

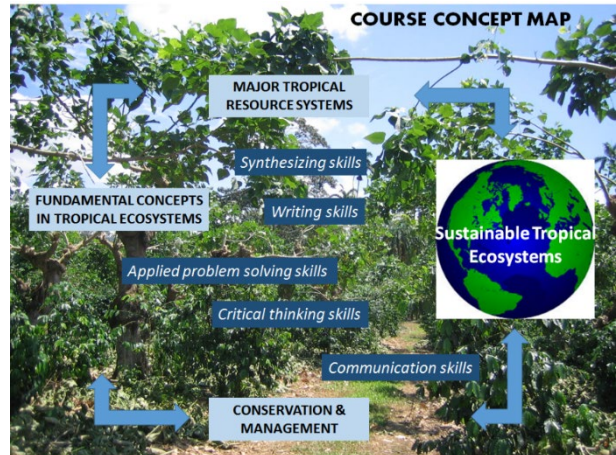
ERS 383/BIOL 383 - TROPICAL ECOSYSTEMS

Course Outline: January 2021

"We don't need to clear the 4 to 6 percent of the Earth's surface remaining in tropical rain forests, with most of the animal and plant species living there" –E.O. Wilson

COURSE OVERVIEW

This course examines the fundamental concepts of terrestrial ecosystems in tropical climates. This is NOT an ecology course. The course is divided into two major sections. The first section, *Fundamental Concepts in Tropical Terrestrial Ecosystems*, introduces tropical biomes and major tropical ecoregions. This section also includes a detailed characterization of vegetation, soils, carbon, and nutrient cycling. The second section, *Major Tropical Resource Systems* includes a detailed study of tropical forests and agroecosystems. Examples using case studies will be presented.



COURSE GOAL

To introduce the fundamental concepts of terrestrial ecosystems in the tropics, outline major tropical resource systems & define conservation issues & their management within concepts of global change.

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

Fundamental Concepts in Tropical Terrestrial Ecosystems

- Tropical biomes: what and where are the tropics located
- Tropical ecoregions and landforms
- Tropical biology and ecology: characterizing vegetation, soils, and carbon and nutrient cycling

Major Tropical Resource Systems

- Tropical forest ecosystems
- Tropical agroecosystems

SKILLS LEARNED

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

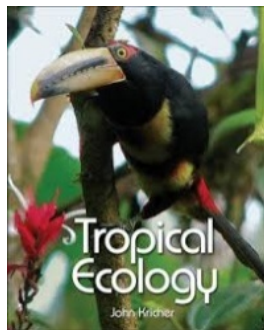
COURSE MEETINGS TIMES & LOCATION

Lecture Times	Location
Online	Online

INSTRUCTIONAL TEAM

	Professor	Teaching Assistants
Name	Prof. Dr. M. Oelbermann	Augustine Osei a2osei@uwaterloo.ca
Contact	E-mail: moelbermann@uwaterloo.ca	Kealan Branellec kbranellec@uwaterloo.ca
Office Hours	Online	

REQUIRED MATERIALS



The textbook available in UW Bookstore:

Kricher, J. 2011. *Tropical Ecology*. Princeton University Press. 632 pp.

ISBN-10: 0691115133

An e-book version of Kricher may be purchased through our UW Vitalsource e-store at

<https://uwaterloo-store.vitalsource.com/products/tropical-ecology-john-kricher-v9781400838950?term=9780691115139>

A free e-book version of Kricher 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. Fundamental Concepts in Tropical Terrestrial Ecosystems	- Weekly Quizzes - Assignment - Final Exam paper	30 30 40	<ul style="list-style-type: none"> • Online lectures • Case studies • Video presentation
2. Major Tropical Resource Systems	(cumulative)		<ul style="list-style-type: none"> • Textbook readings • Course website • PowerPoint slides

WEEKLY QUIZZES

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

SUMMARIZED SCHEDULE OF COURSE ACTIVITIES

Module #	Day of Lecture	Lecture #	Topic	Reading Material	
Module 1: Fundamental Concepts of Tropical Ecosystems	January 11, 2021	1	- Introduction to the course - Tropical biomes & ecoregions	Chapter 1 Chapter 3: 79-82 Chapter 11 Chapter 12: 446-463	
	January 18, 2021	2	- Tropical vegetation	Chapter 3	
Module 2: Major Tropical Resource Systems	January 25, 2021	3	- Tropical soils	Chapter 10: 375-389	
	February 1, 2021	4	- Nutrient cycling, carbon & climate change	Chapter 10 Chapter 9	
	February 8, 2021	5	- Forest landscapes & loss	Chapter 12 Chapter 15	
	February 15, 2021	READING WEEK			
	February 22, 2021	6	- Rainforest development and dynamic	Chapter 6	
	March 1, 2021	7	-Tropical forest management	Not in textbook	
	March 2, 2021	Assignment Due 11:59 pm on Learn			
	March 8, 2021	8	- Humans & terrestrial ecosystems	Chapter 13	
	March 15, 2021	9	- Tropical agroecosystems	Chapter 13: 491-494	
	March 22, 2021	10	- Tropical agroecosystems & diversity	Not in textbook	
FINAL EXAM PAPER	April 12, 2021 The final exam question(s) will be posted on April 12 th , 2021 at 8 am and must be submitted before midnight on April 12 th , 2021 to the Learn dropbox. Open book.				

