

**CFANS 3001: Pests and Crop Protection**  
**Plant Pathology Module**  
**Plant Disease Biology and Management**  
**Spring Semester 2014**

---

**Instructor:** Dr. Brian Steffenson  
Department of Plant Pathology  
Office: 310 Stakman Hall  
E-mail: [bsteffen@umn.edu](mailto:bsteffen@umn.edu)  
Telephone: (612) 625-4735

**Office hours:** Monday and Wednesday at 9:30-10:30 AM, Friday at 10:30 AM-11:30 AM, and by appointment.

**Lectures:** Monday and Wednesday 8:30-9:20 AM in 132 Plant Growth Facility West

**Laboratory:** Friday 8:30-10:25 in 136 Plant Growth Facility West

**Credits:** Three (3) for the entire semester consisting of the three five-week modules

<b>Teaching assistants:</b> Todd Burnes	Matthew Martin
217 Stakman Hall	201 Christensen Laboratory
E-mail: <a href="mailto:burne002@umn.edu">burne002@umn.edu</a>	E-mail: <a href="mailto:mjmartin@umn.edu">mjmartin@umn.edu</a>
Telephone: (612) 625-6231	Telephone: (612) 625-6778

**Prerequisites:** The prerequisite for this course is General Biology (Biol 1009), an equivalent general biology course, or by instructor consent.

**Textbook:** No textbook is required for this module. Instead, I will assign readings from two primary texts, plus several other sources, which are available via electronic reserve. To access the electronic reserve, go to the following link (<https://reserves.lib.umn.edu/>) and enter your UM x500 number and password.

Under CFANS 3001 tab, you will see a list of pdf files with the author name, book name, and page numbers; these are your assigned readings for the lectures. In some cases, a single reading passage is divided into several smaller pdf files to hasten download time. You may elect to save a tree by not printing the articles and reading them on the computer screen. The primary texts of Agrios and Lucas are also on reserve in the Plant Pathology Library (395 Borlaug Hall). <http://plant.lib.umn.edu/>

**Primary reference texts:**

Lucas, J. A. 1998. Plant Pathology and Plant Pathogens. Third Edition. Blackwell Science Ltd. Oxford, England.

Agrios, G. N. 1997. Plant Pathology. Fourth Edition. Academic Press, New York, NY.

**Course objectives:** Plants directly or indirectly provide all of the food upon which humans and animals depend. Unfortunately, diseases are a major constraint to the productivity and quality of food and fiber crops. Plant pathology is the study of organisms and environmental factors that cause disease. The overall goal of this course is to introduce students to the concept of plant health. In this course, I expect students to:

- 1) Develop a basic understanding of plant diseases, their cause, and management;
- 2) Develop an understanding of the basic biology of plant pathogens--i.e. how they cause disease, modes of spread, and survival;
- 3) Develop an understanding of the procedures involved in making a plant disease diagnosis;
- 4) Develop a knowledge base to critically evaluate issues in the popular media dealing with plant health.

**Grading:** One third (33% or 300 of the 900 total points) of your grade in CFANS 3001 is based on this five-week Plant Pathology module. Within this module, you will be evaluated on the following assignments:

<b>Assignment, Exercise, or Exam</b>	<b>Description of Assignment, Exercise or Exam and Assignment &amp; Due Dates</b>	<b>Total Points</b>	<b>Points Scored</b>
Class Participation	Answering oral questions given in class & participating in discussions: <i>Assignment date: continuous from first to last class</i>	10	
Lab Worksheet #1	On laboratory material from Lab #1 <i>Assignment date &amp; due date: February 28</i>	10	
Lecture Quiz #1	On lecture & reading material from February 26, 28, and March 3. <i>Date given: March 5</i>	20	
Lab Worksheet #2	On laboratory material from Lab #2 <i>Assignment date &amp; due date: March 7</i>	10	
Lab Worksheet #3	On laboratory material from Lab #3 <i>Assignment date &amp; due date: March 14</i>	10	
Signs/Symptoms Exercise	<i>Signs of Pathogens &amp; Symptoms of Disease Exercise</i> <i>Assignment date: March 10 &amp; Due date: March 14</i>	22	
Lecture Quiz #2	On video presentation of Borlaug documentary <i>Date given: March 24</i>	20	
Lab Worksheet #4	On laboratory material from Lab #4 <i>Assignment date &amp; due date: March 28</i>	10	
Lecture Final Exam	Comprehensive 50 minute exam with multiple choice, short answer, and essay questions	70	

