GEOGRAPHY 9105B Course Outline
Environmental Modelling
Winter Term 2025

1. Course Information

Course Information
Delivery: Class for GEOG 9105B will follow a lecture and lab format. The first class each week will be a 50-minute lecture followed by questions on the lecture material. We will reconvene after a brief break for ~50 minutes of small and whole group discussions and journal club presentations. Discussion topics will be presented with each week's lecture notes and will be based on the lecture and/or readings for that week. The 2nd class each week will be a practical/lab-based class in which students will work on individual assignments.

List of Anti- and Prerequisites
Antirequisite(s): Geography 3902A/B if taken in Winter 2023.
Prerequisite(s): At least 3rd year standing in a Geography & Environment, Biology, Environmental Science, or Earth Sciences program. Prerequisite checking is the student's responsibility. Senate Regulations state, "unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will 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 in the event that you are dropped from a course for failing to have the necessary prerequisites."

2. Instructor Information

Instructors	Email	Office	Phone
Instructor: Dr. Natasha MacBean (she/her/hers)	nmacbean@uwo.ca	SSC 2412	519-661-2111 x 85008

Office hours will take place in person or via Zoom. Please contact Dr. MacBean via email in advance to arrange a specific time for the meeting. Students can also use the Forum on OWL to pose questions and discuss topics amongst themselves. Students must use their Western (@uwo.ca) email addresses when contacting Dr. MacBean. **Please put GEO 9105 in the email subject line.** Emails will be monitored daily; students will receive a response in 24 – 48 hours.

3. Course Objectives, Format, and Schedule

This course introduces students to broad concepts of environmental modelling. We will learn about the main components of land surface/terrestrial ecosystem models and their role in climate change projections. These components include vegetation, carbon, hydrology and energy cycles, and how agriculture, land use change and land management impact ecosystem processes.

Course Objectives

This course introduces students to environmental modelling from the perspective of terrestrial ecosystem models (TEMs). Students must have at least 3rd year standing in a Geography & Environment, Biology, Environmental Science, or Earth Sciences program. It is recommended that students have completed a course in physical geography, climate change, climatology, hydrology, biogeochemistry, biophysics, ecology, biogeography, or another related field.

TEMs – otherwise known as terrestrial biosphere models, land surface models, or dynamic vegetation models – typically form the land component of global scale earth system models (ESMs) that are used in Intergovernmental Panel on Climate Change (IPCC) climate change projections to model earth system responses to global environmental change. These models include short and long-term vegetation dynamics (phenology, species composition change), biogeochemical (carbon and nutrients), hydrology and energy cycles, as well as processes that impact ecosystems, such as disturbance, land use change and land management. We cover the foundations of these topics and learn how to encode the mathematical representation of these processes into computational models. The individual model components link together a wide variety of environmental modeling concepts and disciplines, including from the ecological, forest gap, carbon, vegetation demographic, catchment hydrology, and land use change modeling communities. Students therefore learn about a variety of different models used to study climate and environmental change impacts on the terrestrial biosphere at scales from ecosystems to the globe.

In lab exercises throughout the course, students will learn how knowledge of environmental, biogeochemical, and biophysical processes are translated into computational code used to run the models over long time periods and large spatial areas. Students will learn how to code a simple carbon cycle model, starting from the initial concept, through the equations, then the algorithm needed to implement the model, and finally writing the code (in Python). Students will then use this model to run experiments to understand how models work, and to learn how we use models to test scientific questions about ecosystem and environmental processes and their response to climate change. Some experience in computer programming would be helpful for the lab component of this course but is not necessary.

We will also learn about the history of TEM development (particularly within the context of climate change modeling), the challenges of developing models, the processes still missing in these models, and about quantifying and reducing model uncertainty via model-data integration. Students will also focus in depth on one specific component of environmental modelling that is pertinent to their interests, future research, and/or career goals via specific paper discussions and a final term paper.
This course should be useful for anyone interested in any aspect of how the terrestrial biosphere is responding to climate change and land use change/management. Understanding how TEMs work should equip students with the knowledge needed to better assess modelling studies that contribute to future climate change projections.

