

# Course information for BIOL 421 Plant Microbe Interactions

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## Example Lecture Schedule (2014)

September 09 (W)	Course structure, Overview of plant microbe interactions, Introduction (JK)
September 11 (F)	Overview of plant microbe interactions (JK)
September 14 (M)	'The Modern Tool-kit for studying Plant-Microbe Interact.' (JK);
September 16 (W)	Beneficial Microbes: Biological nitrogen fixation, case study topics assigned (JK)
September 18 (F)	Rhizobium bacteria and nitrogen fixation (JK)
September 21 (M)	Rhizobium, continued (JK)
September 23 (W)	Mycorrhizal fungi (JK)
September 25 (F)	Mycorrhizal fungi (JK)
September 28 (M)	<i>Literature discussion #1</i> (JK)
September 30 (W)	Plant pathogens: Agrobacterium tumefaciens and crown gall disease (JK)
October 02 (F)	Agrobacterium, continued (JK)
October 05 (M)	Agrobacterium, continued (JK)
October 07 (W)	Bacterial pathogens – mechanisms of plant disease (JK)
October 09 (F)	Bacterial pathogens, continued (JK)
October 12 (M)	<i>Thanksgiving holiday</i>
October 14 (W)	Viruses (Guest expert, DR) (2 lectures - am and pm (pm =Wed. afternoon tutorial)
October 16 (F)	Viruses (Guest expert, DR)
October 19 (M)	<i>Literature discussion #2</i> (JK)
October 21 (W)	Bacterial pathogens, continued (JK)(am) <b>Midterm examination (pm)</b>
October 23 (F)	Bacterial pathogens, continued (JK)
October 26 (M)	<i>Literature discussion #3</i> (JK)
October 28 (W)	Fungal pathogens – mechanisms of plant disease (JK)
October 30 (F)	Fungal pathogens, continued (JK)
November 02 (M)	Fungal pathogens, continued (JK)
November 04 (W)	Fungal pathogens, continued (JK)
November 06 (F)	Fungal pathogens, continued (JK)
November 09 (M)	<i>Literature discussion #4</i> (JK)
November 11 (W)	<b>Remembrance Day</b>
November 13 (F)	Oomycete pathogens (JK)
November 16 (M)	Oomycete pathogens (JK)
November 18 (W)	Plant immunity (JK) <b>Case Study presentations (pm)</b>
November 20 (F)	Plant immunity (JK)
November 23 (M)	<i>Literature discussion #5</i> (JK)
November 25 (W)	Plant immunity (JK)
November 27 (F)	Plant immunity (JK) <b>Case Study presentations (pm)</b>
November 30 (M)	<i>Literature discussion #6</i> (JK)
December 02 (W)	Plant immunity (JK) <b>Case Study presentations (pm)</b>

December 04 (F)  
Date/time TBA

Plant immunity (JK)  
Final examination

Case Study presentations/Course review (JK)

## Course Information and Objectives

### Main Themes:

- Understand the biochemistry, biology, genetics and physiology of the best-studied plant-microbe interactions.
- Understand the impact of plant-microbe interactions on society (positive and negative)

### Objectives:

At the end of this course, students will be able to:

- distinguish between the different types of plant-microbe interactions
- explain the physiological and biochemical processes underlying the best characterized plant-microbe interactions
- recognize conserved processes among plant-microbe interactions
- analyze objectively the design and content of current research studies
- draw connections between the biology of plant-microbe relationships and the impacts of these relationships on the ecosystem and human society

### Why is this course interesting?

1. Plant pathogenic microbes are a global threat to food production and quality. The global population is expected to reach 9 billion by 2050: therefore agricultural yields must increase by 70-100% to feed these people.
2. Plant-Microbe interactions are essential for sustainable agriculture and beneficial microbes could be used to enhance production.
3. The interactions between microbes and plants provide fascinating examples of biological communication.
4. Plant – Microbe interactions are scientifically challenging to study and they therefore provide informative examples of experimental approaches in biological research.

## Course Evaluation – three components:

1. Examinations: Midterm (20%); Final (40%)	60%
2. Literature discussions	20%
3. Group presentation (case studies)	20%
	100%

### Midterm and Final Examination Formats

I. Definitions of key terms: One-sentence answers

II. Short Essays: One-paragraph answers

III. Long Essays: One-page answers

- Students will have options for which questions to answer
- The examinations are based on lecture, reading and discussion material (there is no textbook for the course)

### Literature discussions

Evaluation and discussion of current literature on research topics in Plant-Microbe Interactions.

A current research paper and a corresponding set of questions are provided one week in advance of the discussion period. Students will discuss the questions and present the answers during the discussion periods, and turn in their answers (essentially an open book quiz). The evaluation is based on the written answers and on participation.

### **Group presentations**

Students work in small groups (2-3 students) to research a topic illustrating the real world impact of plant-microbe interactions. The groups present their findings in a 15 “mini-lecture” at the end of the term.

### **Examples topics:**

1. Potato late blight – it’s back, and its not just an Irish problem
2. The blue stain fungi and the mountain pine beetle epidemic
3. ‘Black Sigatoka’: Yes, we may have no bananas!
4. ‘*Fusarium* head blight’: Plant pathology meets Genomics, and is there a link with ‘Roundup’?
5. ‘Chestnut blight’ and hypovirulence: can a virus save a tree?
6. BT corn - do we need to choose between butterflies and caterpillars?
7. *Crinipellis pernicioso*: what are we going to do without chocolate?
8. How can microbes help feed the world?
9. Is bioterrorism a threat to food safety?
10. Is Ug99 a time bomb for the world’s wheat crop?
11. Golden Rice and the prevention of vitamin deficiencies
12. Organic or not, that is the question?
13. What is the role of genetic modified crops in increasing the food supply?
14. Cassava and virus diseases – can biotechnology help feed Africa?

### **Evaluation of the oral presentations is based on:**

- quality and appropriateness of the (scientific) content
- effectiveness of the organization of the presentation
- clarity of oral communication
- participation and team work