



MICR*3220 Plant Microbiology

Fall 2020

Section(s): 01

School of Environmental Sciences

Credit Weight: 0.50

Version 1.00 - August 27, 2020

1 Course Details

1.1 Calendar Description

In this course the interaction between plants and microorganisms will be studied. Topics include molecular plant-microbe interactions, plant defenses, bacterial ice nucleation, interaction among plant microbes, root nodulation, mycorrhizae, wood decay, and decomposition of plant litter.

Pre-Requisites: BIOL*1070, BIOL*1090

1.2 Course Description

In this course, the interaction between plants and microorganisms will be studied. Topics include molecular plant-microbe interactions, plant defenses, bacterial ice nucleation, interactions among plant microbes, root nodulation, mycorrhizae and decomposition of plant litter.

1.3 Timetable

Lecture Mon, Wed, Friday
4:30 pm - 5:20 pm Alex 200

1.4 Final Exam

Thursday December 5, 8:30 - 10:30 AM
Location: TBD
Weight: 30%

2 Instructional Support

Instructor Name: Paul Goodwin
Instructor Email: pgoodwin@uoguelph.ca
Office location and office hours: Room 3239, Bovey Building, MWF, 2:30-3:30

Please arrange by email to contact me through Webex. I will answer all emails within 48 hrs. Grades will be given within 8 days of the exam by email. I will address all questions via Webex.

3 Learning Resources

The Powerpoint of images and text are only presented when lectures are given, they are not available electronically or in any other format.

Recommended Texts (example papers on reserve in library):

1. Plant Pathology, by G.N. Agrios [electronic resource]
2. Fortress Plant: how to survive when everything wants to eat you, by D Walters [electronic resource]
3. Plant Surface Microbiology, by A. Varma [electronic resource]
4. Plant Microbe Symbiosis: Fundamentals and Advances, by NK Arora [electronic resource]
5. Example paper for the review essay: The promotion of the mutualistic symbiosis between plants and fungi due to strigolactones [electronic resource]
6. Example paper for the review essay: Production of bacterial extracellular metabolites as a mechanism for suppression of early plant defense responses [electronic resource]

3.1 Required Resources

Lecture Content: (Readings)

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Memorize the ecological and evolutionary concepts underlying plant-microbe interactions.
2. Describe examples of interactions of microbes with different types of plant tissues.
3. Evaluate examples of plant-microbe interactions to recognize similarities and differences between the various types of interactions.
4. Evaluate examples of plant-microbe interactions to integrate the ecological, molecular, physiological and cellular aspects of plant-microbe interactions.
5. Recognize the historical impacts of plant-microbe interactions.
6. Apply the concepts and examples from the course to describe and evaluate a recent primary research article concerning an aspect of a plant-microbe interaction.

5 Teaching and Learning Activities

5.1 Lecture

Fri, Sep 7

Topics:

This course will use F2F for lectures.

Introduction
Types of microbes
Ecological and evolutionary concepts of plant microbiology
Phylloplane microbiology
Leaf and stem microbiology
Disease resistance
Root microbiology
Vascular tissue microbiology
Seed and fruit microbiology

Post-harvest microbiology
Conclusions

Class Schedule:

Friday, Sept. 11	First Class
Mon-Tue, Oct.12-13	Thanksgiving (no class)
Wednesday, Dec. 2	Last Regularly Scheduled Class
Friday, Dec. 4 (Monday schedule)	Reschedule of Thanksgiving

6 Assessments

6.1 Marking Schemes & Distributions

Additional Notes:

- A hard copy only to be submitted to the instructor in class or office (Bovey 3239) for Approval of Review Essay Topic and Review Essay by 5:00 of the stated due dates of assessment listed above. Grade for Approval of Review Essay Topic or Review Essay will be deducted by 10% per day for lateness up to the date of final course grade submission.
- Mid-term exams are taken during class periods in person.
- Essay questions are to be completed using full sentences and paragraphs.
- Exams will be reviewed in class.
- Students can email the instructor to arrange an in-person or Webex review of the correct exam answers from the grading key without potential re-grading of their exam. However, a request for a review of a student's own exam can result in an increase or decrease in the entire exam grade.