Course Format

Lecture (2 hours per week): Topics will be taught via lectures and paper discussions (typically ~50 hours for lecture, followed by a break, and ~40 minutes for questions and discussion about the readings for that week). In between the lecture and readings discussions, each graduate student will take turns to present a recent paper utilizing TEMs from the peer reviewed literature (~10 minutes).

Labs (2 hours per week): Labs are designed to teach students the practicalities of building, running, and using environmental models. The main part of the lab exercises will be focused on building, testing, and optimizing a simple carbon cycle model using computational programming code. Students will also be taught some foundational skills in Python programming in Google Colab in order to develop the scripts needed to build this model. Students must come to the lab classes to get help with the lab assignments before using office hours or any other appointment outside class time. Online modeling exercises will also be used. Students are not expected to have any prior programming skills or knowledge of high-performance computing.

Course goals:
Students will complete this course with a foundational knowledge of terrestrial environmental/ecosystem models, including how they are developed, and how they are used to make predictions about the response of the terrestrial biosphere to global climate and environmental change drivers. Students will be given a grounding in the basic principles of terrestrial ecosystem modeling from the overall concept to developing the equations, to writing the computational programming code needed to execute these models.

Learning outcomes:
Upon successful completion of this course, students should:

- Understand the basic components of terrestrial ecosystems and how these processes are encoded into computational environmental models: biogeochemical cycles, hydrology, energy budget, disturbances, dynamic vegetation, and anthropogenic land use and management.
- Have in-depth knowledge of one of these components depending on student's own interests and research (see Final Term Paper).
- Know the steps needed for developing a simple environmental/ecosystem model, including: i) identifying the initial concept and purpose of the model; ii) understanding the mathematical equations; and iii) implementing these equations in scientific code that can be used to execute the model.
- Be able to use the model we have built together in class to understand how computational models of environmental and ecosystem processes operate, and how they can be used to make predictions, test scientific hypotheses and theories, and to ask new and exciting questions about the impact of climate and environmental change on terrestrial ecosystems.
- Be able to read and understand high impact scientific literature that tests hypotheses and describes predictions made with these models within the context of understanding the impact of global change drivers (e.g., climate change, CO_2 emissions and land use change) on terrestrial ecosystems and the feedback to climate.
- Have a foundational understanding of what the IPCC is, and the type of modeling used for IPCC climate change projections.
- Have a foundational level of knowledge about running computational models on high performance computing systems and introductory level Python programming knowledge.

Classes begin: January 6, 2025
Last day to add a second-term half course: January 14, 2025
Fall Reading Week: February 17 – 21, 2025
Family Day: February 17, 2025
Last day to drop a second term half course without penalty: March 31, 2025
Classes end: April 4, 2025

Week	**Dates**	**Topic – Lecture**	**Topic – Lab**	**Readings**
1	January 6th/8th	Introduction to the course	Intro to basic Python programming and Colab	
2	January 13th/15th	History of land surface / ecosystem modelling	Intro to Lab exercises: Simple Carbon Cycle Model	Bonan (2019) Ch. 1 and Luo and Smith (2022) Ch. 2
3	January 20th/22nd	Energy Balance Modelling	Assignment 1: Building a simple carbon cycle model	Blyth et al. (2021) and CarbonBrief Explainer “How Do Climate Models Work?”
4	Jan 27th/29th	Hydrology Modelling *(Quiz 1 due by Fri 5pm)*	Assignment 1: Building a simple carbon cycle model *(Assignment 1 deadline by Fri 5pm)*	Clark et al. (2015) and Prentice et al. (2015)
5	Feb 3rd/5th	Carbon Cycle Modelling	Assignment 2: Model Evaluation *(Assignment 2 deadline by Fri 5pm)*	Keenan et al. (2018) and Bonan (2019) Ch. 17
6	Feb 10th/12th	Vegetation Modelling *(Quiz 2 due by Fri 5pm)*	Assignment 3: Model Sensitivity Analysis	Fisher et al. (2018) and Fisher and Koven (2020)
	Feb 17th/19th	*Reading Week – No Class*		
7	Feb 24th/26th	Modelling agriculture and land management *(Quiz 3 due by Fri 5pm)*	Assignment 3: Model Sensitivity Analysis *(Assignment 3 deadline by Fri 5pm)*	Pongratz et al. (2017) and Bonan et al. (2024)
8	Mar 3rd/5th	Model evaluation and data assimilation *(Quiz 4 due by Fri 5pm)*	Assignment 4: Data Assimilation Exercise	Raoult et al. (2025) and Luo and Hoffman (2022)
9	Mar 10th/13th	IPCC and the Coupled Model Intercomparison Project (CMIP) *(Quiz 5 due by Fri 5pm)*	Assignment 4: Data Assimilation Exercise *(Assignment 4 deadline by Fri 5pm)*	CarbonBrief Explainer “CMIP6 Explained” and “IPCC AR6 Q&A”