	<i>Date given: April 2</i>		
Disease Management Exercise	<i>Exploration of Disease Management Systems Exercise Assignment date: March 24 &amp; Due date: April 4</i>	24	
Lab Final Exam	Comprehensive 125 minute exam highlighting disease specimens with multiple choice, short answer, and essay questions <i>Date given: April 4</i>	64	
Lab Report	Koch's Postulates Experiment <i>Assignment date: February 28 &amp; Due date: April 4</i>	30	
	<b>Total Points =</b>	<b>300</b>	

**Letter grade assignments:** This will be based on a straight percentage basis where:

A=90-100% (270-300 total points)

B=80-89% (240-269 total points)

C=70-79% (210-239 total points)

D=60-69% (180-209 total points)

F=0-59% (below 180 total points)

The University of Minnesota Uniform Grading and Transcript Policy can be found at

<http://www.fpd.finop.umn.edu/groups/senate/documents/policy/gradingpolicy.html>

A grade of "A" represents achievement that is outstanding relative to the level necessary to meet course requirements; a grade of "B" represents achievement that is significantly above the level necessary to meet course requirements; a grade of "C" represents achievement that meets the course requirements in every respect; a grade of "D" represents achievement that is worthy of credit even though it fails to meet fully the course requirements; and a grade of "F" represents **failure** and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an incomplete. An incomplete is assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., hospitalization), a student is prevented from completing the work of the course on time. An incomplete requires a written agreement between instructor and student.

**Class participation:** Class participation is strongly encouraged! If you have questions or comments regarding anything discussed in class, please share them with the instructor and the rest of your fellow classmates. We can all learn together in this way.

**Attendance:** This module will involve learning activities that cannot be replicated outside of class time. Therefore, attendance is required and extremely important. If circumstances force you to miss a lecture or a lab, please contact the instructor (by e-mail or telephone) in advance to arrange an excused absence or bring in a doctor's note after the class.

Laboratories involve time-sensitive specimens, a great deal of preparation time, and instructor/teaching assistant participation. Attendance at all laboratory sessions is mandatory. If you miss a laboratory session, you cannot make up the work.

**Making up a missed exam.** To be eligible for a make-up exam, quiz or worksheet, you must have a verifiable excuse (e.g. a doctor's note) and contact the instructor at least 24 hours before the exercise is given.

**Penalty for late work.** The penalty for handing in assignments past the due date will be 20% of the total assigned points for that exercise per day.

**Extra credit:** Students who follow attendance guidelines and complete all course assignments have the option of undertaking extra credit projects. Possible projects include: the creation of a web page on a plant pathology topic or development of an extension bulletin. Check with the instructor for extra credit projects.

**Academic misconduct:** The Conduct Code of the University of Minnesota details matters of scholastic dishonesty to include the following: submission of false records of academic achievement; cheating on assignments or examinations; plagiarizing; altering, forging or misusing a University academic record; taking, acquiring or using test materials without faculty permission; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement.

[http://www.policy.umn.edu/Policies/Education/Student/STUDENTCONDUCTCODE\\_PROC01.html](http://www.policy.umn.edu/Policies/Education/Student/STUDENTCONDUCTCODE_PROC01.html)

*Academic dishonesty in any form will not be tolerated.* At times, you will be allowed (and expected) to work together in pairs or teams. However, whenever you turn in an assignment, it must be your own work! Academic dishonesty in any portion of the academic work for this module shall be grounds for awarding a failing grade for the entire course.

**Disability access:** The University of Minnesota policy is to provide reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities should contact me within the first week of the course to discuss specific needs. An additional resource is the Disability Services Office (Phone: 612-626-1333; <https://diversity.umn.edu/disability/>)

**Discrimination and sexual harassment:** The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, religion, color, sex, national origin, handicap, age, or veteran status. Questions regarding these issues should be directed to the appropriate officer in the university's equal opportunity office (Phone: 612-624-9547) or see <http://www.eoaffact.umn.edu/>.

