Ecology & the Environment

BIO 285 & Lab SPRING 2020 MACALESTER COLLEGE

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Office Hours: OIRi 220 W 9-10:30AM,
Smail Gallery, F 3:30-5PM
Or by appointment via email.

COURSE INFORMATION
Lecture: MWF, 10:50-11:50AM
Lab: Th AM & PM
*Contributes to the Food, Agriculture & Society concentration

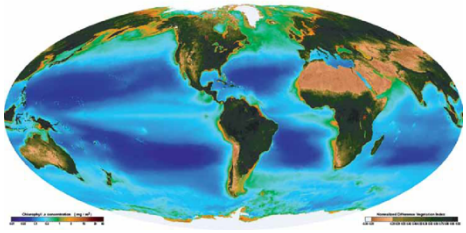
COURSE OVERVIEW

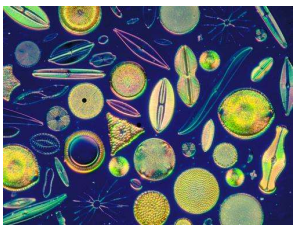
Ecology and the Environment serves Biology and Environmental Studies majors as well as all interested in macrosystem biology. During the semester, we will dive into a range of topics to study how species, populations, communities, ecosystems, and biomes function. The course will emphasize biological nutrient and energy cycling, population dynamics, animal and plant species interactions, disturbances and response to disturbances, and ecology in urban and agricultural landscapes. We will examine Ecology under four 'lenses': ***Climate Change, Environmental Justice, Land Use, and Ecosystem Services***. These lenses provide critical insight into how scientists, policy makers, land managers, and other stakeholders evaluate complex ecological and environmental systems.

Lab meetings will involve trips to Ordway Field Station (20 min away) to observe and measure patterns and processes that we cover in lecture. Data from these trips will be analyzed and presented.

MATERIALS

- *Ecology* 4th ed Bowman, Hacker, Cain eds.
- Primary literature, popular science articles, and media will be made available on Moodle.
- We will use Google Sheets and R/RStudio to analyze datasets.
- All lecture slides, outlines, assignment descriptions, and course materials will be on Moodle.





WHAT QUESTIONS DRIVE ECOLOGY?

- What are the common patterns, processes, and drivers across different species, communities, and ecosystems? What environmental and biological variables drive differences between species, communities, and ecosystems?
- How do climate change and land use change impact ecological processes and functions?
- What will future ecosystems look like and how will they function?
- How can science and Environmental Justice inform each other?
- What services do ecosystems provide and how do they vary across systems?
- Do 'pristine' ecosystems exist? Should they be 'spared' or 'shared'?

OUR LEARNING GOALS

- Work productively in groups and create supportive, effective communities based on open communication, engagement, and sharing of responsibilities.
- Present information confidently through graphic, written, and spoken forms.
- Develop effective preparation, study, and review habits for different assessments.
- Be able to teach new content learned in class to peers and non-peers.
- Connect and synthesize ecological and environmental science content and ideas.
- Engage in and help develop a collaborative, supportive learning environment.
- Read and critically synthesize primary literature.
- Measure, collect, organize, and analyze new ecological data.
- Synthesize and present original data in groups.
- Evaluate ecological case studies and research through different 'critical lenses'.
- Connect processes associated with climate change and land use change to predict likely outcomes of ecosystems

COURSE ASSESSMENTS / GRADING

Assessment	Due	Points	%
Check Ins	At least 3 during semester	10 each, 3x; pts = 30	5%
MiniQuizzes (MQ)	Weekly	3 each, 10x; pts = 30	5%
Reading and Discussion Responses	Thursdays before discussion (by 11:59PM)	5 each, 6x; pts = 30	5%
Applied Quizzes (AQ)	Throughout semester	7 each, 6x; pts = 42	7%
Topic Zine Page	Varies with topic	20	3%
Case Study Analysis (individual)	February 28 (by 11:59PM)	30	5%
Case Study Infographic (group)	March 8 (by 11:59PM)	15	2.5%
Infographic Gallery presentations (group)	March 11 & 13 during class	15	2.5%
Lab participation, Write Ups & Presentation	Ongoing through semester	90	15%
Future of Ecology Perspective	April 27	30	5%
Exam I	February 21	90	15%
Exam II	April 3	90	15%
Exam III	May 4	90	15%
		Total Points Possible = 600	