Week	Dates	Topic – Lecture	Topic – Lab	Readings
10	Mar 17th/19th	*Final Term Paper*	*Final Term Paper*	TBD – based on grad presentation
11	Mar 24th/26th	*Final Term Paper Presentations (grad) (Quizzes due by Fri 5pm)*	*Final Term Paper*	TBD – based on grad presentation
12	Mar 31st/Apr 2nd	*Final Term Paper Presentations (grad) (Quizzes due by Fri 5pm)*	*Final Term Paper Presentations (undergrad)*	TBD – based on grad presentation

4. Course Materials and Communication

Readings: Readings will be assigned from the primary literature. You are expected to have read the assigned paper(s) to consider the main topics for a given week and submitted a weekly reading question ***prior*** to coming to class, in order to be able to follow the material and contribute to discussions.
The following textbooks would be useful for extra reading for this course but are not required. Copies will be available in during class and office hours.

- Bonan, G. (2019) Climate Change and Terrestrial Ecosystem Modeling, 1st Edition, Cambridge University Press, UK.
- Luo, Y. and Smith, B. (Eds.) (2022) Land Carbon Cycle Modeling: Matrix Approach, Data Assimilation, and Ecological Forecasting, 1st Edition, Taylor & Francis, USA. (Freely available online material for this textbook can be found here).

Website: All course material will be posted to the new OWL Brightspace learning environment: https://westernu.brightspace.com/d2l/home. Any changes will be indicated on the OWL site and discussed with the class. Items posted to this website include handouts related to lecture material, required readings, announcements, and grades.

All course material, including lectures, lab and tutorial instructions, additional reading, and assignments will appear on the OWL site. In addition, important announcements will be made on OWL, and you are responsible for obtaining this information. This is the primary method by which information will be disseminated to all students in the class. **Students should check the OWL site every 24-48 hours, and each morning before the start of classes.**

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

Current versions of all popular browsers (e.g., Safari, Chrome, Edge, Firefox) are supported with OWL Brightspace; what is most important is that you update your browser frequently to ensure it is current. All JavaScript and cookies should be enabled. If students need assistance, 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.

5. Course Components and Methods of Evaluation

Course assessment: The overall course grade will be calculated as listed below with due dates. Any deviations will be communicated.

Assessment	Format	Weighting	Due Date
Comprehension quizzes	10 questions per quiz via OWL	5%	See Schedule and OWL
Weekly reading questions	8 sets of readings – questions due prior to start of class	5%	9am before each lecture class
Journal article presentation	Based on 10-minute presentation of journal article (~2 per semester)	10%	Week in which student is presenting
Lab exercises	4 assignments using Python in Jupyter Notebooks/Colab	35%	See Schedule and OWL
Term Paper	Literature review and 30-minute presentation	45%	Friday 5pm final week of class

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., 69 to 70%).