DETAILED SCHEDULE OF COURSE ACTIVITIES

MODULE I: FUNDAMENTAL CONCEPTS IN TROPICAL TERRESTRIAL ECOSYSTEMS

LECTURE 1

Introduction

- Introduction to ERS 383/BIOL 383: Tropical Ecosystems: Course syllabus & expectations

What & Where are the Tropics (Chapter 1)

- Historical perspectives on tropical ecosystems
- Location of the tropics
- Tropical climates and seasons

Tropical Ecoregions (Chapter 3 pp. 79-82; Chapter 11; Chapter 12 pp. 446-463)

- Tropical rainforests (Chapter 3, pp. 79-82)
- Tropical and neo-tropical savannas
- Tropical dry forests
- Tropical wetlands and riverine ecosystems (Chapter 12 pp. 446-463)

LECTURE 2

Characteristics of Tropical Vegetation (Chapter 3)

- Stratification and stature
- Roots, trunks, bark, and crowns
- Leaves
- Flowers, fruits, seeds, and vegetative reproduction
- Climbers, lianas, stranglers, and epiphytes
- Deciduous behavior

LECTURE 3

Tropical Soils (Chapter 10 pp. 375-389)

- What is soil and tropical soil mineralogy
- Tropical soil chemistry, physics, biology and soil organic matter
- What are tropical soils?
- Soil formation & factors influencing soil formation
- Types of tropical soils
- Undisturbed and disturbed tropical soils
- Processes of tropical soil degradation
- The paradox of exuberant vegetation and poor soils: the case of tropical forest removal

LECTURE 4

Nutrient Cycling (Chapter 10)

- Nutrient cycling and the soil community
- Factors affecting nutrient cycling
- Rapid nutrient recycling
- Tropical soil types and nutrient cycling
- Nitrogen and phosphorus

Carbon & Climate Change (Chapter 9)

- Primary and net productivity
- Carbon in pioneer and successional species
- What is a carbon sink?
- Seasonal fluxes and carbon losses
- Climate change and tropical forests

MODULE 2: MAJOR TROPICAL RESOURCE SYSTEMS

LECTURE 5

Tropical Forested Landscapes & Landforms (Chapter 12)

- Montane and neotropical montane forests
- High elevation tropical ecosystems
- Mangroves
- Tropical dry forests

The Driving Forces Behind Tropical Forest Cover Loss (Chapter 15)

- Global forest cover: then and now
- Valuable hardwood tree species
- Forest removal: fuel wood & paper industry; grazing & agriculture; subsistence farming
- The effects of deforestation: local, regional, and global
- What can be done to reduce tropical forest removal?

LECTURE 6

Rainforest Development & Dynamics (Chapter 6)

- Secondary succession in the tropics
- Early succession in the tropics
- Effect of ENSO on second-growth rainforests
- Resilient pastures: secondary succession in Amazonia
- Disturbance impacts and regeneration pathways
- Fire as disturbance in the tropics
- When succession does not succeed
- Forest gaps and tree demographics

LECTURE 7

Tropical Forest Management (not in textbook)

- Historical overview of logging in the tropics
- Conventional timber harvest
- Sustainable timber harvest
- Plantation forest: good, bad, or indifferent?

LECTURE 8

Humans as Part of Tropical Ecosystems (Chapter 13)

- Human impact on ecology: traditional agriculture in tropical environments
- Hunting and gathering: the first human societies
- Emergence of tropical crops
- From simple beginnings: the discovery of agriculture

- Agriculture in the neotropics
- Agroforestry and hillside farming
- Ethnobotany
- Semi-commercial farming systems: tropical beverage crops
- Conventional agroecosystems: the commercialization of agriculture using plantation crops

LECTURE 9

Sustainable Tropical Agroecosystems: An Old Idea Made Modern (Chapter 13, pp. 491-494)

- The principles of complex agroecosystems & examples of complex agroecosystems in the tropics
- A detailed look at agroforestry systems
- Historical perspectives on agroforestry
- Types of agroforestry systems
- Why do we need agroforestry: what are the benefits?
- What is the role of multipurpose trees?
- Can agroforestry stop deforestation?
- Coffee and cacao agroforestry systems

LECTURE 10

Tropical Agroecosystems & Biodiversity (not in textbook)

- Ecological role of biodiversity in modern agroecosystems
- What happens if biodiversity is lost in modern agriculture?
- Biodiversity in complex agroecosystems
- Biodiversity in cacao agroecosystems: a case study from Costa Rica

Tropical Agroecosystems & Climate Change (not in textbook)

- Potential impacts of climate change on agriculture in the tropics
- Biophysical responses to increased atmospheric greenhouse gas concentrations
- Adaptation to climate change and the limits of adaptation in the tropics
- Agroforestry as an adaptive agroecosystem: a case study from Costa Rica

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.