Approval of Review Essay Topic:

A hard copy of your review essay title and selected references is required to be submitted to the instructor by 5:00 on its due date of assessment for approval of your choice of topic and primary research article. The review essay topic approval included the title of the review essay which should be specific and directly related to the primary research article that is the focus of the review essay. Below the title on the same page, include the bibliographic information (authors, year, title, journal, volume, pages) of 5 selected pertinent references (but no more than 5) obtained from a computer search using AGRICOLA, CAB Abstracts, Life

Sciences Database, and/or other databases in the library. One of these 5 must be your primary research article that was published in the last 4 years, which should be marked at the beginning as “PRIMARY RESEARCH ARTICLE” and MUST include the abstract from that article. That article must be from the list of approved journals shown below. All references must be available in the University of Guelph Library. A “resubmit” mark indicates that changes are required for the topic to be approved, and a revised version must be submitted to the instructor within the following 7 days from when it is returned. All review essays must have an approved review essay topic.

Journals that can be used as the source of the primary research article about mechanisms of plant-microbe interactions are ONLY: Applied and Environmental Microbiology, bioRxiv, Cell, Current Biology, Environmental Microbiology, Frontiers in Microbiology, Frontiers in Plant Science, Fungal Biology, Journal of Bacteriology, Journal of Experimental Botany, Journal of Integrative Plant Biology, Journal of Virology, Molecular Ecology, Molecular Plant-Microbe Interactions, Microbiome, Molecular Plant Pathology, Nature, New Phytologist, Physiological and Molecular Plant Pathology, Plant Cell, Plant Cell and Environment, Plant and Cell Physiology, Plant Journal, Plant Physiology, Plant Science, PlosOne, PlosPathogens, Proceedings of the National Academy of Sciences USA, Science, Scientific Reports, Virology.

Review Essay:

A hard copy of your Review Essay is required to be submitted to the instructor by 5:00 of its due date of assessment via email. The Review Essay is a 6-8 page hard copy of double-spaced text (6-8 pages excludes the cover page, references), which reviews a topic related to a molecular or cellular mechanism of how plants and microorganisms interact (not disease management, not field studies, not infection cycles, not pathogen detection). The focus is a primary research article that must have been published in the last 4 years. A primary research article contains results/data. Primary research articles are the basis of all scientific knowledge in modern times, and the ability to read, analyze and place primary research articles in context is an important scientific skill. The review essay begins with an introduction directly related to the primary research article followed by the relevant background needed to understand the results of the primary research article. That is followed by at least one full page of a general description of the results/data in the primary research article, progressing from the first table or figure to the last one, along with the conclusions of the primary research article. Provide only enough of a general description of methods so that the results are understandable without details about the methods. The last part of the review essay is a description as to how the primary research article advances our understanding. Do not use any lecture notes or websites (other than e-journals) as reference material, and only minimal use (1-2 references at most) of textbooks. I would expect 12-24 references with the “PRIMARY RESEARCH ARTICLE” marked in the reference list as per the example essay paper on reserve in the library. Cover page, margins, type size and spacing must follow the example essay paper on reserve. No sub-headings or quotations allowed. No figures or tables are

allowed. Because there is a close link between thought and expression, the review essay will be graded for the quality of written expression as well as for content.

6.2 Assessment Details

mid-term exam (24%)

Date: Fri, Oct 9

Learning Outcome: 1, 2, 3, 4, 5

Approval of review essay topic (2%)

Date: Fri, Oct 16

Learning Outcome: 6

2nd Mid term exam (24%)

Date: Fri, Nov 6

Learning Outcome: 1, 2, 3, 4, 5

Review Essay (20%)

Date: Fri, Nov 20

Learning Outcome: 6

7 University Statements

7.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

7.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

7.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

7.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

7.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website

<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website

<https://www.ridgetownc.com/services/accessibilityservices.cfm>

7.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as

possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

7.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

7.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

7.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

7.10 Illness

The University will not require verification of illness (doctor's notes) for the fall 2020 or winter 2021 semesters.
