

Course Outline Form: Winter 2026

General Information

Course Code: ENVS*4070

Course Title: Pollinator Conservation

Course Description:

This course students will explore the ecology of pollination with an emphasis on the roles animals play in pollen movement. Students will critically examine hypothesized drivers of regional, national and global pollinator declines, and the range of potential strategies suggested to mitigate or reverse these declines. Students will examine the efficacy of a wide range of pollinator conservation strategies in different geographical, ecological and economic contexts to help them build an understanding of the available toolbox for conservation.

Credit Weight: 0.50

Academic Department (or campus): School of Environmental Sciences

Campus: Guelph

Semester Offering: W26

Class Schedule and Location: Monday & Wednesday, 1430-1550, MCKN (Mackinnon) room 229

Instructor Information

Instructor Name: Professor Nigel Raine

Instructor Email: nraine@uoguelph.ca

Instructor Phone and Extension: 519 824-4120 ext. 52103

Pronouns: he/him/his

Office location and office hours: EC Bovey Building, Room 2227. Office hours by appointment (please e-mail in advance to determine a mutually convenient meeting time).

GTA Information

GTA Name: Samantha Reynolds

GTA Email: sreyno08@uoguelph.ca

GTA office location and office hours: please contact by email.

Course Content

Specific Learning Outcomes:

<i>Course Learning Outcomes</i>	<i>Major/Specialization Learning Outcomes</i>	<i>U of G Undergraduate Learning Outcomes</i>
1. Define and describe the process of pollination, its importance for plant reproduction, the maintenance of wild plant biodiversity and crop production.	1	<i>Critical & Creative Thinking Literacy</i>
2. Describe using correct taxonomic names the diversity of flower visiting animals and pollinators, and how their behaviour and ecology influence floral traits and plant ecology.	1, 8	<i>Critical & Creative Thinking Literacy Communication</i>
3. Explain how interspecific interactions can affect the structure of plant-pollinator communities through processes such as competition, facilitation and mutualism.	1, 6, 7	<i>Critical & Creative Thinking Literacy Communication</i>
4. Describe the evidence suggesting pollinator declines around the world, and analyze the shortcomings of these data sets and hence our ability to predict future trends.	2, 5, 7	<i>Critical & Creative Thinking Literacy Communication</i>
5. Explain how the key hypothesized drivers of declines could be affecting pollinator populations, and how these drivers might interact. Evaluate how the relative importance of drivers of decline might differ among key pollinator taxa.	2, 3, 5, 9, 10	<i>Critical & Creative Thinking Global Understanding Professional & Ethical Behaviour</i>
6. Explain how environmental risks to pollinators are currently assessed and reported, and how these processes might be improved in future using current scientific literature.	2, 4, 8	<i>Critical & Creative Thinking Global Understanding Professional & Ethical Behaviour</i>
7. Discuss the efficacy, and analyze the cost effectiveness, of pollinator conservation strategies around the world. Describe how the success of such schemes might be enhanced in the future.	3, 4, 7, 10	<i>Critical & Creative Thinking Global Understanding Communication Professional & Ethical Behaviour</i>
8. Explain, with specific examples, how policy engagement at regional, national and international levels can have positive (and negative impacts) on pollinator conservation.	3, 4, 7, 10	<i>Critical & Creative Thinking Global Understanding Communication Professional & Ethical Behaviour</i>

Lecture Content:

Topic 1: What is pollination, and why is it important for plant reproduction, maintenance of wild plant biodiversity and crop production?

Topic 2. Survey the diversity of pollinators, ranging from specialist to generalist, and introduce pollination syndromes and functional guilds.

Topic 3. Pollinator behaviour – how foraging behaviour influences pollen transfer.

Topic 4. Plant-pollinator communities, competition for pollination, facilitation and pollination networks.

Topic 5. The evidence supporting global pollinator declines, and overview of the drivers of declines.

Topic 6. Land use change and agricultural intensification as drivers of pollinator declines.

Topic 7. Parasites, pathogens and invasive species as drivers of pollinator declines.

Topic 8. Climate change and interacting impacts of multiple drivers of pollinator declines.

Topic 9. How are environmental risks to pollinators currently assessed and reported, and how might these be improved?

Topic 10. Assessing the efficacy and cost effectiveness of pollinator conservation strategies around the world: how can the success of such schemes be enhanced?

Topic 11. How can policy engagement at regional, national and international levels effect positive change for pollinator conservation?

Labs: not applicable

Seminars: not applicable

Course Assignments and Tests:

Assignment or Test	Due Date	Contribution to Final Mark (%)	Learning Outcomes Assessed
Midterm exam	23 February (in class)	25	1,2,3,4,5
Pollinator conservation management plan (written coursework)	16 March	35	3,4,5,7
Oral presentation (group project)	Weeks 6-11 (in class)	15	7,8
Final exam	10 April, venue tbc	25	5,6,7,8

Final examination date and time: 10th April, 0830

Final exam weighting: 25%

Course Resources

Required Texts: None (but see other resources).