## Class Schedule 2014

Date	Class/Lab Topic
	<b>Readings</b>
<b>February 26</b>	<p><b>Lecture 1:</b> Class requirements and goals; introduction to plant diseases</p> <p><b>Readings:</b> Lucas 1-25; 30-38 and Agrios 3-7; 25-33</p>
<b>February 28</b>	<p><b>Lecture 2:</b> Pathogen groups: structure, classification, and biology of fungi and fungal-like organisms</p> <p><b>Readings:</b> Lucas 1-25; 30-38 and Agrios 245-254</p> <p><b>Lab 1:</b> Microscopy; Introduction to fungal pathogens; Koch's Postulates I</p> <p><b>Assignment: start <i>Lab Report on Koch's Postulates Experiment</i></b></p> <p><b>Lab Worksheet #1 due on material from Lab 1</b></p>
<b>March 3</b>	<p><b>Lecture 3:</b> Pathogen groups: structure, classification, and biology of bacteria and viruses</p> <p><b>Readings:</b> Lucas 1-25; 30-38 and Agrios 407-413; 479-483</p>
<b>March 5</b>	<p><b>Lecture 4:</b> Pathogen groups: structure, classification, and biology of nematodes and parasitic higher plants plus abiotic agents of disease</p> <p><b>Readings:</b> Lucas 1-25; 30-38 and Agrios 488-496; 565-571</p> <p><b>QUIZ #1 on lecture and assigned reading material from Lectures 1, 2 &amp; 3</b></p>
<b>March 7</b>	<p><b>Lab 2:</b> Plant diseases caused by fungi in phylum Ascomycota; Koch's Postulates II</p> <p><b>Lab Worksheet #2 due on material from Lab 2</b></p>
<b>March 10</b>	<p><b>Lecture 5:</b> Signs of pathogens and symptoms of disease</p> <p><b>Readings:</b> Lucas 6-9, hand-outs;</p> <p><b>Assignment: <i>Signs of Pathogens &amp; Symptoms of Disease Exercise</i></b></p>
<b>March 12</b>	<p><b>Lecture 6:</b> Pathogen dispersal, survival, and infection; How pathogens cause disease and how plants defend themselves</p> <p><b>Readings:</b> Lucas 39-52 and Agrios 48-52</p>
<b>March 14</b>	<p><b>Lab 3:</b> Diseases caused by Basidiomycota and Oomycota; Physiologic specialization in pathogens; Disease Resistance, and Koch's Postulates III</p>

	<b>Lab Worksheet #3 due on material from Lab 3;</b> <b>DUE: <i>Signs of Pathogens &amp; Symptoms of Disease Exercise</i></b>
<b>March 17-21</b>	<b>SPRING BREAK: NO CLASSES!</b>
<b>March 24</b>	<b>Lecture 7:</b> Documentary video: Freedom from Famine: The Norman Borlaug Story <b>QUIZ #2 on Borlaug documentary</b>
<b>March 26</b>	<b>Lecture 8:</b> Host-parasite specificity; Disease management part I: Host resistance <b>Readings:</b> Lucas 219-226 and Agrios 115-128 <b>Assignment: <i>Exploration of Disease Management Systems Exercise</i></b>
<b>March 28</b>	<b>Lab 4:</b> Plant parasitic nematodes, bacteria, viruses, and plants <b>Lab Worksheet #4 due on material from Lab 4</b>
<b>March 31</b>	<b>Lecture 9:</b> Disease management part II: Chemical, cultural, and biological control strategies/Integrated Pest Management <b>Readings:</b> Agrios 173-178; 188-216
<b>April 2</b>	<b>Lecture Final Exam</b> <b>DUE: <i>Exploration of Disease Management Systems Exercise</i></b>
<b>April 4</b>	<b>Lab 5: Laboratory Final Exam</b> <b>DUE: <i>Report on Koch's Postulates Experiment</i></b>

Note: The lecture schedule is subject to change. The exam schedule **is not** subject to change.

**Additional plant pathology reference materials:**

Dingra, O. D. and Sinclair, J. B. 1995. Basic Plant Pathology Methods. 2<sup>nd</sup> edition. CRC Publishers, Boca Raton, FL.

Holliday, P. 1990. A Dictionary of Plant Pathology. Cambridge University Press, New York, NY.

Horst, R. K. 1990. Westcott's Plant Disease Handbook. Van Nostrand Reinhold, New York, New York.

Pirone, P.P., Dodge, B. O., and Rickett, H. W. 1960. Diseases and Pests of Ornamental Plants. 3<sup>rd</sup> edition. The Ronald Press Company, New York, NY.

Schumann, G. L. 1993. Plant Diseases: Their Biology and Social Impact. American Phytopathological Society Press, St. Paul, MN.

Shurtleff, M. C., and Averre, C. W. 1997. Glossary of Plant-Pathological Terms. American Phytopathological Society Press, St. Paul, MN.

Hawksworth, D. L., Kirk, P. M., Sutton, B. C., and Pegler, D. N. 1995. Ainsworth & Bisby's Dictionary of the Fungi. International Mycological Institute, Wallingford, UK.

**General plant pathology web site for information and searches:**

Plant Pathology Internet Guide Book (PPIGB) <http://www.pk.uni-bonn.de/ppigb/>