

Biology 3425G Course Outline

Global Change Biology

Winter Term 2026

1. Course Information

Course Information

Delivery: Class for Biology 3425G in the Winter Term 2026 will include a 50-minute lecture followed by questions on the lecture material. In three of the classes there will be a quiz during class. These quizzes will follow the lecture after a short break. In the remaining classes the lecture will be followed by a short break, after which we will reconvene after for ~50 minutes of small group discussions, followed by another short break, and then a ~50-minute whole class discussion. Discussion topics will mostly be related to the weekly readings and each week's lecture notes (see tentative calendar). In person attendance is required during class time.

List of Prerequisites

[Biology 2290F/G](#); [Biology 2483A/B](#); [Biology 2601A/B](#). Unless you have either the requisites for this course or written special permission from your Dean or Dean's Designate (Department/Program Counsellors and Science Academic Counselling) to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees if you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Instructor: Dr. Natasha MacBean (she/her/hers)	nmacbean@uwo.ca	-	-	-
TA: Mr Liam Bogucki (he/him/his)	lboguck@uwo.ca	-	-	-

Office hours will take place in person or via Zoom. **Please contact Dr. MacBean or Mr Bogucki via email in advance to arrange a specific time for the meeting and you will receive a zoom link or a time to meet in person.** Students can also use the Forum on Brightspace to pose questions and discuss topics amongst themselves. Students must use their Western (@uwo.ca) email addresses when contacting their instructors. Please email Dr. MacBean and Mr Bogucki with all other queries via their Western emails. Emails will be monitored daily; **students will receive a response in 24 – 48 hours.**

3. Course Syllabus, Schedule, Delivery Mode

This course will investigate concepts and issues associated with the response of organisms, communities and ecosystems to global-scale changes in the environment. Topics covered will include changes in atmospheric CO₂ concentration, global warming, changes to the nitrogen cycle, and invasive species biology.

Learning Outcomes: From lecture materials and readings, students will be able to describe:

- the impact of atmospheric CO₂ on the global carbon cycle
- the physiological effects of rising atmospheric CO₂ on biological systems
- how warming affects organisms and ecosystem processes (like heterotrophic respiration)
- what land use change is and why it is occurring
- how land use change impacts organisms
- the nitrogen cycle and how eutrophication affects organisms and ecosystems
- what an invasive species is and how they impact communities
- how biodiversity loss impacts the functioning of communities
- how global change factors interact with each other

In addition, students will be able to critically examine the peer-reviewed research literature and develop their scientific research skills in order to assess: a) critically assess whether past studies are cited correctly; b) identify gaps in existing research; c) how to perform a literature review; and d) how to formulate hypotheses and/or research questions that extend existing research.

Classes begin: January 5, 2026

Reading Week: February 14-22, 2026

Classes end: April 9, 2026

TENTATIVE CALENDAR Winter 2026: Students will be informed in advance of any upcoming changes.

Week	Dates	Topic	Weekly Reading	Discussion/Quiz
1	Jan 9	Introduction, global change, past and future	Sage (2019)	In-class discussion
2	Jan 16	Elevated CO ₂ – the carbon cycle and effects on organisms	Walker et al. (2020) and Norby et al. (2025)	In-class discussion (graded)
3	Jan 23	Elevated CO ₂ – effects on communities and ecosystems	Reich et al. (2018)	Paper citation discussion
4	Jan 30	Global warming – causes and effects on organisms	-	1st Quiz
5	Feb 6	Global warming – effects on higher ecological scales	Hajek and Knapp (2021) and Green (2024)	In-class discussion (graded)
6	Feb 13	Land use change – patterns and drivers <i>Midterm (Critical Citation Assessment) due on February 13 by 11:55pm</i>	Erb et al. (2018) and Lawrence et al. (2022)	In-class discussion (graded)
	Feb 20	<i>Reading Week – No Class</i>		
7	Feb 27	Land use change – effects on organisms	-	2nd Quiz
8	Mar 6	Eutrophication – the nitrogen cycle and effects on plants, communities, and ecosystems	Stevens et al. (2018) and Feng et al. (2024)	In-class discussion (graded)
9	Mar 13	Invasive species – definitions and patterns	Walker et al. (2022) and Braasch et al. (2025)	In-class discussion (graded)
10	Mar 20	Biodiversity loss	Keck et al. (2025) and Isbell et al. (2017)	In-class discussion (graded)
11	Mar 27	Multi-factor global climate and environmental change	-	3rd Quiz
12	Apr 3	<i>Good Friday Holiday – No Class</i>		

Contingency Plan: This course will be delivered in-person, however in the unlikely event of any university-declared emergency, some or all of this course may be required to be delivered online, either synchronously or asynchronously. *The grading scheme will not change.* Any assessments affected will be conducted online as determined by the professor.