Recommended Texts:

Dicks, L. V., D. A. Showler and W. J. Sutherland (2010). Bee Conservation: Evidence for the Effects of Interventions. Pelagic Publishing. ISBN 978-1-907807-00-8

Mader, E., M. Shepherd, M. Vaughan, S. H. Black and G. LeBuhn (2011). Attracting Native Pollinators: the Xerces Society Guide. Storey Publishing. ISBN 978-1-60342-695-4

Mader, E., J. Hopwood, L. Morandin, M. Vaughan and S. H. Black (2014). Farming with Native Beneficial Insects: the Xerces Society Guide. Storey Publishing. ISBN 978-1-61212-283-0

Waser, N. and J. Ollerton (2006). Plant-Pollinator Interactions: from Specialization to Generalization. University of Chicago Press. ISBN 978-0226874005

Willmer, P. (2011). Pollination and Floral Ecology. Princeton University Press. ISBN 978-0691128610

Wilson, J. S. and O. M. Carril (2016). The Bees in your Backyard: a Guide to North America's Bees. Princeton University Press. ISBN 978-0-691-16077-1

Lab Manual: not applicable

Other Resources: The course content will draw heavily on peer-reviewed and grey literature sources. Where these are used full citation information will be provided to allow students to access these sources.

No textbook is required reading, but recommended texts contain information highly relevant to the course and related topics.

Field Trips: Not applicable

Additional Costs:

Course Policies

Grading Policies:

Midterm Examination: Make-up exams for a missed midterm examination will only be granted for medical reasons, documented by a Doctor's note. If you are unwell and unable to sit a midterm examination, you are expected to promptly contact the Instructor as soon as possible regarding the missed exam. An alternate exam time will be established between the Instructor and student, as soon as possible after the original midterm date. If a midterm exam is missed for a non-medical reason (other than for approved reasons at the discretion of the Instructor), the student will receive a grade of 0 for the missed examination.

Pollinator Conservation Management Plan: Each student will research and write a conservation management plan for pollinators. This is an individual assignment meaning that group work is not permitted.

Late assignments will be penalized 10% per day and will no longer be accepted a week after the due date. If you cannot meet a course requirement, let Prof. Raine (nraine@uoguelph.ca) know as soon as possible, and preferably before the due date. Extensions will only be granted for medical reasons or for documented compassionate reasons, at the discretion of the Instructor.

Keep paper and/or other reliable electronic back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time. The teaching team reserves the right to request an oral re-examination of any assignments submitted for this course in the case of mark disputes.

Group project – oral presentation: Each group member will receive the same mark for the academic quality component of the group presentation, but will be evaluated individually for enunciation, pace, ability to convey scientific information and ability to answer questions. Presentations will be assessed by the course instructor and peer evaluation from the audience.

Attendance at oral presentations is mandatory. A 10% deduction from the group project oral presentation grade will be deducted if you do not attend.

Peer Evaluation - each student will complete a performance evaluation for themselves and for their project partners at the end of the semester in order to encourage equal participation of each group member, and to help ensure that each individual's group project oral presentation mark is a realistic reflection of actual participation and effort. The Peer Evaluation is a quantitative assessment of each person's abilities, participation and contribution to the group and to the process of constructing the research program schematic, group paper and presentation. Peer Evaluations must be honest and fair, and be accompanied by comments to justify the assessment of each individual. The Peer Evaluation will be used at the Instructor's discretion to modify the grade (up to $\pm 10\%$ of the worth of the assignment) of any individual based on their level of contribution and participation in all aspects of the group project. A deduction of 10% will be applied to the group project oral presentation mark of any student that fails to submit evaluations for both themselves and their group members.

Course Policy on Group Work:

Group work is required only for the group project, which includes group meetings, preparation of group contract and an oral presentation. All group members are expected to participate and contribute equally to the research and oral presentation. Group participation will be evaluated through group peer evaluation. In addition you will be required to peer evaluate presentations made by other groups. All group members are expected to behave professionally and ethically in all group activities. All members of the group are responsible for all content and aspects of the presentation, and may be held responsible for any instances of academic misconduct in group assignments.

Requests for deadline extensions or other considerations:

If you require an extension for a medical or otherwise legitimate and approved reason, you are to contact the Instructor prior to the deadline. All requests made after the deadline will not be considered.

You are expected to save backed up versions of your work (drop box or Google Drive work very well and if you need help in learning how to use these contact course instructors). All requests for consideration made due to a crashing computer (or similar) will not be considered.

You are expected to submit the correct version of your assignments. All requests to resubmit an updated version will not be considered.

You are expected to ensure that your assignments have been correctly uploaded and verified by the Courselink drop box system. All requests to resubmit due to a failure to verify will not be considered.

If you are Varsity athlete, or have similar travel commitments during semester, please contact the instructor to discuss implications with regards to missing teaching sessions and concerns around exam and assessment deadlines at least two weeks prior to the event.

Students with young children:

Parental and student responsibilities sometime coincide. That's normal. You are welcome to bring your child/ren to class if your usual arrangements have temporarily fallen through. If you are nursing an infant, you are welcome to attend all classes with that infant. If you are caring for an infant so young that childcare is not possible, you are welcome to bring that infant to all classes.

If you are unable to make arrangement for child care and anticipate having to bring your child/ren to every class, please discuss this situation with the instructor.

In all cases, we ask that you sit at the end of a row of seating, closer to a door so that your departure or arrival does not interfere with others' learning.

University Policies

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.

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>

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>

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. The teaching team reserves the right to request an oral re-examination of any assignments submitted for this course in the case of mark disputes.

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>

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-misconduct.shtml>

Graduate Calendar - Academic Misconduct

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

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 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>

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.

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).

Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

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

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