

ERS 270 - SUSTAINABLE AGRICULTURE

Course Outline: January 2021

"Bring diversity back to agriculture. That's what made it work in the first place"
– David R. Brower

COURSE DESCRIPTION

This course introduces the fundamental concepts of agroecology and discusses the integration of agriculture and society, and the transition to sustainability. Topics include the impact of biotic and abiotic factors on crops, soil and the agroecosystem as a whole. A system-level approach will be used to understand species interactions in agroecosystems including the use of genetically modified organisms.

COURSE GOAL

To introduce the fundamental concepts of sustainable agriculture and agroecology; and to introduce the major factors that lead to the interaction between people, society and agroecosystem and system-level interactions.



This course will be taught from an anti-homophobic, anti-racist and female positive perspective and comments or discussion that do not respect this policy will not be tolerated.

INTENDED LEARNING OUTCOMES

- 1. Agroecology**
 - Understanding agroecosystem concepts & why fundamental change in agriculture is needed
- 2. Crops, Abiotic Factors of the Environment and Autoecology**
 - Understanding biotic & abiotic factors affecting crop production and agroecosystems; positive and negative impacts of heterotrphic organisms
- 3. System-Level Interactions**
 - Understanding population ecology, genetic resources in agroecosystems & species interactions
- 4. Transitioning to Sustainability**
 - How to convert to an ecologically based management system; what are the indicators of sustainability. What are sustainable food systems: integrating agriculture, society & agroecology

TECHNIQUES LEARNED

- Applied problem solving skills
- Critical thinking skills
- Writing & time management skills
- Synthesizing new knowledge skills
- Communication & organizational skills
- Writing exams under pressure

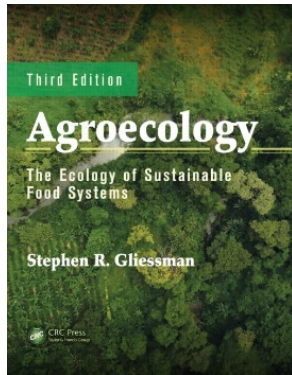
COURSE MEETING TIMES & LOCATION

Lecture Times	Location
Online	Online

INSTRUCTIONAL TEAM

	Professor	Teaching Assistant
Name	Prof. Dr. M. Oelbermann	Emily Filinska efilinska@uwaterloo.ca
Contact	E-mail: moelbermann@uwaterloo.ca	
Office Hours	Online	

COURSE MATERIALS



This textbook is available in the UW Bookstore:

Required

Stephen R. Gliessman. *Agroecology: The Ecology of Sustainable Food Systems, 3rd Ed.*, CRC Press, 2015 ISBN-10: 9781439895610

An e-book version of Gliessman may be purchased through our UW Vitalsource e-store at <https://uwaterloo-store.vitalsource.com/textbooks?sort=&term=9781439895610>

A free e-book version of Gliessman is available to read through our library website at : www.lib.uwaterloo.ca

Additional (*but not required for the course*) readings to supplement the textbook will be available on Learn. These readings will be relevant to the material discussed in class; help with the assignment and provide further insight for interested students.

COURSE ASSESSMENT

Learning Outcome	Assessment Methods (Formative & Summative)	% of overall Grade	Teaching & Learning Methods
1. Agroecology	- Weekly Quizzes	30	- Online lectures
2. Crops & Abiotic Factors of the Environment	- Assignment	30	- Case studies
3. System-Level Interactions	- Final Exam paper (cumulative)	40	- Video presentation
4. Transitioning to Sustainability			- Textbook readings
			- Course website
			- PowerPoint slides

Posting Date	Due Dates	Penalties
Every Thursday (except during reading week) by 10 am on Learn under "Quizzes" in course content	Every Friday (except during reading week) by 10 pm to Learn Dropbox	Quizzes submitted after Fridays at 10 pm will be considered late and receive a mark of zero (0). No exceptions.
Posting Dates: Jan 14, 21, 28 Feb 4, 11, 25 Mar 4, 11, 18, 25	Due Dates: Jan 15, 22, 29 Feb 5, 12, 26 Mar 5, 12, 19, 26	