4. Course Materials

Readings: Readings will be assigned from the primary literature and will be posted to the Brightspace course site. You are expected to have read the assigned paper(s) and considered the main topics for a given week ***prior*** to coming to class, in order to complete the weekly reading assignment, and to be able

to follow the material and contribute to discussions. Discussion participation is a significant component of the grade, and attendance is mandatory.

Required equipment: Laptop or computer for assignments and stable internet connection for access to Brightspace.

Website: All course material will be posted to OWL: <https://westernu.brightspace.com/>

Students are responsible for checking the course OWL site (<https://westernu.brightspace.com/>) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Your marks will be regularly updated under 'Grades' in the Brightspace course site. You may query any apparent inconsistencies between what you thought you received and what is on Brightspace. When assessing these marks, keep in mind you will not have marks for things that have not yet been marked.

Personal Response Systems ("Clickers") are not used in this course.

5. Methods of Evaluation

Course assessment: The overall course grade will be calculated as listed below (*with due dates for major assignments):

15% Class Participation (see below for details)
20% Weekly Readings (7; see below for details)
15% Quizzes (3; see below for details)
20% Midterm Critical Citation Assessment (see below for details; *due Friday, February 13)
30% Term paper (see below for details; *due Thursday, April 9)

Please read the sections on university and course policies below.

Your final grade for the course will be calculated as the sum of your marks for each of the components. This mark will then be rounded to the nearest integer. No marks will be awarded for arbitrary reasons, and there will be no after-the-fact changes (e.g., of 69 to 70%).

- Written assignments will be submitted to Turnitin (statement in policies below).
- Students will have 2 submissions to Turnitin (Midterm Critical Citation Assessment and Term Paper).
- **After an assessment is returned, students should wait 24 hours to digest feedback before emailing Dr. MacBean or the TA.**

Class Participation: 15% of the course grade will reflect attendance every week as well as meaningful participation in graded discussions (see Tentative Calendar). Your participation in the discussion section

is essential for your own development as a scientist and leader, and all students are expected to contribute on a weekly basis. During discussion sections, electronic devices are only permitted if they are being used to look up information that is pertinent to the discussion, or to take notes.

The Class Participation grade will be broken down into four parts:

1. **Attendance (5%)** – attendance is mandatory for every class. For more information, see course policies on attendance and missed classes below.
2. **Group discussion participation (4%)**: all groups will be evaluated in six graded in-class discussions based on the level of their discussion, inclusiveness of all members of the group, and how thoroughly they discuss the question/discussion topic.
3. **Group discussion spokesperson report back (3%)**: Each student will report back on their group's graded discussion session **once during the term** (students will organise themselves to take it in turns to do this each week we have graded discussions). The grade will be based on the clarity, completeness, and conciseness of their report back. The spokesperson will work with another student in the group who will be the official note taker for that week to come up with a summary of the group's discussion. No submission is needed for this assignment. Report backs will be given a mark of 0 (no report), 1 (report given, but lacking clarity or detail), 2 (adequate), or 3 (good), depending on the level of detail and clarity of the notes. Grades will be uploaded to Brightspace for all students at the end of the semester.
4. **Group discussion note-taker report (3%)**: Each student will be the official "note taker" for their group's discussion session **once during the term** (students will organise themselves to take it in turns to do this each week that we have graded discussions). The note-taker will work with another student in the group who will be the official "spokesperson" for the group for that week to come up with a summary of the group's discussion to present to the rest of the class. The note taker will upload their notes in a word or pdf file for this assignment by the end of each class. A 10% per day late policy will be applied. Note taker reports will be given a mark of 0 (no report submitted), 1 (report submitted, but insufficient detail), 2 (adequate) or 3 (good), depending on the level of detail and clarity of the notes. Grades will be uploaded to Brightspace for all students at the end of the semester.