Participate in Biology beyond this course and attend 3 seminars!
Write a Haiku (5-7-5 poem) of 3 seminars you attended to receive full credit.
One of these responses must be completed before spring break.

Bio Seminar:
A weekly research showcase
To learn about life.

ASSESSMENT DESCRIPTIONS

Check Ins - 'Checks Ins' are individual and/or group meetings with that will occur through the semester to talk casually about yourself, your progress in the class, any questions you have on content or expectations, and how you are doing generally. These can take place during office hours or another arranged time. The first Check In will occur on January 30st during lab period. You will sign up for a 10-minute meeting time. Prior to the first meeting, you will complete a short survey that will let me know about you. You will need to schedule at least 2 more meetings after that – one before spring break, and one after.

MiniQuizzes - Miniquizzes are short quizzes that will take place in class on Wednesdays. After completing the quiz (10 min), students will work in small groups to discuss answers, after which we will discuss them as a class. They are ungraded (C/NC); questions may reappear on exams!

Applied Quizzes - Applied questions are for credit and graded, and should take 20 minutes. They will occur either on Moodle, in class, or as take-home assignments, and are to be completed independently. Questions will require application of concepts covered in classes, readings, and in MQs.

Topic Zine Page - Students will work in pairs to create an original page on a topic covered in a lecture in class. This page can be designed in any way, but must fit on an 8.5 x 11 page, and can be submitted as a hard or digital copy. We will assemble these as a Zine Textbook at the end of the semester.

Reading and Discussion Responses - We will be discussing articles from science and general-population publications. To prepare for discussions, you will write a response to a prompt(s) that will be published on Moodle earlier in the week. These prompts will vary in their focus, but require you to have read the paper thoroughly.

Case Study Analysis & Infographic - Groups will tackle case studies representing issues and ecosystems around the world.

(1) Individual Case Study Analysis: Within groups, students will be randomly assigned a critical lens with which to evaluate the case study, and then will choose a 'supporting lens' from the remaining three. Based on the two critical lenses, students will individually analyze the system drawing from 3-5 references. The analysis will describe the system briefly, identify and describe stakeholders involved, and then assess the case study based on their two lenses. The Analysis will be 2 pages, single spaced, and will include a reference list.

(2) Case Study groups, while writing up their individual analyses and after they are due, will develop and create a visual infographic representing the case study. The infographic will be visually striking and communicate facts about the system.

(3) Infographic Gallery will take place on March 11 and 13th during class time. Printed Infographics will be displayed, and groups will present their posters, while non-presenting students will do a 'scavenger hunt' based on the posters.

Future of Ecology Perspective - At the end of the semester, you will write a perspective essay (in an op-ed editorial/Scientific American level) on the "Future of Ecology", broadly defined. This can focus on an emerging trend, ecosystem, threat, success story, environmental justice or equity in the study or impact of ecology, or case study that you are interested in. The essay should be ~750 words and include 3-5 references. Topics will be shared and cleared by April 13.

WEEKLY ROUTINES, NORMS, AND EXPECTATIONS

Day	Monday	Wednesday	Thursday	Many Fridays
What to expect	**Conceptual Overview**	**'Real World' Applications**	**Lab!**	**Discussions**
What you need to succeed	- Notebook + pen, - Attention & focus, - Readings completed and reviewed, and guiding questions answered - Rested mind and body and/or caffeine	- Critical thinking - Notebook + pen - Reviewed information from Monday's class - Expect a MQ every week!	- Layers of clothes if we go to Ordway; - extra pens, - enthusiasm about data collection and analysis	- Response Prompt written & turned in - discussion Q - Open mind - Respectful and supportive engagement - Curiosity - A sense of fun

2 Minute Warm Up!
At the start of class from January through Spring Break, students will begin class with a 'warm up'. Based on a new prompt each day, students will find someone they haven't 'warmed up' with yet, and talk for 60 seconds describing themselves. The other student will listen for the first 60 seconds, then the roles switch. Your goal is to talk to 20 different people in class by Spring Break, and meet everyone in the class personally by the end of the semester.