SUMMARIZED SCHEDULE OF COURSE ACTIVITIES

Module #	Week of Lecture	Lecture #	Topic	Reading Material
Module 1: Agroecology	January 11, 2021	1	- Introduction to ERS 270 - Change in agriculture - Agroecology & agroecosystems	Introduction Chapter 1 Chapter 2
Module 2: Crops & Abiotic Factors of the Environment	January 18, 2021	2	- Crops - Light - Temperature	Chapter 3 Chapter 4 Chapter 5
	January 25, 2021	3	- Soil - Soil Water	Chapter 8 Chapter 9
	February 1, 2021	4	- Humidity & Rainfall, Wind, Fire	Chapters 6, 7, 10
Module 3: System-Level Interactions	February 8, 2021	5	- Biotic factors & organisms - Environmental complexity	Chapter 11, 13 Chapter 12
	February 15, 2021	Winter Reading Week		
	February 22, 2021	6	- Population ecology - Genetic resources - Species interactions	Chapter 14 Chapter 15 Chapter 16
	February 26, 2021	Assignment Due 11:59 pm on Learn		
	March 1, 2021	7	- Agroecosystem diversity - Animals in agroecosystems	Chapter 17 Chapter 19
	March 8, 2021	8	- Agroecosystem disturbance, succession & management	Chapter 18 Chapter 21
Module 4: Transition to Sustainability	March 15, 2021	9	- Converting to ecologically based management	Chapter 22 Chapter 23
	March 22, 2021	10	- Agriculture, society & agroecolgy - Sustainable food systems	Chapter 24 Chapter 26
FINAL EXAM PAPER	April 14, 2021	The final exam question(s) will be posted on April 14 th , 2021 at 8 am and must be submitted before midnight on April 14 th , 2021 to the Learn dropbox. Open book.		

DETAILED SCHEDULE OF COURSE ACTIVITIES

MODULE I: AGROECOLOGY

LECTURE 1

Introduction to ERS 270: Sustainable Agriculture

- Course outline
- Course expectations

Agroecology & Agroecosystems (Chapters 1 & 2)

- The case of why a fundamental change in agriculture is needed
- What is agroecology
- What are agroecosystems; agroecosystems within the context of the food system

MODULE 2: CROPS & ABIOTIC FACTORS OF THE ENVIRONMENT

LECTURE 2

Crops, Light & Temperature (Chapters 3, 4 & 5)

- Crop nutrition; crops and their interaction with the environment
- Importance of light and photosynthesis for crops; managing light in agroecosystems
- Sources of heat, variation in temperature, response of plants to temperature; microclimates; temperature & sustainability

LECTURE 3

Soil & Soil Water (Chapters 8 & 9)

- Soil formation & development; soil horizons; soil characteristics; soil nutrients; soil organic matter; soil management; sustainable soil management; diversifying cropping systems
- Movement of water in soil; water availability & plant water uptake; excess water; water deficiency; irrigation ecology; water resource use optimization

LECTURE 4

Humidity, Rainfall, Wind & Fire (Chapters 6, 7 & 10)

- Precipitation & hydrology, rainfed agroecosystems; wet & dry seasons; increased precipitation variability
- Effects of wind & atmospheric movement; modifying wind in agroecosystems
- Fire in natural ecosystems; effects of fire on soil; plant adaptations to fire; fire, fire management & modern agroecosystems

LECTURE 5

Biology & Complexity (Chapters 11, 12 & 13)

- Organisms in the agroecosystems: allelopathy, interactions among organisms
- Organisms affecting crops: parasitism & mutualism, pollinators
- The environment as a complex of factors; interactions of environmental factors; complexity

MODULE 3: SYSTEM LEVEL INTERACTIONS

LECTURE 6

Population Ecology & Genetic Resources in Agroecosystems, Crop Communities (Chapters 14, 15 & 16)

- Principles of population ecology; ecological niche and niche theory in agriculture, population ecology and crops
- Genetic change in nature and genetic diversity; selection & domestication, transgenic modification, consequences in the use of genetic resources; preserving agrobiodiversity; genetics and sustainability
- Interference at the community level; mutual beneficial interferences in agroecosystems; species interactions for sustainability