Quizzes: There will be five open-book quizzes throughout the semester to test students' knowledge gained during the lectures and paper discussions on different parts of land surface and terrestrial ecosystem modeling. These quizzes will be on 1) hydrology and energy balance modeling; 2) carbon and vegetation modeling; 3) modeling agriculture and land management; 4) model benchmarking and data assimilation; and 5) IPCC and climate modeling. In addition, there will be one quiz for each of the longer graduate student final term paper presentations during the final 2-3 weeks of the semester. Quizzes will be taken on OWL. They will be timed (1 hr) and contain 10 questions each (however, the quiz is only expected to take 20-30 minutes). Students will have one quiz attempt. Quizzes will be due by 5pm on Friday in weeks 4, 6, 7, 8, 9, 11 and 12. **A 10% per day late policy will be applied beyond the flexible deadline. The lowest grade for the quizzes will be dropped.**

Lab exercises: Four in-class exercises will be set for the main lab component part of the course. The lab exercises will be coding and comprehension exercises designed to teach students how to build, test, and optimize a simple carbon cycle model using computational programming code. The lab exercises will be assigned via OWL and the course GitHub page. Students will be using Python v3 and Jupyter Notebooks in Google Colab. Students will be introduced to these programming tools prior to the start of these lab exercises. Students are expected to complete the assigned exercises and submit them by the deadline, which will be the Friday at 5pm after the final lab class on that assignment. Grades will be based on completing the assignments correctly. **A 10% per day late penalty will be applied beyond the flexible deadline.** Students must come to the lab classes to get help with the lab assignments before using office hours or any other appointment outside class time. Answers to all lab exercises will be provided 1 week to 10 days after the deadline. To use Google Colab you will need a google account, which will enable you to do the exercises anywhere and not just in the lab; however, if you do not have a google account and do not wish to get one you can do the practical classes using the lab computers. Both methods for completing the lab exercises will be shown in class.

Weekly reading questions: For each of the weekly readings in weeks 2 to 9 students are expected to submit one comment or question about the readings by 9am before the lecture class each week. Questions will be given a mark of 0 (no submission); 1 (inadequate/unclear/vague – not clear if student has read readings or very general question); 2 (adequate – question fairly general/similar to other week's readings); or 3 for (good/creative/insightful – carefully considered the readings). A good or "creative" comment or question would push other participants in the discussion to think about the material further or point out discrepancies or missing information from the readings. During the in-class group discussions on each paper, students are expected to share their questions or comments about the paper to contribute to the group discussion. Students will be taught methods of reading and discussing journal articles before reading the papers. **A 10% per day late policy will be applied beyond the flexible deadline. The lowest grade for the weekly reading questions will be dropped.**

Journal article presentation: Each graduate student will take it in turns in weeks 2 to 9 to present a recent high impact journal article that utilizes land surface/earth system/terrestrial ecosystem models to predict climate or environmental change impacts on ecosystems (or vice versa). These presentations will take place after the 1st hour (lecture) part of the lecture class, and before the group discussion on the weekly readings. The presentations should be about 10 minutes long and cover the main methods and findings of each paper, as well as a summary of the caveats and limitations of the paper (especially of the modeling approach used). Students will complete ~2 journal article presentations this semester depending on the number of graduate students in the course.

Term paper: Each student will complete a final term paper in which they write a 2500-3000 word (single spaced) in-depth literature review on one part of the model (e.g., carbon cycle, or water cycle*) and projections related to that part of the model. Each student will be given a reading list relevant to their chosen topic but should out other journal articles to complement this reading list and to achieve the highest grade. The grade will be based on the detail and quality of the literature review. The review will include discussion on advantages and disadvantages of adding process model complexity in relation to their chosen topic (as we will have discussed extensively in class).

Students will also prepare a 30-minute presentation on their chosen topic that they will present to the rest of the class during the lecture in the final 2 weeks of the course. In addition to this presentation, students will prepare a 10-question true/false or multiple-choice quiz to be taken by all other students in the class to test their comprehension of the material presented. Students will submit this quiz to OWL on the Friday before their presentation in class (Dr. MacBean will upload the quiz to OWL).

