ATMO.5050
Atmospheric Measurements and Data Analysis

Semester, Year
Time, Location
3 Units

Course Description:

Against the backdrop of unprecedented global environmental change, meteorological and climatological observations have been thrust into the scientific and public spotlight. ATMO.5050 explores the range of instrumentation, measurement principles, and data analysis techniques used to monitor Earth's ever-changing weather and climate. From hands-on work with state-of-the-art field instruments, including a brand new campus weather station, high-altitude weather balloons, sonic anemometers, and lidar systems, to computational data processing and visualization with Python, students will gain a broad set of skills that will position them to succeed in both observational and computational atmospheric/environmental science sub-fields.

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. Collect standard atmospheric measurements using discipline-specific best practices.
2. Install, deploy, and program state-of-the-art atmospheric instrumentation.
3. Process and analyze environmental data with academic and industry standard software.
4. Dissect, interpret, and critique scientific journal articles.
5. Write data analysis scripts using Python and Jupyter Notebooks

Prerequisites:

MATH 1310 Calculus I
PHYS 1410 Physics I
ENVI 2020 Earth Systems: Atmosphere and Oceans

Instructor:

Christopher Skinner   Olney Hall 301b   christopher_skinner@uml.edu

Office Hours:

Primary office hours will be held on (day and time) (after class). Otherwise, please email me to schedule individual meeting times.

Textbook:

Meteorological Measurements and Instrumentation, by R. Giles Harrison, 2015.

Link to online version of the textbook:
https://ebookcentral.proquest.com/lib/uml/detail.action?docID=1813671

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.

Data Analysis Assignments
There will be four (4) data analysis assignments. In these assignments, students will collect and analyze real weather/climate data. 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.

Group Project
Students will work in groups to design and execute a "field campaign" project to collect and analyze data to observe an atmospheric phenomena. Groups will have access to meteorological instruments from class. At the end of the semester each group will hand in a written report detailing the phenomena, instrumentation, analysis techniques, and results of the project, and will present their findings to the class.

**Late assignments will not be accepted unless approved by the instructor prior to the due date/time. In fairness to your classmates, if your assignment is late and you have not made prior arrangements, you will receive no points on the assignment.

Assessment (UPDATED TO REFLECT ONLINE COURSE):
ATMO.5050 Grades will be based on:
- **10%** Class attendance and participation
- **15%** Data Analysis Assignment #1
- **15%** Data Analysis Assignment #2
- **15%** Data Analysis Assignment #3
- **15%** Data Analysis Assignment #4
- **30%** Group Project

Course Topics:
Types of meteorological observation systems; station siting; calibration; measurement error and uncertainty; signal processing; upper air instruments; data analysis techniques with Python.

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 (www.uml.edu/alert/coronavirus/COVID-19-symptom-review.aspx)](http://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.