

## Biology 446 Plant Pathology

### Instructor Information:

Instructor	Dr. Kristopher Blee
Office	Holt 301H
Office hours	
Phone	898-5116
email	Use the course VISTA email tool

### Required Items:

1. Permanent fine tip marker for labeling tubes, seriously, get your own pen.
2. Biology 446 Lab course manual (purchase form Omicron, on second floor of Holt Hall near mountain lion).
3. George Agrios, Fifth ed. 2005. Plant Pathology. Elsevier Academic Press.

### Course Assignments:

**1. Quizzes.** Quizzes will be taken online through the course Web-CT site. The quizzes will be timed and consist of 20 questions taken from the previous reading and lecture material. The questions will be multiple choice and / or fill in the blank and / or short answer. When assigned, quizzes will become available through the course website either Friday evening or Saturday morning. The assigned quiz will remain open from that time until the following Tuesday at 11:55 pm. Quizzes are to be your personal efforts and no one else's. While taking the quiz you may use your notes and your text book. Discussion of quiz questions with other students who have not yet taken the quiz will be considered a breach of academic honesty.

**2. Disease reports.** Disease reports are short oral presentations of about 10 minutes. A report consists of four main parts, description of disease symptomatology, description of causal agent, description of disease cycle / life cycle, and description of control measures. Compendia for a wide variety of crops have been put on reserve in the library to serve as reference material. Your text is also an excellent reference for these reports. You will find the resources at [www.apsnet.org/education/LessonsPlantPath/Top.html](http://www.apsnet.org/education/LessonsPlantPath/Top.html) very valuable as well. While giving your report you are expected to make use of transparencies for the visual portion of your presentation. Good reports will accurately and completely address all 4 areas listed above. Excellent reports will use either quality color presentation of symptoms or actual diseased tissue, will address the economic impact on the particular crop, will name alternate hosts and or diseases caused by the same organism on other crops, will link stages of the life / disease cycle to symptoms or sign in an attempt to understand what processes in the plant are disrupted, will include biological and / or use of biotechnology in control of the disease.

**3. Written disease case assignment.** Students will be introduced to a diseased plant. Students will explore the symptoms and then present a short list of possible causal agents with justification of each. Students will describe diagnostic tests that will allow identification of the causal agent. Choose one pathogen from your list since most likely causing the symptoms, describe the life / disease cycle of the organism and control strategies. Include how control measures would be integrated into IPM of the crop.

**4. Lab assignments.** Each lab assignment is detailed in the course lab manual. These assignments range from answering a few questions to creation of figures from your results and then writing a short "Results" section where the data of the figure are analyzed. On these assignments you are to work independently, and work turned in must be your own creation.

**5. Attendance.** Each week (except weeks 3, 12, 13, and 17, see schedule below) of the semester you can earn up to 10 points for your attendance. It is an all or nothing award, either 10 pts or 0 pts. To earn 10 pts for a week requires full period attendance at the lectures and lab. Absence from a lecture or lab will be scored at any time during scheduled course meeting times and the record of absences kept by the instructor is not disputable.

<u>Course Assignments and Value</u>	<u>Point Value</u>
Quizzes (7 at 20 pts each)	140
Disease reports (4 at 20 pts each)	80
Written disease case (1 at 40 pts)	40
Exams (4 lab at 25 pts each, 3 lecture at 25 pts each, 1 lecture final at 75 pts)	250
Lab assignments (11 at 10 pts each)	110
Attendance (13 at 10 pts each)	130
Total Course Points	500

<u>Percentage of Correct Points and Grade</u>	<u>Letter Grade</u>
90 to 92 to 100%	A- to A
80 to 82 to 87 to 89%	B- to B to B+
70 to 72 to 77 to 79%	C- to C to C+
63 to 67 to 69%	D to D+
less than 63%	F
unauthorized withdraw	WU

**Course Policies:**

- Exam attendance.** Make-up lecture exams will not be given unless previous arrangements have been made.
- Dropping.** You may drop this course during the first 2 weeks by TRACS, and during the 3rd and 4th weeks with a drop card signed by the instructor. After the Census Date of the 4th week, a drop requires a "serious and compelling" reason. Therefore, before you request a late drop for this class, obtain written documentation of your reason for withdrawal. I will not consider any late drop without professional (Ex. Physician) verification of "serious and compelling" reason.
- Students with disabilities.** Additional efforts can be made to increase access of course materials for students with permanent and temporary disabilities. If you are disabled contact CSU Chico Disability Support Services ([www.csuchico.edu/dss/index.shtml](http://www.csuchico.edu/dss/index.shtml)) or University Center Room 100 or 898-5959) for help and notify your instructor as soon as possible.

