

Ecosystem Climatology:
Interactions between the biosphere and atmosphere (NRSM 418)

Instructor:

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Course Time & Location:

Tuesday and Thursday 12:40-2:00
Gallagher Business School 202

Office Hours:

Tuesday 2:00-3:00 or by appointment

Course Description:

Life has evolved on Earth due to its favorable climate conditions, but life has also played an important role in the evolution of Earth's atmosphere and climate. This course will explore the interactions between Earth's biosphere and atmosphere and how they affect climate over a range of scales. We will focus on the exchange of energy, mass, and important elements between the biosphere and atmosphere and how this exchange can lead to fascinating feedbacks in Earth's climate system.

This course will reintroduce important principles from physics, chemistry and biology in a conceptual framework to elucidate how the biosphere and atmosphere are inextricably linked. Based on this conceptual framework, we will evaluate recent scientific literature and do simple thought experiments to explore Earth's climate system.

**Graduate students participating in this course will be expected to give an in-class presentation and a brief research paper (5 page limit) on principles of ecosystem climatology and how they relate to their research in lieu of final exam.*

Learning Outcomes:

This course will introduce students to several important concepts that will be helpful in evaluating Earth's climate system and how humans are an integral part of that climate system. We will cover energy budgets from individual leaves and forest canopies to the entire planet. Spatial differences in Earth's energy budget and their importance in driving atmospheric circulation will then be covered. We will then investigate how biogeochemical processes affect the soil-vegetation-atmosphere continuum. Lastly, this course will look at the dynamic response of vegetation to climate and how changes in human land use have potentially altered Earth's climate. Through this course we will come to appreciate not only how climate may be altering Earth's biosphere, but also how the biosphere is actively affecting Earth's atmosphere and thus climate.

Course Readings:

Ecological Climatology 2nd Edition by Gordon Bonan, Cambridge Press 2010. Additional reading assignments from the recent scientific literature have also been selected to compliment the textbook.

Additional Course Information and Materials: <http://umonline.umd.edu/>

On the Moodle site, you will need to enter your Net ID and password to access course lectures and supplemental readings. Lectures will be posted on the Moodle page immediately following class. Because this is a smaller upper division course, students will be expected to actively participate during discussions and exercises.

Grading:

- 1) Problem Sets (25 %)
- 2) Literature Review (25 %)
- 3) Mid-term Examinations (20 %)
- 4) Final Examination/Research Presentation (20 %)
- 5) Attendance & Participation (10 %)

Course Schedule

Week	Topic	Reading	Assignment
1	Introduction & Earth System	Chpts 1 & 2	Bonan Paper
2	Global Cycles & Atmospheric Radiation	Chpts 3 & 4	Problem Set
3	Atmospheric Circulation & Climate	Chpts 5 & 6	Literature Review
4	Climate Variability & Change	Chpts 7 & 8	Problem Set
5	Soil Physics & Biogeochemistry	Chpts 9 & 10	Literature Review
6	Water Balance & Watershed Hydrology	Chpts 11 & 12	Problem Set
7	Energy Fluxes & Midterm (Feb. 28)	Chpts 13	Review
8	Leaf Energy & Photosynthesis	Chpts 15 & 16	Literature Review
9	Plant Canopies	Chpts 17 & 18	Problem Set
10	Spring Break		Get Lost!
11	Plant Strategies & Communities	Chpts 19 & 20	Literature Review
12	Ecosystem Dynamics	Chpts 21 & 22	Problem Set
13	Disturbance & Biogeography	Chpts 23 & 24	Maness Paper
14	Land Surface Change	Chpts 25-27	Problem Set
15	Climate-Vegetation Feedbacks	Chpts 28 & 29	Grad Student Presentations
16	Final Friday May 15 @ 8:00		

Assignments:

Problem Sets will be assigned from the textbook and are due the following week. Literature reviews are due the week after reading assignments are made available on the Moodle site. Literature reviews should be brief- no more than 1 page- and consist of a 1 paragraph synopsis of the assigned paper and then 1 paragraph critical assessment. You will be evaluated primarily on your critical assessment, so put some thought into it. Late assignments will be accepted, but 1 point will be deducted for every day late.