Words of the Week (WoWs)
When a major concept is covered, it will be noted as a 'Word of the Week' (WoW) in the lecture. Keep note or a list of these and we will return back to them, play games around them, and they will definitely show up on assessments!

Check Ins, Office Hours, and supporting each other's learning
You will be in this class for over 80 hours this semester – and working hard out of class too! This is an introductory class, and many of you are cultivating practices that you will carry on to upper level courses. You are also busy with activities, clubs, jobs, family and friend responsibilities, and figuring out who you are and what you want to be. I expect you all to be respectful, and kind to each other and use this course as an opportunity to model best practices of student interactions. Individual and group Check Ins will let us figure out what is working and not working for you and develop plans for success.

Out of class work expectations
Readings and daily assignments should take ~1-3 hrs. Longer assignments and group work will require more time to be scheduled. If you are having trouble working in a group setting due to work or class scheduling conflicts, let me know as soon as possible.

Developing your voice in science
Science requires a balance of COURAGE and HUMILITY – this is as true for undergraduates as it is for researchers at leading institutions. You need courage and confidence to pursue and develop new ideas and approaches, confidence to critique others' ideas, confidence to follow your curiosity. But science also requires humility – identifying limitations, asking for advice, help and guidance, accepting appropriate criticism from others, and reflecting on potential improvement. Science is a process of realizing you don't have all the answers, seeking information from other sources, and developing new questions to build on existing experience.

COURSE ENVIRONMENT AND RESOURCES

Learning environment and inclusivity. My goal is to promote an inclusive learning environment where diverse perspectives are recognized, respected, and contribute to our strength as a class. Part of that effort includes a recognition that all humans have implicit biases, and it is our responsibility to do our best to identify them in ourselves and take actions to mediate them. If something in or about this class makes you feel unwelcome, please see me, a TA, or a college administrator.

Names and pronouns. You should be addressed in the manner that you prefer. If you want to make sure I address you with a particular name and/or pronoun please let me know.

Title IX. Macalester College is committed to providing a *safe learning environment* for all students that is free of discrimination, sexual harassment, sexual assault, domestic violence, dating violence, and stalking. Further details are explained in the college's Title IX regulations (https://www.macalester.edu/titleix). If you, or someone you know, experiences a Title IX violation, know that Macalester has staff trained to support you. Macalester faculty members are "responsible employees," which means that if you tell me about a Title IX violation, I must share that information with the Title IX Coordinator. Still, you will control how your case is handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need (Title IX Office, 651-696-6258) including, if you wish, confidential sources on campus who are not subject to the mandatory reporting requirement (see list of "Confidential On-Campus Support" at https://www.macalester.edu/violenceprevention/support/).

Accessibility. I want all students to have fair and equitable access to the learning opportunities in this course. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or to accurate assessment of achievement, please notify me as soon as possible. Students are also welcome to contact the disability service office to discuss a range of options to removing barriers in the course, including accommodations (contact Disability Services, 651-696-6275 or disabilityservices@macalester.edu). Once you have a letter of accommodations, please see me so that we can implement an action plan. Furthermore, I know that at times personal issues, stress, health problems or life circumstances may impact your ability to perform academically. Please contact the Office of Student Affairs at 651-696-6220 (studentaffairs@macalester.edu) for support and ask them to get in touch with your instructors.

