



# **PBIO\*4530 Plants and Environmental Pollution**

Winter 2022

Section(s): 01

School of Environmental Sciences

Credit Weight: 0.50

Version 1.00 - December 20, 2021

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## **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<sub>x</sub>) 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-Requisites:** (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; Remote Delivery – Synchronous in the 1<sup>st</sup> two weeks. Thereafter will be decided according to the University's policy. If face-to-face is allowed, then the lectures will be delivered at MCLN, Room 101.

### **1.4 Final Exam**

TBD

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## 2 Instructional Support

### 2.1 Instructional Support Team

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

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## 3 Learning Resources

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## 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, SO<sub>2</sub>, NO<sub>2</sub>, 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.
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## 5 Teaching and Learning Activities

### 5.1 Lecture

**Topics:**

Lecture Content and tentative schedule:

Week	Date	Topic
1	Jan 11	Introduction
	Jan 13	Risk assessment framework. Introduce p topics and students start to form teams.
2	Jan 18	Intro to gaseous pollutants and plants. De group is going to work on what topic for p
	Jan 20	Intro to gaseous pollutants and plants. Oz
3	Jan 25	Ozone & plants.
	Jan 27	How to write & read scientific paper/repo in the exam(s).
4	Feb 1	NO <sub>x</sub> & plants.
	Feb 3	NO <sub>x</sub> & plants.
5	Feb 8	SO <sub>2</sub> & plants.

	Feb 10	SO <sub>2</sub> & plants. Discuss about presentation again.
6	Feb 21	Particulate & plants/air pollution combination of plants.
	Feb 24	Midterm Exam.
7	Mar 1	How to use plants to improve air quality; green infrastructure (e.g. green roof, living wall) for environmental remediation. P 1, 2. (P1, 2: presentation).
	Mar 3	Green infrastructure (e.g. green roof, living wall) for environmental remediation. P 3, 4.
8	Mar 8	Intro to metal and plants, including methods of plant response to metal pollutants. P5, 6.
	Mar 10	Intro to metal and plants, including methods of plant response to metal pollutants.  P7, 8.
9	Mar 15	Metal availability, uptake, transportation and accumulation. P9, 10
	Mar 17	Metal availability, uptake, transportation and accumulation. P11, 12.
10	Mar 22	Metal availability, uptake, transportation and accumulation.

		accumulation. P13, 14.
	Mar 24	Metal availability, uptake, transportation and accumulation. P15, 16.
11	Mar 29	Effects of metals on plants. P 17, 18.
	Mar 31	Effects of metals on plants. P19, P20
12	Apr 5	Environmental remediation
	Apr 7	Wrap up.

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## 6 Assessments

### 6.1 Assessment Details

#### Discussion & Engagement (10%)

**Learning Outcome:** 1, 2, 3, 4, 5, 6, 7

#### Group Presentation (30%)

**Learning Outcome:** 1, 2, 3, 4, 5, 6, 7

Will be evaluated by fellow students as well. **Submit presentation (PDF) no later than the next noon after the presentation**

#### Final paper (25%)

**Date:** Thu, Feb 24 - , 12:00 AM

**Learning Outcome:** 1, 2, 3, 4, 5, 6, 7

#### Exam (35%)

**Date:** TBD

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

Time TBD

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## 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>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

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

### 8.3 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>

## 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 make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

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>

## 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>

## 8.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

## 8.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).



## **8.11 Covid-19 Safety Protocols**

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.

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