LECTURE 7

Agroecosystem Diversity (Chapters 17 & 19)

- Whole-system approach to diversity; ecological diversity; agroecosystem diversity and its benefits; organism colonization and diversity; diversity, resilience & sustainability
- Role of animals in ecosystems; coevolution of livestock animals and agriculture; integrated farming systems; livestock and food system sustainability

LECTURE 8

Agroecosystem Disturbance, Succession & Management (Chapter 18)

- Disturbance & recovery in natural ecosystems
- Disturbance & recovery application to agroecosystem management
- Agroforestry systems
- Disturbance, recovery and sustainability

MODULE 4: TRANSITION TO SUSTAINABILITY

LECTURE 9

Converting to Ecologically Based Management (Chapters 22 & 23)

- Factors & guiding principles for conversion;
- Indicators of sustainability: learning from existing sustainable systems; defining & measuring agricultural sustainability

LECTURE 10

Agriculture, Society & Agroecology (Chapters 24 & 26)

- Narrow view of agriculture; political economy & ecology of food systems
- Broadening the agricultural perspective
- Progress towards sustainability; attaining sustainability; challenges & opportunities

STUDENT CONDUCT AND APPROPRIATE BEHAVIOUR

I encourage students to study together, however each student is expected to individually fulfill the requirements of the midterm and the final exam. The assignment is a group effort Please refer to the **Assignment Outline** on Learn for further details. It is the responsibility of each student to be aware of what constitutes responsible behaviour in class, what constitutes plagiarism, and your rights and responsibilities with respect to these issues.

STUDENT & FACULTY RESOURCES

The Faculty of Environment has an entire webpage <https://uwaterloo.ca/environment/undergraduate-teaching-resources> dedicated to Student Resources including issues surrounding the following topics. Further detailed topics are outlined below:

- Teaching Resources
- Important Dates
- The Course Outline
- Student Privacy
- Academic Integrity
- Group Work
- Scheduling and Administration of Tests and Exams
- International Exchange Students
- Accommodation and Accessibility

ACCOMMODATION & ACCESSIBILITY

Please note that if you are registered with AccessAbility Services <https://uwaterloo.ca/accessability-services/about>, please write your midterm and final exam in accessibility if this is one of the requirements you requested. The instructor has to send a certain number of midterms and final exams to AccessAbility Services several days before the midterm/final exam is written. If you write in the class-room you must let the instructor know about a week ahead of time to ensure that sufficient number of midterms/exams are available.

AccessAbility Services, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

MENTAL HEALTH (more information below)

The University of Waterloo, the Faculty of Environment and our Departments/Schools consider students' well-being to be extremely important. We recognize that throughout the term students may face health challenges - physical and / or emotional. **Please note that help is available.** Mental health is a serious issue for everyone and can affect your ability to do your best work. Counselling Services <http://www.uwaterloo.ca/counselling-services> is an inclusive, non-judgmental, and confidential space for anyone to seek support. They offer confidential counselling for a variety of areas including anxiety, stress management, depression, grief, substance use, sexuality, relationship issues, and much more. If you think you are experiencing mental health issues, please see this website for guidance and support: <https://uwaterloo.ca/environment/get-mental-health-support-when-you-need-it> Also see last page of this syllabus.

INTELLECTUAL PROPERTY:

Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo. Intellectual property includes items such as:

- Lecture content, spoken and written (and any audio/video recording thereof);
- Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
- Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and
- Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights. Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

RELIGIOUS OBSERVANCES: Students need to inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

GRIEVANCE: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. See Policy 70 - Student Petitions and Grievances, Section 4, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please contact your Undergraduate Advisor for details.

APPEALS: A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 - (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals)
www.adm.uwaterloo.ca/infosec/Policies/policy72.htm

COMMUNICATIONS WITH INSTRUCTOR AND TEACHING ASSISTANTS: All communication with students must be through either the student's University of Waterloo email account or via Learn. If a student emails the instructor or TA from a personal account they will be requested to resend the email using their personal University of Waterloo email account.

