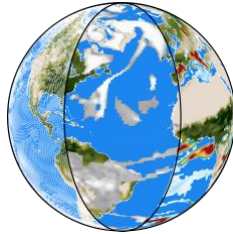


ATMO.4080/5080

The Climate System



Semester, Year
Time, Location
3 Units

Course Description:

Would Europe really fall into a deep freeze if the Gulf Stream shut down? Why do El Niños/La Niñas happen, what types of impacts do they cause, and can we predict them? How does deforestation impact climate, and what impact will higher carbon dioxide concentrations have on plants? What makes a greenhouse gas a greenhouse gas, and how sensitive is our climate to changes in their concentration? How do we distinguish natural climate variability from anthropogenic climate change, and what climate changes are humans already responsible for (if any)?

ATMO.4080/5080 explores the physical, chemical, and biological processes that interact to shape Earth's climate. Topics covered in the class include the global energy balance, radiative transfer, the greenhouse effect, the general circulation of the atmosphere and oceans, the hydrologic, carbon, and nitrogen cycles, and natural and anthropogenic climate change.

Student Expectations:

1. Students will treat each other respectfully.
2. Students will not use their cell phones during class unless an emergency arises.
3. Students will follow the university academic integrity policy. There is zero tolerance for cheating or plagiarism.
<https://www.uml.edu/catalog/undergraduate/policies/academic-policies/academic-integrity.aspx>
4. Students are expected to attend class regularly, as regular attendance is one of the most important contributors to student success. However, students may occasionally need to miss class due to illness, emergency, or caring for a sick family member. In such cases, you are responsible for notifying me of your absences and working with me to arrange to make up any missed work. I will be very accommodating to students who are experiencing pandemic-related challenges, but you must communicate your requests with me regularly and with as much advance-notice as possible.

Instructor Expectations:

1. I will begin and end class on time.
2. I will be available during all specified office hours (see below) and will do my best to accommodate individual office hour appointments if you cannot make the regularly scheduled office hour dates/times.
3. I will assign out of class work that adheres to the time expectations for a 3-unit course.
4. If I should need to miss class, I will communicate with you via Blackboard as soon as possible with clear instructions.

Course Learning Objectives:

By the end of the semester, students will be able to:

1. Develop conceptual models of the climate system.
2. Conduct statistical analysis of real-world weather and climate data.
3. Dissect, interpret, and critique scientific journal articles.
4. Derive key climate system forces, balances, and equations, including radiative balance, Coriolis, geostrophic balance, hydrostatic balance, and thermal wind.
5. Distinguish natural and anthropogenic climate forcings.

Prerequisites:

MATH 1310 Calculus I

PHYS 1410 Physics I

Instructor:

Christopher Skinner

Olney Hall 301b

christopher_skinner@uml.edu

Office Hours:

Primary office hours will be on (days) before class (time). Otherwise, please email me to schedule individual meeting times.

Textbook:

Global Physical Climatology (2nd Edition), by Dennis L. Hartmann, 2016.

Assignments will also include readings from journal articles.

Blackboard:

Course announcements, readings, and assignments will be posted on the course blackboard site. Please be sure your blackboard alerts are on.

Assignments:*Readings*

Students are expected to complete the assigned readings before class and participate in the discussion of the reading material during class. Readings will consist of textbook chapters and journal articles. Material from the assigned textbook chapters and journal

articles will appear on exams.

Journal Article Presentation

Each student will work with partners to lead the discussion of an assigned journal article. Each group will develop a 15-20 minute presentation that synthesizes the article material. The presenters are expected to engage the class with meaningful discussion questions. The presentation will be evaluated on your synthesis of the article's key points, and on the quality of engagement with the class. Every student in the class will read the article and come prepared to discuss.

Problem Sets

There will be four (4) problem sets. These are intended to help synthesize the information from lectures and readings. Assignments should be handed in at the start of class on the due date. Each problem on the problem sets will have a pre-determined and clearly labeled point value associated with it. Partial credit on problems is possible, so please attempt all of the problems.