Recommended Preparation:

- Successful completion of a university-level chemistry course (e.g., CHMY 121N).
- Successful completion of a university-level physics course (e.g., PHSX 205N).
- We will be doing important in class exercises covering key concepts, so make sure that you attend class.

You are expected to read the assigned material, write thoughtful reviews of papers, and complete problem sets. This course integrates principles from climatology and ecology and thus requires the ability to relate concepts from several different disciplines (e.g. physics, chemistry, and biology). Upon completion of this course, students will have a solid conceptual framework for evaluating how the biosphere responds to climate perturbations and how climate is affected by processes in the biosphere. This course will provide students with a critical thinking skill-set that will allow them to evaluate important topical issues regarding climate change.

Students with learning disabilities or disadvantages needing special dispensation or assistance, please see me during the first week of class. All course activities are governed by the Student Conduct Code, which embodies the ideals of academic honesty, integrity, human rights, and individual responsibility. It is your responsibility to read, understand and adhere to the student conduct code (http://life.umt.edu/vpsa/student_conduct.php).

Additional Course Information and Important Dates:

To 15 th instructional day	Students can drop classes on Cyberbear with refund	February 13 = last day
16 th to 45 th instructional day	Drop requires form with instructor and advisor signature, a \$10 fee from registrar's office, student will receive a 'W' on transcript, no refund.	February 14 through April 6
Beginning 46 th instructional day	Students are only allowed to drop a class under very limited and unusual circumstances. Not doing well in the class, deciding you are concerned about how the class grade might affect your GPA, deciding you did not want to take the class after all, and similar reasons are not among those limited and unusual circumstances. If you want to drop the class for these sorts of reasons, make sure you do so by the end of the 45 th instructional day of the semester.	April 7

The following resources may be helpful to faculty/TA's should you find yourself needing to address certain issues in your courses/student interactions. I (Mike, Associate Dean, 243-6614) would be happy to meet with any faculty member, teaching adjunct, or TA at any point if you have questions or experiences with these types of issues that you would like to discuss with a second person.

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Curry Health Center's Counseling & Psychological Services Program (CAPS)

- On occasion in interacting with a student you may become concerned about the amount of stress and/or degree of depression you perceive. In such cases you may wish to refer the student to CAPS (243-4711 - Monday through Friday from 8:00 AM to 5:00 PM). CAPS staff are trained how to handle if instructors call with a student in your office.
 - See also CAPS Webpage for Faculty Concerned for a Student
 - See also their Crisis (students with immediate/urgent need) page.
- If the student is not in immediate Crisis, but you wish to refer the situation to UM professionals with specialized training and experience in assessing what to do regarding concerns about students in distress you may wish to consider UM's Behavioral Intervention Team (BIT).
 - Who they are and what they do is described in this 2 page brochure.
 - A confidential referral form you can fill out (anonymously if desired) is located on the BIT page.
 - Recognize that the BIT form covers a wide range of issues from “concerned for the student’s welfare” to “concerned about others’ welfare re the student’s behavior”. In other words, 1 form for all situations. Don’t be put off by the form if your concern is solely for the individual. You can trust the BIT team to interpret your specific concerns appropriately.

Disability Services for Students (DSS)

1) Lommasson Center 154, 243-2243

- Please see their website for additional information including their Faculty page

Disruptive Student Behavior

1) The UM Student Conduct Code has a section on disruptive behavior

- Faculty have the authority to dismiss a student from any class session in which the student displays disruptive behavior that threatens the learning environment or well-being of others.
- The student remains eligible to return the next class session.
- See the Student Conduct Code section VI E for full details and follow up options.
- If you have questions or concerns (including just wondering if you should be concerned) please feel free to talk to your Department Chair, the CFC Associate Dean, the CFC Dean, or the UM Dean of Students, we are resources to listen and support instructors.