Weekly Readings: Students will have two papers assigned in 7 weeks of the course (pdfs posted on Brightspace) (except for week 3 where only 1 paper is assigned – see Tentative Calendar). In these 7 weeks, a weekly reading assignment will be due before class. In these weekly reading assignments, each student will submit a short answer response regarding the week's reading material. The short response will either be to answer questions on the content of the weekly readings, or to provide a detailed description of one thing you have learned and one question you have about each of the papers. See the weekly reading assignments each week for questions and marks. The cumulative score for the weekly reading submissions at the end of class will make up 20% of your final mark. The lowest grade for the weekly reading submissions will be dropped.

Quizzes: Three mandatory in-class quizzes will be set for this course to test students' comprehension of foundational concepts taught in the course. The quizzes will take place after the 50-minute lecture followed by a 10-minute break. Each quiz will cover the material taught prior to that quiz and after the previous quiz (or the start of semester). Students will have 1 hour to complete the in-class quiz. The quizzes will cumulatively account for 15% of the course grade.

Midterm Critical Citation Assessment: For 20% of the course grade, students will read an assigned paper on a current global change biology topic and then complete a critical assessment of whether three peer reviewed articles (out of six provided) have correctly or poorly/incorrectly cited the assigned paper (and why). The goal here is to learn how to correctly identify: a) how, and for what, peer-reviewed

journal articles cite past studies; and b) how past studies can be poorly or incorrectly cited. The assigned paper, six papers that have cited the assigned paper, and a word template with sections to complete (with word counts) for the critical citation assessment will be provided on the OWL Brightspace site. This assignment will be open from the start of the 2nd class, and the assessment (completed word document) must be submitted on-line through the OWL Brightspace site, via turnitin.com, by 11:55 pm on **Friday 13th February**. A policy for use of Generative AI will be included with the assignment.

Term Paper: For 30% of the course grade, you are to write a term paper summarizing and critically reviewing a journal article on a specific topic related to “*the impact of changing precipitation on terrestrial ecosystems*”. The chosen journal article should be from the primary literature (e.g., a research article). Example articles will be given in class, in addition to tips on how to perform a literature review and search for the journal article you choose. The paper should be between 2500-3000 words, not including references or figures, with single-spaced or 1.15 spaced text, 12-point Calibri font, and 1-inch margins. A rubric for the term paper, together with the policy for the use of Generative AI, will be provided with the term paper assignment. The paper must be submitted on-line through the OWL Brightspace site, via turnitin.com, by 11:55 pm on **Thursday 9th April**. The Term Paper assignment will be open from the start of the 2nd class.

Click [here](#) for a detailed and comprehensive set of policies and regulations concerning examinations and grading. The list below outlines the University- wide grade descriptors.

A+	90-100	One could scarcely expect better from a student at this level
A	80-89	Superior work which is clearly above average
B	70-79	Good work, meeting all requirements, and eminently satisfactory
C	60-69	Competent work, meeting requirements
D	50-59	Fair work, minimally acceptable
F	below 50	Fail

NOTE: Students must get a passing grade (D or above/50+) on the Midterm Critical Citation Assessment and Term Paper to satisfy the Senate requirement that students must demonstrate “some minimal competence in essay writing” in order to pass this essay course. (Please see following sections for late work and student absence policies for these two components of the course).

6. Student Absences and Missed/Late Evaluations

6.1 General information about missed coursework and academic consideration

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs*, posted on the Academic Calendar: https://uwo.ca/univsec//pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](#).

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:

https://registrar.uwo.ca/academics/academic_considerations/

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. **However, the following assessments are excluded from this and, therefore, always require formal supporting documentation:**

- **Quizzes**

Missed quizzes will receive a grade of 0 unless academic consideration has been approved. If academic consideration is approved, the other quiz grades will be re-weighted such that the total value of quizzes remains 15% of the final grade (if all 3 quizzes are missed, the remaining marks for missed quizzes will be re-weighted to the final term paper). It is not possible to attend a make-up quiz.

When a student mistakenly submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

6.2 Attendance and Class Participation

- **Attendance in class is mandatory, and class participation is a significant component of your final grade** (see Section 5). Attendance will be taken each week, and grades for participation in group discussion (and attendance) will be given each week (although the final class participation grade will only be submitted to OWL Brightspace site at the end of the semester).
- Students can self-report to Dr. MacBean if they are going to miss class due to medical, compassionate or extenuating circumstances for up to 3 weeks without providing supporting documentation. However, if students miss class or any assessment due to illness or another serious circumstance for **more than 3 weeks, they will be required to provide supporting documentation or obtain an academic consideration** (see Section 6.1).

