BIOLOGY 4405B – ECOSYSTEM ECOLOGY

Winter 2025 Course Outline

1. Course Information

Course Instructor: Dr. Gabor Sass (gabor.sass@uwo.ca)

Mode of delivery: 2-hour class and 1-hour tutorial

Calendar description: This course traces the flow of water, energy, and nutrients from their abiotic origins to their cycles through microbes, plants, and animals. This course will synthesize current advances in ecology with established theory to offer a comprehensive survey of ecosystem pattern and process.

List of Prerequisites

a) Biology 2483A/B – Ecology

b) Any 0.5 Biology course at the 3000-level

Unless you have either the requisites for this course or written special permission from your Dean 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 in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Course Syllabus

Objectives

This course introduces students to the science of ecosystem ecology. Ecosystem ecology is a young, inherently multidisciplinary science. Over the last 80 years, major advances in ecosystem ecology were driven by the emergence of environmental problems such as the response of ecosystems to biomagnifications of pesticides and eutrophication of waters from excess nutrients.

By the end of the 20th century, recognition of the fundamental role that humans play in all ecological problems led to the integration of ecosystem ecology with social sciences. This course examines the concept of ecosystem ecology; the factors that influence ecosystem structure and function; the processes that determine the flow of energy and water and the cycling of carbon and nutrients in ecosystems from local to global scales; the role of disturbance on these processes; and the integrated effects of these processes at landscape scales and their consequences for sustainable use by human societies.

Lectures will focus on the fundamental principles of ecosystem ecology. Tutorials will extend the knowledge gained in lectures by critically evaluating key papers from the primary literature of the past two decades. These sessions will help you develop skills at reading, interpreting and critically evaluating scientific articles as well as improve your oral

presentation and facilitation skills. An individual writing assignment will hone your writing skills of science communication to a non-expert audience.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- understand and outline the biotic and abiotic factors that define and differentiate ecosystems and the relationships between them.
- understand the basic flows of energy and nutrients within ecological systems from local to global scales and be able to describe them in a systems framework (e.g. stocks and flows; mass balance).
- describe the factors that affect (and disrupt) the functioning of ecological systems including major stressors like climate change.
- analyze and interpret scientific papers about ecosystem structure and function.
- communicate scientific knowledge in oral and written forms to a variety of audiences.

3. Course Materials

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. 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.

Required textbook:

Chapin, F.S. III, P.A. Matson, P.M. Vitousek. 2011. Principles of Terrestrial Ecosystem Ecology. Springer-Verlag, NY. [on-line access through UWO library system]

Course reading list:

PDFs/links to articles will be posted on the course website. Students are expected to complete readings before the corresponding discussion during the Wednesday tutorial period. These readings are also the basis of the Short Scientific Communication assignment that is part of the course evaluation (see below).

Additional recommended resources:

Capra, F. 1996. The Web Of Life: A New Scientific Understanding Of Living Systems. New York: Anchor Books. [QH501.C375 1996]

Chapin, III, F.S., G.P. Kofinas, and C. Folke (eds). 2009. Principles Of Ecosystem Stewardship: Resilience-Based Natural Resource Management In A Changing World. New York, Springer. [on-line access through UWO library system]

Raffaelli, D.G. (ed.) 2010. Ecosystem Ecology: A New Synthesis. New York: Cambridge University Press. [QH541.2.E385 2010]

4. Methods of Evaluation

Below is the evaluation breakdown for the course. Any deviations will be communicated.

Assessment	Format	Weighting	Due Date
Attendance & Participation	*iclicker* and tutorial participation sheet	15%	Weekly
Group presentation & facilitation	20-minute presentation and facilitation	15%	Topic dependent
Short scientific communication assignment	OWL "Assignments" – Word Document	15%	March 26
Mid-term exam	In-person written exam	20%	February 24
Final exam	In-person written exam	35%	TBA

The evaluation methods described in the course outline are essential requirements for the course. Students are responsible for material covered in the lectures as well as the assigned chapters in the course text and the other readings.

☒ All assignments are due at 11:59 pm EST unless otherwise specified

☒ Written assignments will be submitted to Turnitin (statement in policies below)

☒ Rubrics will be used to evaluate assessments and will be posted with the instructions

☒ After an assessment is returned, students should wait 24 hours to digest feedback before contacting their evaluator; to ensure a timely response, reach out within 7 days

☒ It is imperative that students read through the detailed expectation documents for the different assessment components listed above (see OWL "content" [Week0])

4.1 Attendance & Participation (15%):

Participation is a fundamental part of the learning environment. You will need to be present in all lectures and tutorials as well as be ready to participate actively in the communal learning. There will be lots of emphasis on active learning and critical thinking. Students will get the most out of lectures by reading the material ahead of time. An individual attendance and participation grade will be awarded based on your attendance, readiness, and discussion during class activities, including answering *iclicker* questions. I will be using the *iclicker* software (free to Western students) to take attendance and record your answers to clicker questions. In addition, students will be required to fill out a tutorial participation sheet based on the presentations.