2) UM has a Behavioral Intervention Team (BIT)

- BIT's Charge: “to identify, assess, and respond to ... potentially serious concerns or incidents related to student mental health, physical health or conduct which, if disregarded, could threaten the health and safety of the student or the campus community.”
- Click the following for BIT's Referral Form

- *Incidents which might warrant referral include:* threatening statements; erratic or bizarre behavior such as emotional outbursts or disturbing essays; repeated disruptions in class with “off-the-wall” remarks; crossing professional or personal boundaries; etc.
- Referrals can be anonymous and/or confidential.

Pregnancy and Course Requirements

- 1) This is a Title IX issue; UM’s Title IX coordinator is Jessica Weltman (243-5710, jessica.weltman@umontana.edu).
- 2) “It is illegal under Title IX for schools to exclude pregnant students (or students who have been pregnant) from participating in any part of an educational program, including extracurricular activities.”¹
- 3) “Schools cannot require a pregnant student to produce a doctor’s note in order to stay in school or participate in activities ... unless the same requirement to obtain a doctor’s note applies to all students being treated by a doctor.”²
- 4) “... a school must make adjustments to the regular program that are *reasonable and responsive* to the student’s temporary pregnancy status.”²
- 5) A school must “excuse a student’s absences due to pregnancy or related conditions, including recovery from childbirth, for as long as the student’s doctor deems the absences to be medically necessary. ... When the student returns to school, she must be reinstated to the status she held when the leave began, which should include giving her the opportunity to make up any work missed. A school may offer the student alternatives to making up missed work, such as retaking a semester, taking part in an online course credit recovery program, or allowing the student additional time in a program to continue at the same pace and finish at a later date ... The student should be allowed to choose how to make up the work.”²
- 6) “... a teacher may not refuse to allow a student to submit work after a deadline that she missed because of absences due to pregnancy or childbirth.”²
- 7) “... if a teacher’s grading is based in part on class attendance or participation, the student should be allowed to earn the credits she missed so that she can be reinstated to the status she had before the leave.”²

¹June 25, 2013 US Office of Civil Rights (OCR) Dear Colleague letter

²OCR document “Supporting the Academic Success of Pregnant and Parenting Students Under Title IX”

Sexual Misconduct – Your Reporting Responsibilities & Resources at UM

- 1) UM employees must report information they have about sexual misconduct, sexual harassment, sex-based discrimination, or retaliation involving students to the Title IX/EO Coordinator (Jessica Weltman within 24 hours
 - Title IX coordinator will investigate situation and take appropriate steps to address situation and ensure safety of survivor
 - To report you may leave a private voice mail (243-5710), send a private email (jessica.weltman@umontana.edu), report on-line using the Harassment Incident Report Form, or make an appointment with EO staff
- 2) See the UM web-page on what you need to do and how to support a survivor of sexual misconduct
 - If a student chooses to open up to you about an assault, your job in that moment is to believe them and help them access appropriate resources (it is not your job to ask for facts)
 - You may call the SARC crisis line (see below) and their web page on ways to help a survivor
 - Advise the student you will be required to report to the Title IX Coordinator
- 3) Student Advocacy Resource Center (SARC) – Curry Health Center
 - Provides free and confidential services for students of UM who have experienced sexual or relationship violence, stalking, or harassment.

- SARC has a 24 hour help line: (406) 243 6559
 - SARC has medical employees whose professional role allows privileged communication under Montana law. Unlike you who must report to the Title IX, they are not required to report – so going to SARC does not trigger a report of sexual assault
- 4) First STEP (Providence St. Patrick Hospital)
- **First STEP** provides medical care and evidence collection for victims of sexual assault, in a safe and private environment, 24 hours of the day (406) 329 5776
 - UM does endorse First STEP referrals
 - Going to First STEP does **not** trigger a report of sexual assault
- 5) See also the discrimination prevention tutorial website for additional information