TURNITIN: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, and are subject to the USA PATRIOT ACT, 2001; therefore, students must be given an alternative (e.g., scaffolded assignment or annotated bibliography) if they are concerned about their privacy and/or security. Students will be due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin® in this course.

RECORDING LECTURES:

Use of recording devices during lectures is only allowed with explicit permission of the instructor of the course. If allowed, video recordings may only include images of the instructor and not fellow classmates. Posting of videos or links to the video to any website, including but not limited to social media sites such as: facebook, twitter, etc., is strictly prohibited.

CO-OP INTERVIEWS AND CLASS ATTENDANCE: Co-op students are encouraged to try and choose interview time slots that result in the least amount of disruption to class schedules. When this is challenging, or not possible, a student may miss a portion of a class meeting for an interview. Instructors are asked for leniency in these situations; but, a co-op interview does not relieve the student of any requirements associated with that class meeting.

When a co-op interview conflicts with an in-class evaluation mechanism (e.g., test, quiz, presentation, critique), class attendance takes precedence and the onus is on the student to reschedule the interview. CECA provides an interview conflict procedure to manage these situations. Students will be required to provide copies of their interview schedules (they may be printed from WaterlooWorks) should there be a need to verify class absence due to co-op interviews.

MENTAL HEALTH

Everyone struggles at some point

From transition to university life, to changes in expectations, to relationships, there are a lot of reasons you might seek help for your mental health. 1 in 5 Canadians experience poor mental health in their lifetime. **You are not alone.**

Signs that something might not be quite right

If you notice any of the following situations, consider getting some support:

- Your mood is low for more than two weeks
- You've lost focus or motivation
- You're having difficulty sleeping or your energy levels are poor
- You feel extreme loneliness
- You think about harming yourself
- You feel extreme fear about certain situations

Counselling Services is here to support you

We offer a variety of confidential services at no charge to University of Waterloo students who are currently registered or are on a co-op term. Our mental health professionals are here for you and interested in helping you through whatever you are experiencing. Our regular [hours](#) are Monday to Friday 8:30 a.m. to 4:30 p.m.

Emergency appointments

Emergency appointments are available during our regular hours and are provided to any student who is at **immediate risk** of self harm or harming someone else, or have recently experienced a trauma.

Booked appointments

Regular booked appointments can be made and scheduling depends on the urgency of your needs. When you meet with a counsellor they will listen to your concerns and develop a plan that suits your individual situation and needs. This plan could consist of booking a series of regular appointments, readings, meditations, or practical exercises.

Walk-in appointments

Walk-in appointments are available each **Wednesday and Thursday between 11:30 a.m. and 3:30 p.m.** These appointments are 90-minutes in length and are focused on finding you practical solutions for your most pressing concern.

UW MATES peer counselling

Peer counselling is available on a walk-in or booked basis. [MATES](#) student volunteers are trained by Counselling Services and are available to offer confidential support to students struggling with social issues, mental health issues, and transitioning to university life.

Coping Skills seminars

Over the last couple of years, hundreds of students have found our Coping Skills [seminars](#) valuable. Coping Skills seminars are 1-hour seminars that focus on cultivating resilience, challenging thinking, managing emotions, and changing behaviour. They are offered a variety of times per term and can be registered for on LEADS.

Group therapy and workshops

Our [groups](#) and [workshops](#) provide you with the opportunity to learn more about topics such as: Managing anxiety and stress, regulating emotion, increasing motivation, sustaining recovery from depression, learning to meditate, and much more. Registration is online through LEADS.

More information about all of our services can be found at: <https://uwaterloo.ca/counselling-services>

After-hours and off campus resources

If you need to speak with someone outside of our regular hours the following resources are available 24/7.

Good2Talk

[Good2Talk](#) is a free confidential help line for post-secondary students.

1-866-925-5454

Grand River Hospital Mental Health Emergency Care

[Grand River Hospital](#) offers 24/7 emergency care for mental health emergencies. 834 King Street West, Kitchener. 519-749-4300 x 6880.

Here 24/7

[Here 24/7](#) is Waterloo Region's Mental Health and Crisis Services team.

1-844-437-3247

WatSAFE app

Download the [WatSAFE](#) app to have access to a list of support contacts at all times.