4.2 Group presentation & facilitation (15%):

Working in a pair, students will select one of the papers from the assigned class reading list and present it on the day it has been allocated to. They will critically read and analyze it and based on what they have learnt will prepare a 10-minute conference-like talk to present the essence of the paper to the class. They will then lead a class discussion for 10 minutes on the topic of their paper. The facilitation should include commenting, posing further questions and asking the class for questions. Total time allotted will be 20 minutes.

4.3 Short scientific communication assignment (15%):

Students will select one article from the class reading list and based on their critical reading and assessment prepare a 2-page scientific news article that they might find in the 'news' section of Science or Nature. These articles are written for the non-specialist and use language and concepts that are easily understandable by anyone with basic scientific training. The article should have appropriate figures or tables to best convey the essence of the article and should refer to some other research in the field as well. The article will be due by March 26th and be formatted ready for publication.

4.4 Exams (55%):

There will be a two-hour mid-term exam (20%) and a final examination (35%) in Ecosystem Ecology. The mid-term will be held on February 24th in class. The final examination (3 hours) will be scheduled by the Registrar during the April examination period. The examinations will include questions from material covered in lectures and tutorials. The final examination will include material from the entire term. The format of the examinations will be a combination of short and long answer type questions. No electronic devices (e.g. laptop computers, cell phones, etc.) will be allowed during an examination.

Click here for a detailed and comprehensive set of policies and regulations concerning examinations and grading. The table 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

Information about late or missed evaluations (for exams please see section 5 below):

☒ Late assignments will be subject to a late penalty 10 %/day

☒ An assignment cannot be submitted after it has been returned to the class

☒ A make-up mid-term exam will not be offered [The weight of a missed exam will be transferred to the final exam.]

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.

Winter 2025 Bio4405 Course Calendar			
Week Starting	**Monday lecture**	**Wednesday tutorial**	**Action**
1 Jan-06	Introduction & The Ecosystem Concept	Ecosystem Approach to Life	Chapin - Ch 1
2 Jan-13	Earth's Climate System	Climate variability on the Boreal Plain	Chapin - Ch 2
3 Jan-20	Water and Energy Balance	Presentations (Grp. 1 & 2)	Chapin - Ch 4
4 Jan-27	Carbon Input to Ecosystems (GPP)	Presentations (Grp. 3 & 4)	Chapin - Ch 5
5 Feb-03	Carbon Budgets – Plants (NPP)	Presentations (Grp. 5 & 6)	Chapin - Ch 6
6 Feb-10	Carbon Budgets – Ecosystems (NEP)	Presentations (Grp. 7 & 8)	Chapin - Ch 7
7 Feb-17		**Reading week**	
8 Feb-24	Mid-term Exam (In-class)	No tutorial	Mid-Term
9 Mar-03	Nutrient Use & Cycling	Presentations (Grp. 9 & 10)	Chapin - Ch 8, 9
10 Mar-10	Trophic Dynamics	Presentations (Grp. 11 & 12)	Chapin - Ch 10
11 Mar-17	Temporal Dynamics & Landscape Heterogeneity	Presentations (Grp. 13 & 14)	Chapin - Ch 12, 13
12 Mar-24	Change in the Earth System	Presentations (Grp. 15 & 16)	Chapin - Ch 14 News article due
13 Mar-31	Managing and Sustaining Ecosystems	Presentations (Grp. 17 & 18) Presentations (Grp. 19 & 20)	Chapin - Ch 15

5. 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.

Absence from Course Commitments

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

Students missing course work for medical, compassionate or extenuating circumstances 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. 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.

Course Assessments that Require Supporting Documentation

For this course the following assessment has been designated as requiring supporting documentation:

- **Mid-term exam – February 24th**

Academic Consideration for Course Components with Flexible Deadlines

This course employs flexible deadlines for assignments. 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 **short scientific communication assignment** up to 48 hours past the deadline without academic penalty. Should students submit their assessment

beyond 24 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 will not be granted. 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.

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.

Make-up Examinations (offered only for final exam)

A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents.

The format and content of make-ups may differ substantially from the scheduled test or examination.

[If a student fails to write a scheduled Special Examination, permission to write another Special Examination will be granted only with the permission of the Dean in exceptional circumstances and with appropriate supporting documents. In such a case, the date of this Special Examination normally will be the scheduled date for the final exam the next time the course is offered and the maximum course load for that term reduced by the credit of the course(s) for which the final examination has been deferred. If permission for such a further deferral or other accommodation is not granted, a course grade based on an examination mark of zero (0) will be entered. You can find the actual policy here]

6. Use of Electronic Devices

No electronic devices will be allowed during tests and examinations.

6.1 *iClicker* Application:

This course requires that you have and bring an electronic device that can connect to the internet to class. You will use this device to download the iClicker app for activities such as attendance checking and answering questions assigned during class time. To download the app visit: https://www.iclicker.com/

Please note: this software is *free* for all Western students.

7. Academic Offences

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).

8. Western's Commitment to Accessibility

The Department of Biology 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.

9. 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.

10. Support Services

Western's Support Services
Student Development Centre

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

11. Important Dates

January 6: Classes resume
January 14: Last day to add or drop a second-term half (0.5) course or a second-term full (1.0) course
February 17: Family Day

February 15-23: Spring Reading Week
March 31: Last day to drop a second term half course or a full course without penalty
April 4: Classes end
April 5-6: Study days
April 7-30: Final Examination Period