Overall, 70% of the grade for the final term paper will be based on the submitted literature review, 30% on the presentation to class (including the quiz submitted for the rest of the students to complete).

The term paper will be due by Friday 5pm in the final week of class. A rubric for the term paper and presentation will be provided in the assignment instructions on OWL. **A 10% per day late penalty will be applied beyond the flexible deadline.** Students can choose a topic of interest to them in consultation with Dr MacBean. The topic and option selected for their final term paper will be submitted by 5pm on the Friday before Reading Week.

*Potential term paper topics:

- Modeling impacts of climate change at ecosystem to global scales
- Modeling impacts of rising CO_2 on plants/ecosystems
- Modeling impacts of drought on specific ecosystems
- Modeling impacts of changing water availability/streamflow

- Modeling disturbance (fires, insect outbreaks, etc.)
- In depth study related to biogeochemical models: how to model carbon allocation, soil microbial processes, photosynthesis, phenology, nutrient limitations, etc.
- In depth study related to hydrology models: Snow modeling; spatial hydrology modeling, plant hydraulics etc.
- Dynamic vegetation modeling (species competition etc.)
- In depth study related to modelling human activities: modelling traditional and/or sustainable agriculture practices, modelling historical land use changes etc.
- Model benchmarking, evaluation, and inter-comparison studies (for a particular region or model output)
- Model matrix analysis (see Luo textbook)
- Model traceability analysis (see Luo textbook)
- Model optimality theory (for carbon or hydrology)
- Model results in the latest IPCC report (e.g., for the carbon or water cycle feedback to climate)

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

- Students are responsible for material covered in the lectures as well as the assigned chapters/sections in the text.
- Attendance is not mandatory but is strongly encouraged (particularly for the paper discussions during the 2nd hour of the lecture class). Both lectures and paper discussions will form the basis of the comprehension quizzes.
- Software needed for the lab exercises will be installed in the computer lab in Social Sciences Center. Students are responsible for installing relevant software on their own computers if they want to work on the lab exercises outside the SSC computer lab (advice will be given from the course instructor).
- Students must attend the lab classes if they require assistance with lab exercises.
- All assignments are due at 5pm EST unless otherwise specified.
- Written assignments (e.g., for the Final Term Paper) will be submitted to Turnitin (statement in policies below).
- Rubrics will be used to evaluate assessments and will be posted with the assignment instructions on OWL.
- After an assessment is returned, students should wait 24 hours to digest feedback.
- **Grades <u>will not be adjusted</u> on the basis of need. It is important to monitor your performance in the course. Remember: *You* are responsible for your grades in this course.**
- Please read all the sections on university and course policies below.

6. Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: Academic Accommodation for Students with Disabilities.

General Information about missed work:

University policy on academic considerations are described here. This policy requires that all requests for academic considerations must be accompanied by a self-attestation. Further information about academic considerations, and information about submitting this self-attestation with your academic consideration request may be found here.

Please note that any academic considerations granted in this course will be determined by the instructor, in consultation with the academic advisors in your Faculty of Registration, in accordance with information presented in this course outline.

6.1 Absence from Course Commitments

Students must familiarize themselves with the Policy on Academic Consideration – Undergraduate Students in First Entry Programs.

6.2 Class Participation

- Attendance in class is not mandatory except for the journal article and term paper presentations. However, attendance is encouraged to learn the lecture material, receive support with the lab assignments, and to engage in group discussion of the weekly readings.
- Students should self-report to Dr. MacBean **as early as possible (and before the start of class)** if they are going to miss their journal article or term paper presentation due to medical, compassionate or extenuating circumstances. Alternative arrangements will be made for the student to complete the journal article or term paper presentation and make up the grade.