***Late assignments will not be accepted unless approved by the instructor prior to the due date/time.*

Assessment:

ATMO.4080 Grades will be based on:

- 10%** Class participation
- 10%** Group journal article presentation
- 40%** Problem sets
- 20%** Midterm exam
- 20%** Final exam

ATMO.5080 Grades will be based on:

- 10%** Class participation
- 10%** Group journal article presentation
- 40%** Problem sets
- 20%** Midterm exam
- 20%** Final exam

ATMO5080 will differ from ATMO4080 in two ways. Students enrolled in ATMO.5080 will complete additional components to the problem sets and exam questions. I also expect ATMO.5080 students to help facilitate class discussion.

Problem Set Schedule:

- Problem Set #1 assigned date, and **due date**
- Problem Set #2 assigned date, and **due date**
- Problem Set #3 assigned date, and **due date**
- Problem Set #4 assigned date, and **due date**

Exam Schedule:

The midterm exam will take place during week 7 (**date**).

The final exam will take place during finals week (date).

Student Mental Health and Well-being

We are a campus that cares about the mental health and well-being of all individuals in our campus community, particularly during this uncertain time. If you or someone you know are experiencing mental health challenges at UMass Lowell, please contact [Counseling Services](#). They will be offering free in-person counselling for all students.

Disability Services

If you have a documented disability that will require classroom accommodation, please notify me as soon as possible, so that we might make appropriate arrangements. Please speak to me during office hours or send me an email, as I respect, and want to protect, your privacy. Visit the [Student Disability Services webpage](#) for further information.

Additionally, Student Disability Services supports software for ALL students. Read&Write Gold is literacy software that allows you to read on-screen text aloud, research and check written work, and create study guides. You can download the software from the IT Software webpage on the UML website: [IT Software page](#)

Diversity, Inclusion, and Classroom Community Standards:

UMass Lowell—and your professor—value human diversity in all its forms, whether expressed through race and ethnicity, culture, political and social views, religious and spiritual beliefs, language and geographic characteristics, gender, gender identities and sexual orientations, learning and physical abilities, age, and social or economic classes. Enrich yourself by practicing respect in your interactions, and enrich one another by expressing your point of view, knowing that diversity and individual differences are respected, appreciated, and recognized as a source of strength.

Academic Integrity Policy:

All students are advised that there is a [University policy regarding academic integrity](#). Students are responsible for the honest completion and representation of their work.

University Privacy Statement

UMass Lowell recognizes the importance of mutual trust between students and faculty. Massachusetts is a two-party consent state, which means it is illegal to record someone without their permission. Recordings of classroom lectures are the intellectual property of the instructor. Instructors have the right to prohibit audio and video recording of their lectures, unless the requesting student is registered with Disabilities Services and recording of class sessions is an

approved accommodation. In addition, sharing or selling recordings of classroom activity, discussions or lectures with any other person or medium without permission of the instructor is prohibited.

Health and Safety

The safety and health of the UMass Lowell community is our shared priority. In seeking to provide the fullest academic and campus life experience possible, UMass Lowell will rely on all members of our community to act responsibly. For the latest updates on UMass Lowell's COVID policies, please visit www.uml.edu/coronavirus.

UMass Lowell has implemented reasonable health and safety protocols in accordance with national and state public health guidelines. These standards apply to anyone who is physically present on campus or participating in a UMass Lowell-sponsored activity.

- **Daily Symptom Checker:** All campus community members should use the [daily symptom checker](http://www.uml.edu/alert/coronavirus/COVID-19-symptom-review.aspx) (www.uml.edu/alert/coronavirus/COVID-19-symptom-review.aspx) every day prior to leaving your home, apartment or room.
- **Vaccination:** COVID-19 vaccination is required for ALL students (with rare and approved exceptions). Please visit Mass. Vaccine Finder (vaxfinder.mass.gov) to find vaccine locations.
- **Face Coverings:** Face coverings are required for all faculty, staff, students, vendors and visitors regardless of vaccination status in nearly all indoor common spaces, including classrooms, instructional laboratories, meeting rooms, work areas, break rooms, hallways, elevators and restrooms. Face coverings are not required outdoors. Faculty may opt to remove face coverings when teaching.