WK	DATE	SECTION	LECTURE TOPICS	Agrios	LAB (Monday)
1	Aug24 Aug26 Aug28	I. The Diseased State	Introduction, Environmental disease Development of infectious disease <b>Furlough</b>	Ch 1, 10 Ch 2,421-426	<b>LAB Introduction</b> <b>CASE STUDY</b> <b>ASSIGNED</b>
2	Aug31 Sep2 Sep4		Pathogen weapons, Effects on plants <b>QUIZ 1</b> Genetics of plant disease and resistance <b>Furlough</b>	Ch 5,3 Ch 4	<b>LAB 1</b> Disease symptoms and signs. <b>Assignment due next lab</b>
3	Sep7 Sep9 Sep11	II. Plant Defense	<b>Labor Day No Classes</b> Plant defenses Principles of disease control	Ch 6 Ch 9	<b>NO LAB</b>
4	Sep14 Sep16 Sep18	III. Bacterial Pathogens	Bacteria as pathogens <b>QUIZ 2</b> Bacterial diseases Mollicutes as pathogens <b>Census Date</b>	Ch 12 Ch 12 Ch 12	<b>LAB 2-1</b> Isolation of organisms. <b>Assignment due next lab</b>
5	Sep21 Sep23 Sep25		Viruses as pathogens <b>Bacterial disease reports</b> <b>Bacterial disease reports</b>	Ch 14	<b>LAB 2-2</b> Selective media and antibiosis. <b>Assignment due next lab</b>
6	Sep28 Sep30 Oct2	IV. Viral Pathogens	Viral diseases <b>QUIZ 3</b> Viral diseases <b>LAB TMV inoculation</b>	Ch 14 Ch 14	<b>LAB 3-1</b> Plant defense and viral disease. <b>Assignment due next lab</b>
7	Oct5 Oct7 Oct9		Fungi as pathogens <b>Viral disease reports</b> <b>Viral disease reports</b>	Ch 11,383-403	<b>LAB 2-3</b> Gram staining, proof of pathogenicity. <b>Assignment due next lab</b>
8	Oct12 Oct14 Oct16	V. Fungal Pathogens	Fungal like pathogens, Zygo's <b>QUIZ 4</b> <b>LAB TMV ELISA</b> Asco's & imperfects	404-438 439-552	<b>LAB 3-2</b> TMV ELISA. <b>Assignment due next lab</b>
9	Oct19 Oct21 Oct23		<b>LAB</b> Experimental design <b>LAB</b> Sampling Asco's & imperfects <b>CASE STUDY DRAFT</b>	439-552	<b>LAB 4-1</b> Plant defense and bacterial disease. <b>Assignment due next lab</b>
10	Oct26 Oct28 Oct30		<b>LAB</b> Sampling <b>QUIZ 5</b> Post harvest mycotoxins, Rusts & Smuts <b>Furlough</b>	553-561-615	<b>LAB 4-2</b> Bacterial inoculations and survival. <b>Assignment due next lab</b>
11	Nov2 Nov4 Nov6		<b>Furlough</b> <b>LAB</b> Bacterial survival (Lab 4-2 prep) <b>Fungal disease reports</b>		<b>CSU Chico Administration</b> <b>Furlough, NO LAB</b>
12	Nov9 Nov11 Nov13	VI. Nematode Pathogens	<b>Fungal disease reports</b> <b>Veteran's Day No Classes</b> Nematodes	Ch 15	<b>LAB 4-3</b> Bacterial counts and calcs of survival. <b>Assignment due next lab</b>
13	Nov16 Nov18 Nov20		<b>LAB</b> Protein extraction <b>QUIZ 6</b> Nematode diseases <b>CASE STUDY DUE</b> <b>Furlough</b>	Ch 15	<b>LAB 4-4</b> Protein extraction and assay. <b>Assignment due next lab</b>
14	Nov23 Nov25 Nov27		<b>THANKSGIVING VACATION</b> <b>NO CLASSES</b>		<b>NO LAB</b>
15	Nov30 Dec2 Dec4		<b>LAB</b> GUS reporter assay Environment & disease Disease epidemics	Ch 7 Ch 8	<b>LAB 4-5</b> PR1a: GUS reporter activity. <b>Assignment due next lab</b>
16	Dec7 Dec9 Dec11		<b>Nematode disease reports</b> <b>Nematode disease reports</b> Methods for control of plant diseases <b>QUIZ 7</b>	Ch 9	<b>LAB 4-6</b> Calcs of GUS activity and graphing.
17	Dec 13		<b>Final Monday 10 – 12</b>		

**Upon completion of Biology 446 students should be able to:**

1. Define plant disease.
2. List and describe or differentiate between abiotic and biotic causes of plant disease.
3. Distinguish between the terms pathogen and disease.
4. Distinguish between the terms signs and symptoms of disease.
5. Describe and give examples of obligate parasites, nonobligate parasites, facultative saprophytes, and facultative parasites.
6. List Koch's postulates, and for a given example of diseased tissue, describe how to apply them.
7. Describe the plant disease triangle, define its components, explain the influence of time and humans on each component, and describe management strategies used to break each of the legs of the triangle.
8. Define epidemic, list the factors that affect epidemics and describe how they do so, and differentiate between monocyclic and polycyclic diseases in terms of their likelihood in causing epidemics and their control.
9. List distinguishing characteristics, diagram and narrate life cycles, describe a specific example (including genus species, disease cycle, dissemination, infection, favorable conditions, signs and symptoms, host range, testing, and control methods) of plant pathogens from each of the following groups:
  - Bacteria
  - Mollicutes
  - Viruses
  - Fungal-like organisms
  - Ascomycetes and imperfect fungi
  - Rusts and Smuts
  - Nematodes
10. List and describe structural, non-inducible, and inducible plant defense mechanisms. At the molecular level explain the gene-for-gene model, the hypersensitive response, and systemic acquired resistance.
11. Describe some of the diagnostic tests that can be used to identify diseases caused by the groups of plant pathogens listed above.
12. Define the critical parameters used in disease forecasting for specific pathogens belonging to the groups listed above, visit and use websites providing local forecasting services.
13. Define IPM and provide an explanation of how each of the following may be employed in IPM; exclusion, cultural methods, biological methods, physical methods, chemical methods, host resistance, and resistance of pathogens to chemicals.
14. Carryout Koch's postulates in a laboratory setting.
15. Evaluate chemical company claims of enhanced resistance to viruses using their product.
16. Evaluate chemical company claims of enhanced resistance to bacterial pathogens through the activation of systemic acquired resistance by their product.