

Course Outline Form: Winter 2026

General Information

Course Code: PBIO*4530

Course Title: Plants and Environmental Pollution

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).

Credit Weight: 0.5

Academic Department (or campus): School of Environmental Sciences

Campus: Guelph

Semester Offering: W26

Class Schedule and Location: LEC Tues and Thur 11:30AM - 12:50PM at MCKN 228.

Instructor Information

Instructor Name: Dr. Youbin Zheng

Instructor Email: yzheng@uoguelph.ca

Office hours: The best way to contact me is through email and we can schedule either a face-to-face meeting or a Zoom meetings as needed.

Course Content

Specific Learning Outcomes:

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

1. Characterize and describe 8-10 common environmental pollutants (e.g., ozone, SO₂, NO₂, NO, CO₂, 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 through in-class presentations and critiquing fellow students' presentations.
7. Exhibit improved professional and ethical behavior towards diverse scientific ideas and academic opinions through presentations, group discussions and evaluating presentations by other students.

Lecture Content and tentative schedule:

Week	Date	Topic
1	Jan 6	Introduction
	Jan 8	Risk assessment framework. Introduce presentation topics and students start to form teams.
2	Jan 13	Intro to gaseous pollutants and plants. Decide which group is going to work on what topic for presentation.
	Jan 15	Intro to gaseous pollutants and plants. Ozone & plants
3	Jan 20	Ozone & plants.
	Jan 22	Tour research facilities/research projects
4	Jan 27	NO _x & plants.
	Jan 29	How to write & read scientific paper/report.

5	Feb 3	SO ₂ & plants.
	Feb 5	SO ₂ & plants. Discuss about presentation evaluation again.
6	Feb 10	Particulate & plants/air pollution combination effects on plants.
	Feb 12	Midterm Exam.
7	Feb 24	How to use plants to improve air quality; Green infrastructure (e.g. green roof, living wall) and environmental remediation. P 1 (12 min each presentation).
	Feb 26	Green infrastructure (e.g. green roof, living wall) and environmental remediation. P 2, 3.
8	Mar 3	Intro to metal and plants, including methods for studying plant response to metal pollutants. P4, 5.
	Mar 5	Intro to metal and plants, including methods for studying plant response to metal pollutants. P6, 7
9	Mar 10	Metal availability, uptake, transportation and accumulation. P8, 9
	Mar 13	Metal availability, uptake, transportation and accumulation. P10, 11
10	Mar 17	Metal availability, uptake, transportation and accumulation. P12, 13
	Mar 19	Effects of metals on plants. P14, 15
11	Mar 24	Effects of metals on plants. P16, 17
	Mar 26	Environment remediation. P 18, 19
12	Mar 31	Environment remediation; wrap up. P20, 21.
	Apr 2	Last lecture.

Course Assignments and Tests:

Assignment or Test	Due Date	Contribution to Final Mark (%)	Learning Outcomes Assessed
Discussion & engagement		10	5, 6, 7
Presentation (group)	Submit presentation (PDF) no later than the next noon after the presentation	30	1, or 2, or 3 or 4, and 5, 6, 7
Midterm Exam	Feb 12 11:30-12:50	25	1, 2, 3, 4, 5
Final Exam	Time: April 18 11:30AM-1:30 PM	35	1, 2, 3, 4, 5

	Room TBA		
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Additional Notes (if required):

Course Resources

Required Texts:

There is no textbook for this course. Some readings will be posted.

Course Policies

Grading Policies:

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.

Course Policy on Group Work:

Group work is allowed for the group presentations, but the midterm and final exams have to be completed independently.

Standard Statements for Undergraduate Courses

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 discourages misconduct. 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. The Academic Misconduct Policy (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academicmisconduct/>) is outlined in the Undergraduate Calendar.

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 10 days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. ([https:// www.uoguelph.ca/sas/](https://www.uoguelph.ca/sas/)).

Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the Academic calendar for information on regulations and procedures for Academic Accommodations of Religious Obligations (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-accommodation-religious-obligations/>).

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.

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 undergraduate students 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 the Undergraduate Calendar - Dropping Courses (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulationsprocedures/dropping-courses/>).

Email Communication

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

Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (<https://wellness.uoguelph.ca/>). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (<https://wellness.uoguelph.ca/navigators/>) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources

(<https://wellness.uoguelph.ca/shine-this-year/>). The Student Wellness team are here to help and welcome the opportunity to connect with you.

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).

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.

Resources

The Academic Calendars (<http://www.uoguelph.ca/registrar/calendars/?index>) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

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. See the Undergraduate Calendar for information on regulations and procedures for Academic Consideration. (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulationsprocedures/academic-consideration-appeals-petitions/>)