclerotinia
Fungal diseases: Deuteromycetes
Basidiomycetes and higher parasitic plants
Oomycetes and diseases caused by them
Viruses, viroids and protozoa
How do pathogens attack plants
How do plants defend themselves?
Hypersensitive response (HR) and phytoalexins

Induced systemic resistance (ISR) and Systemic acquired resistance (SAR)
Hormone crosstalk in plant defense
Circadian rhythm of hormones in plants and relation to disease symptoms
Host-Pathogen interactions: PAMP-triggered immunity (PTI) and Effector-triggered immunity (ETI)
How can we study host-pathogen interactions? Discussion

**Lab Topics – tentative list**

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Identification of plant diseases (symptoms) KOCH postulates–

Isolation of plant pathogens from diseased samples (soybean stems and roots).

Discussion and experiment to determine impact of environment on disease (Sclerotinia stem rot).

Preparation of pure cultures of pathogens and record results from lab 2.

Identify certain plant diseases and disorders.

Nematode: Visualization and identification of plant pathogenic nematodes.

Basidiomycetes: A look under the microscope at spores from the genera Puccinia.

Deuteromycetes: A look under the microscope at spores

Viruses in plants: A lecture tutorial

How can we study host pathogen interactions? A look at plant defense gene expression during infection using quantitative real-time PCR.

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

Student Presentations:20%

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.