



PBIO*4530 Plants and Environmental Pollution

Winter 2019

Section(s): C01

School of Environmental Sciences

Credit Weight: 0.50

Version 1.00 - January 03, 2019

1 Course Details

1.1 Calendar Description

This course analyzes the environmental pollution effects on physiological and ecological processes of plants, in both managed and unmanaged ecosystems. Pollutants under study include contaminants of air (such as ozone, sulphur dioxide, NO_x) and soil (such as metals). This course also covers how to use plants to improve air (both indoor and outdoor), water and soil environment. The format includes both lecture and presentation/discussion of current and historical peer-reviewed literature.

Pre-Requisite(s): (1 of BIOL*2060, BOT*2100, ENVM*1200, ENVS*2040, ENVS*2330, PBIO*3110), CHEM*1040

1.2 Course Description

This course will use the ecological risk assessment framework to study the responses of plants to environmental contaminants, mainly pollutants found in air, soil and water. The curriculum will cover characterization of exposure and effects, as well as practical application of these concepts. This course will also discuss on how to use plants to improve air, water and soil environment qualities (i.e. phytoremediation).

1.3 Timetable

LEC Tues and Thur 11:30AM - 12:50PM, MCKN, Room 238

Timetable is subject to change. Please see WebAdvisor for the latest information.

1.4 Final Exam

08:30AM - 10:30AM (2019/04/11)

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructional Support Team

Instructor:	Youbin Zheng
Email:	yzheng@uoguelph.ca
Telephone:	+1-519-824-4120 x52741
Office:	ECBL 2220
Office Hours:	9:00-18:00 (Call or email to make an appointment)

3 Learning Resources

4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Characterize and describe 8-10 common environmental pollutants (e.g., ozone, SO₂, NO₂, NO, particulate, acid deposition, heavy metals), including their sources, chemical and physical characteristics, current and historical concentrations, and regional and global distributions.
2. Understand and describe how plants are exposed to, and the uptake paths of, common environmental pollutants in natural and man-made environments.
3. Identify and describe the responses (e.g., visible symptoms, growth and yield) of plants to 8-10 common environmental pollutants.
4. Understand the mechanisms of different plants (e.g., indoor and outdoor plants) in removing or degrading common environmental pollutants, and apply these mechanisms in green infrastructures (e.g., living walls, green roofs and constructed wetlands) for environmental quality improvement.
5. Demonstrate enhanced critical thinking skills through critiquing current scientific literature, evaluating other students' presentations and participating in lectures and in-class discussions.
6. Demonstrate enhanced communication skills (both oral and written) through written assignments and an in-class presentation (on a student-selected topic).
7. Exhibit improved professional and ethical behavior towards diverse scientific ideas and

academic opinions through presentations, group discussions and evaluating presentations by other students.

5 Teaching and Learning Activities

5.1 Lecture

Week 1

Topic(s): Introduction

Thu, Jan 10

Topic(s): Risk assessment framework. Introduce presentation topics and students start to form teams.

Tue, Jan 15

Topic(s): Intro to gaseous pollutants and plants. Decide who is going to work on what topic for presentation and written assignment.

Thu, Jan 17

Topic(s): Intro to gaseous pollutants and plants. Visit Bovey Greenhouses and labs.

Tue, Jan 22

Topic(s): Ozone effects on plants. How to write scientific paper/report.

Thu, Jan 24

Topic(s): Ozone effects on plants

Tue, Jan 29

Topic(s): NO_x effects on plants.

Thu, Jan 31

Topic(s): NO_x effects on plants.

Tue, Feb 5

Topic(s): SO₂ effects on plants.

Thu, Feb 7

Topic(s): SO₂ effects on plants.

Presentation 1 & 2 (P1, 2; 20-25 min each).

Tue, Feb 12

Topic(s): Particulate effect on plants/air pollution combination effects on plants.

P 3, 4.

Thu, Feb 14

Topic(s): How to use plants to improve air quality; Green infrastructure (e.g. green roof, living wall) and environmental remediation.

P 5, 6.

Tue, Feb 26

Topic(s): Living wall and indoor air quality (guest lecture).

Thu, Feb 28

Topic(s): Green infrastructure (e.g. green roof, living wall) and environmental remediation.

P 7, 8.

Tue, Mar 5

Topic(s): Intro to metal and plants, including methods for studying plant response to metal pollutants.

P9, 10.

Thu, Mar 7

Topic(s): Metal availability, uptake, transportation and accumulation; Guest lecture and visiting Dr. Hale's lab and Peter's analytical lab.

Tue, Mar 12

Topic(s): Intro to metal and plants, including methods for studying plant response to metal pollutants.

P11, 12

Thu, Mar 14

Topic(s): Metal availability, uptake, transportation and accumulation.

P13, 14.

Tue, Mar 19

Topic(s): Metal availability, uptake, transportation and accumulation.

P15, 16.

Thu, Mar 21

Topic(s): Metal availability, uptake, transportation and accumulation.

P17, 18.

Tue, Mar 26

Topic(s): Effects of metals on plants.

P19, 20.

Thu, Mar 28

Topic(s): Effects of metals on plants.

Tue, Apr 2

Topic(s): Environmental remediation

Thu, Apr 4

Topic(s): Wrap up.

6 Assessments

6.1 Assessment Details

Discussion & Participation (20%)

Learning Outcome(s): 1,2,3,4,5,6,7

Evaluation for other presenters due 12pm on the next day of each presentation.

Group Presentation (25%)

Learning Outcome(s): 1,2,3,4,5,6,7

Will be evaluated by fellow students as well.

Final paper (25%)

Date: Sun, Feb 17 - , 12:00 AM

Learning Outcome(s): 1,2,3,4,5,6,7

Please submit your paper in Microsoft Word format following the requirements as discussed in class.

Exam (30%)

Date: Thu, Apr 11, 8:30 AM - 10:30 AM, TBD

Learning Outcome(s): 1,2,3,4,5

7 Course Statements

7.1 Grading Policies

1. Submit your evaluations for other presenters in MS Word format in the Courselink Dropbox

before 12pm on the next day of each presentation.

2. Submit your paper in MS Word format in the Courselink Dropbox before 24:00 of Feb 17, 2019.

3. Late penalty for assignments is 20% per day. If you cannot hand in an assignment, etc. for a valid reason, please let the instructor know.

8 University Statements

8.1 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.

8.2 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>

8.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for course registration are available in the Undergraduate and Graduate 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>

8.4 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.

8.5 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.

More information can be found on the SAS website
<https://www.uoguelph.ca/sas>

8.6 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>

8.7 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.

8.8 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>