Other helpful information to support your experience in the class:

- **Concerns on content or experience in the class →** find me, Mike Anderson, or a TA before/after class; attend office hours; email to set up a time to meet in person.
- **Need additional writing support →** Check out MAX Center for writing tutors or Works in Progress peer review program (Kagin Commons, first floor)
- **Are you absent due to an unexpected event (sickness, family issue) →** Contact me, Mike Anderson, or a TA by email as soon as possible to set up a time to talk about options.
- **Absence due to religious observance →** Please let me know you will be observing ahead of time, so that you can obtain course materials ahead of the absence.
- **Do you need to sleep? Of course you do. Take care of yourself. If you are feeling overwhelmed about the scheduling or pace of this course, please let me know.**

All readings, assignment descriptions, and other information about the course will be on Moodle. Moodle will be updated frequently, so please check regularly. If something seems to be missing – please let me and the TAs know.

	Week: Topic	Monday	Wednesday	Thursday	Friday
The Big Picture	Welcome to Ecology & the Environment			1/23 NO LAB MEETING	1/24 Driving Questions & Course Overview
	1: Ecological Lenses	1/27 Climate Change	1/29 Land Use & Ecosystem Services 1st MQ!	1/30 *First Check In!* Sign up online for meeting time	1/31 Environmental Justice (& Summer Jobs) 1st Discussion!
	2: Life on Earth	2/3 Earth as habitat: Climate & Biomes AQ before Monday	2/5 Primary Production & Rubisco MQ	2/6 Climate Policy Lab (CC, EJ)	2/7 Overview of Case Studies / Summer Opportunities *Assign Case Studies
Dynamic & Diverse Life	3: Biodiversity of Species	2/10 Natural Selection & Adaptation	2/12 Life Histories MQ	2/13 Urban Emissions Lab (EJ, CC, ES)	2/14 Discussion: Page et al. 2016
	4: Populations	2/17 Distribution & Dispersal AQ before Monday	2/19 Growth & Extinction & Modeling Populations MQ	2/20 **EXAM 1**	2/21 **TBA**
	5: Species Interactions	2/24 *Group work on Infographic	2/26 Predation, Mutualism, & Parasitism MQ	2/27 Urban Ecosystem Services (ES, EJ)	2/28 Competition & Niches **CS Analysis due**
Interconnected Systems	6: Communities	3/2 Trophic Systems & Cascades AQ before Monday	3/4 Biodiversity & Complexity MQ	3/5 Workshop time for Infographics	3/6 Yellowstone Discussion
	7: Case Studies	3/9 AQ before Monday	3/11 **CS Infographics**	3/12 **Senior Capstone Seminars**	3/13 **CS Infographics**
	SPRING BREAK				
	8: Siberia Break!	**Mary in Siberia**		3/26 Hypothesis Building	3/27 **Mid-Course Interview *attendance is required***
	9: Ecosystems	3/30 Succession & Disturbance	4/1 Ecosystem Steady-States & Resilience MQ	4/2 Lab @ Ordway Measuring Biomass	4/3 **EXAM 2**
21st Century Ecology	10: Ecosystems	4/6 The Carbon Cycle* *(My Jam)	4/8 Climate Change & Nutrient Cycling MQ	4/8 Lab @ Ordway Environmental Variation	4/10 Data Entry in Class
	11: Developed Landscapes	4/13 Invasive species AQ before Monday	4/15 Urban Adaptation MQ	4/16 Working with R (Meet for 1 hr blocks) FoE topics due	4/17 Island Biogeography & Habitat Fragmentation
	12: Agroecology	4/20 Crops – a novel biome AQ before Monday	4/22 Climate-adapted Agriculture MQ	4/23 Group Workshop Time	4/24 Food Security Discussion
	13: Conservation & Future of Ecology	4/27 Traditional Ecological Knowledge **FoE Perspective due**	4/29 Science Communication MQ	4/30 Project Presentations	5/1 Last Class
	14: Exam	5/4 **EXAM 3**	*The final exam is being held on the last day of class. If this poses a conflict, please inform me as soon as you know.		