6.3 Academic Consideration for Course Components with a Deadline with a No-Late-Penalty Period

This course employs **deadlines with a no-late penalty period for the Weekly Reading Assignments, Midterm Critical Citation Assessment, and the Term Paper**. The assignment deadlines can be found above in the course outline. Students are expected to submit each of the assignments by the deadline listed. Should extenuating circumstances arise, students do not need to request Academic Consideration,

and they are permitted to submit their assignment **up to 48 hours past the deadline without a late penalty**. Should students submit their assessment beyond 48 hours past the deadline, a late penalty of 10% per day will be applied. Academic Consideration requests may be granted only for extenuating circumstances that started before the deadline and lasted longer than the No-Late-Penalty Period (48 hours) and will require supporting documentation for the Midterm Critical Citation Assessment and Term Paper.

7. Additional Statements

7.1 Religious Accommodation

When a recognized religious holiday or observance conflicts with an examination, test, or other scheduled academic obligation, students must request accommodation via the University's Student Absence Portal (SAP). This request should identify the conflict and specify which course component(s) (e.g. test, midterm, exam) are affected.

Students are encouraged to submit the SAP request as early as possible, but no later than two weeks before any examination, or one week before any mid-term test or quiz, to allow sufficient time for adjustment.

The SAP request serves as official notification to both the course instructor and the Academic Advising Office, in accordance with University policy:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

The Faculty of Science considers religious accommodations as scheduling conflicts. Instructors should provide either a make-up exam or an earlier sitting of the same exam to accommodate the student.

For more information on recognized religious holidays, please visit the Diversity Calendar posted on the Equity, Diversity & Inclusion website - <https://www.edi.uwo.ca>

7.2 Academic Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf.

7.3 General Academic Policies

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

Use of @uwo.ca email: In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf, the centrally administered e-mail account provided to students will be considered the individual's official university email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

Requests for Relief (formally known as "appeals")

Policy on Request for Relief from Academic Decision:

https://uwo.ca/univsec//pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf

Procedures on Request for Relief from Academic Decision (Undergraduate):
https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf

7.4 Scholastic Offences

Policy on Scholastic Offences:

https://uwo.ca/univsec//pdf/academic_policies/appeals/scholastic_offences.pdf

Procedures on Scholastic Offences (Undergraduate):

https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf

Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the possession of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, and wireless earbuds or headphones.

Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at your desk, on your person, or within reach during an assessment will be treated as a *scholastic offence*, even if the device is not in use.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is your responsibility to review and comply with these expectations.

Use of Generative AI Tools

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is **not permitted** in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations.

Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a **scholastic offence**.

If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is prohibited. It is your responsibility to seek clarification before using any AI tools in academic work.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

In the event of a health lockdown quizzes in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remote-proctoring.uwo.ca>. Use of online proctoring for in-person courses will be upon approval from the Dean's Office.

7.5 Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, requests for relief, exam conflicts, and many other academic-related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced GBSV (either recently or in the past), you will find information about support services for survivors, including emergency contacts, at:

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. If you have any questions regarding accommodations, you may also wish to contact Accessible Education at http://academicsupport.uwo.ca/accessible_education/index.html

Learning-skills counsellors at Learning Development and Success (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.

8. Land acknowledgement

We acknowledge that Western University is located on the traditional lands of the Anishinaabek, Haudenosaunee, Lūnaapéewak and Attawandaron peoples, on lands connected with the London Township and Sombra Treaties of 1796 and the Dish with One Spoon Covenant Wampum.

This land continues to be home to diverse Indigenous peoples (First Nations, Métis and Inuit) whom we recognize as contemporary stewards of the land and vital contributors of our society. Throughout Canada, North America, and the world, Indigenous Peoples are vital contributors to their communities, and we greatly value their presence, knowledge, and wisdom.

With this, we respect the longstanding relationships that Indigenous Nations have to this land, as they are the original caretakers. We acknowledge historical and ongoing injustices that Indigenous Peoples endure in Canada, and we accept responsibility as a public institution to contribute toward revealing and correcting miseducation as well as renewing respectful relationships with Indigenous communities through our teaching, research and community service.