6.3 Academic Consideration for Course Components with Flexible Deadlines

This course employs **flexible deadlines for all course components except the Journal article and Term Paper Presentations**. The assignment deadlines can be found above in the course outline. For each assignment, students are expected to submit the assignment by the deadline listed. Should illness or extenuating circumstances arise, students are permitted to submit their assignment for these course components **up to 48 hours past the deadline without academic penalty**. Should students submit their assessment beyond 48 hours past the deadline, a late penalty of 10% per day will be subtracted from the assessed grade. As flexible deadlines are used in this course, requests for academic consideration from the instructor will not be granted (see Section 6.4). If you have a long-term academic consideration or an accommodation for disability that allows greater flexibility than provided here, please reach out to your instructor at least one week prior to the posted deadline.

In addition to flexible deadlines, for the quizzes and weekly reading question assignments the lowest grade will be dropped. Academic consideration from the instructor will not be granted for missed quizzes/weekly reading assignments. If students miss 1 quiz/weekly reading assignment, the remaining quizzes/weekly reading assignments will be used in the calculation of the final grade for that component of the course. If students miss greater than 1 quiz/weekly reading assignment, they will receive a grade of zero on each missed quiz/weekly reading assignment unless they submit an academic consideration request to the central academic consideration portal (see Section 6.4).

6.4 Requesting academic consideration beyond the flexible deadline

Students missing course work for medical, compassionate or extenuating circumstances that need to submit course work after the flexible deadline can request academic consideration by completing a request at the central academic consideration portal. Students are permitted one academic consideration request per course per term without supporting documentation. Note that supporting documentation is **always** required for academic consideration requests for examinations scheduled by the office of the registrar (e.g. December and April exams) and for practical laboratory and performance tests typically schedule during the last week of the term. Students should also note that the instructor may designate one assessment per course per term that requires supporting documentation. This designated assessment is described elsewhere in this document (see Section 6.5). Please note that any academic considerations granted in this course will be determined by the instructor of this course, in consultation with the academic advisors in your Faculty of Registration, in accordance with information presented in this course outline. Supporting documentation for academic considerations for absences due to illness should use the Student Medical Certificate or, where that is not possible, equivalent documentation by a health care practitioner.

6.5 Course Assessments that Require Supporting Documentation

For this course the following assessment has been designated as requiring supporting documentation for academic accommodation.

Final Term Paper – due Friday April 4 at 5pm

Please note that this assessment is considered to be central to the learning objectives for this course. Accordingly, students seeking academic consideration for this assessment will be required to provide formal supporting documentation. If students cannot submit this assignment by the deadline (or within 48 hours past the deadline) then they must obtain an academic accommodation with supporting documentation in order to receive the grade. Students who are granted academic consideration for this assessment will be provided with additional time (as discussed with the instructor) to complete and submit the assignment. Note that a 10% per day late policy will be applied to this assignment if no academic accommodation is provided.

6.6 Accommodation for Religious Holidays

Students should review the policy for Accommodation for Religious Holidays. Where a student will be unable to write examinations and term tests due to a conflicting religious holiday, they should inform their instructors as soon as possible but not later than two weeks prior to writing the examination/term test. In the case of conflict with a midterm test, students should inform their instructor as soon as possible but not later than one week prior to the midterm.

7. Land acknowledgement

We/I 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.

With this, we/I 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 (e.g., First Nations, Métis, and Inuit) 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.

8. Academic Policies

Electronic devices during quizzes and assignments: All quizzes, lab exercises, and reading question assignments are "open book" and students are encouraged to use materials from the course in addition to further literature search (for the Final Term Paper) to complete those assessments.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence.

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).

9. Western's Commitment to Accessibility

The Department of Geography and Environment strives at all times to provide accessibility to all faculty, staff, students and visitors in a way that respects the dignity and independence of people with disabilities.

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2147 for any specific question regarding an accommodation. Information regarding accommodation of exams is available on the Registrar's website. More information about "Accessibility at Western" is available.

10. Mental Health

If you or someone you know is experiencing distress, there are several resources here at Western to assist you. Please visit Western's Health and Wellness website for more information on mental health resources.

11. Support Services

Western's Support Services
Student Development Centre

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (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.