Atmospheric Measurements

Physics 650
Spring 2022
Lecture: Physics 107, Mondays 1:00 – 2:15 PM

Webex: https://umbc.webex.com/umbc/j.php?MTID=m919de1cc3cfbd1e6c17be19a3662e2f6

INSTRUCTORS

Dr. Ruben Delgado (delgado@umbc.edu)
UMBC Phys Rm 428
Cell: (301) 512 6638, voice: (410) 455 1936
Office Hours: After class, or by appointment.

Dr. Belay Demoz (bdemoz@umbc.edu)
UMBC Phys Rm 426

Dr. Zhibo Zhang (zzbatmos@umbc.edu)
UMBC Phys Rm 418

COURSE DESCRIPTION

PHYS650 is a course that discusses the basic concepts and principles of atmospheric measurements with hands-on experience of commonly used instruments to measure aerosols, gases and meteorological variables. Instrumentation, theory, data analysis and applications from ground based lidar, soundings, sun photometers and spectrometers will be covered.

Prerequisite: Physics 621 and 622 (or instructor's permission). We use and expand on concepts from these two classes. Is assumed that you have some experience with data files from multiple formats (text, comma separated variables, netcdf, hdf, h5) and source code (Matlab or Phython) to process them. Data files from multiple instruments will be provided or downloaded over the web with the intention for you to explore and reinforce concepts discussed in class.

OFFICE HOURS

Typically, we will be available after lectures to answer questions, and you can always contact us using email to arrange for an online meetings. You can also come to our campus office(s). Changes on how to meet will be based on accordance to UMBC COVID-19 pandemic protocols.

LEARNING OBJECTIVES

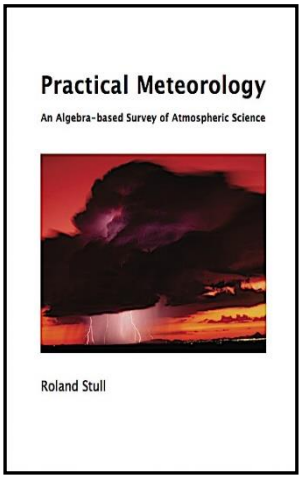
By the end of the course you will develop an understanding of basic concepts and principles in atmospheric measurements commonly used in meteorology, air quality, wind energy, atmospheric chemistry and physics applications. Specifically, you should be able

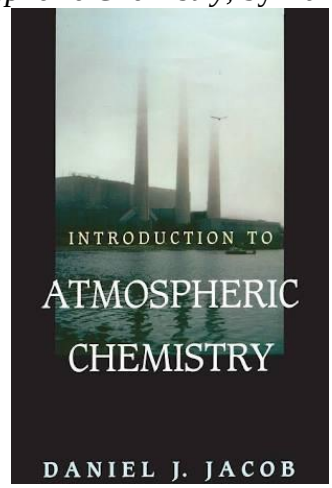
- To understand the basic principles and components of the instrumentation
  - Instrument operation (calibration/validation)
  - Inherent uncertainties
  - Advantages and limitations
  - Data acquisition and quality assurance
- To interpret and/or describe observations of physical and chemical atmospheric phenomena.
- To get comfortable with the operation/use of several commonly used atmospheric instruments
  - Elastic Aerosol/Cloud lidars
  - Meteorological soundings (weather balloons)
  - AERONET sun photometer
  - PANDORA spectrometer
- To incorporate any of the measurements discussed in class your current research projects: observation of atmospheric physics processes, validation and verification of satellite and modeling data products, etc.

COURSE MATERIALS

Since there will be a wide variety of topics presented in class during the semester, the chosen textbooks below can be a resource for you to review the atmospheric concepts/phenomena related to the measurements that we will work on. In addition, we will be providing, via Blackboard, material from other books or articles related to the measurements itself.

- **Online Textbook 1:** *Practical Meteorology: An Algebra-based Survey of Atmospheric Science* by R. Stull **(**https://www.eoas.ubc.ca/books/Practical_Meteorology/)
  Online Textbook 2: *Introduction to Atmospheric Chemistry*, by Daniel J. Jacob, 1999





(https://acmg.seas.harvard.edu/education/introduction-atmospheric-chemistry)

GRADING

The final grade will be determined from

Class participation	20%
Homework	40%
Presentation	20%
Written Report	20%

Grade breakdown: (A) 90-100, (B) 80-89, (C) 70-79, (D) 60-69, (F) below 60.

Class Participation

You are expected to attend class regularly. We have invited speakers to discuss technology, retrievals and applications for each of these instruments. Your presence in class is a kind of participation. Participation also means to do the readings carefully and contribute significantly to our discussions. You should come to class having read the assigned material for that day and withsomething to say about it.

Homework

Homework will be submitted **before midnight of the due date.**

Is strongly encouraged to work in groups,but the final turned-in homework should represent *your* work. Also, avoid turning in late homework – it is unfair both to your fellow students and to us.

Hands on Demonstration

The goal of this course is for students to gain experience to handle multiple instrumentation. Demonstration when not suitable to be performed in the classroom will be done at a separate day and time agreed in class. For that purpose, this activity will require to students pair up or work on group of 3.

Project (Presentation and Written Document)

The motivation behind this course is to provide a baseline understanding of the instrumentation that allows you to understand the basic concepts and principles in atmospheric measurements. **EACH OF YOU** will be asked to give a 12-minute presentation **AND** written document (approximately 10 pages: Times New Roman 12 pt font and single spacing) where you will discuss how the measurements discussed in class can/are/will be used for your current research or thesis project (e.g. validation/verification, calibration, observations, intercomparing instruments). References will not count against the 10 pages. Written document will be due Wednesday May 25 at 11:59 pm EDT. Day of presentation will be announced at later time to minimize interference of other ATPH courses.

COURSE SCHEDULE

Below current class schedule for this semester *and is subject to change.*

Date	Topic
January 31	Course Overview and Lidar
February 7	Lidar
February 14	Lidar
February 21	Lidar*
February 28	Soundings
March 7	Soundings
March 14	Soundings
March 21	**Spring Break**
March 28	AERONET
April 4	AERONET
April 11	AERONET
April 18	AERONET
April 25	PANDORA
May 2	PANDORA
May 9	PANDORA
May 16	PANDORA
May 25	End of Semester

* Guest Speaker (s)

COURSE POLICIES & RESOURCES

Attendance policy

You are expected to attend class regularly. Your presence in class is a kind of participation. Therefore, more than 2 unexcused absences will lower your grade. More than 4 such absences may result in failure of participation grade. It is your responsibility to inform instructors of any extenuating circumstances affecting attendance or class performance.

Cellphone policy

Cellphones may be brought to class, but please remember to silence them. If you are expecting an urgent call about a private matter, you are exempt from this policy; but please let us know about this ahead of time.

Late Policy

Late assignments are only accepted under extenuating circumstances. The course instructor will exercise increased flexibility considering the COVID-19 pandemic.

Course caveat

The itinerary for the course is subject to change. In case of any emergency or unforeseen obstacles the instructor will email students with information regarding the changes or accommodations made. In the event of a major emergency (other than the COVID-19 pandemic), course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Every student is responsible for checking their mail and being informed about any changes to the course schedule.

Diversity Statement

Our role as an instructor is not to convince you to share my beliefs. My mission is to help you develop your critical thinking and analysis skills so that you can form strong arguments and support them.

UMBC's Vision Statement

Our UMBC community redefines excellence in higher education through an inclusive culture that connects innovative teaching and learning, research across disciplines, and civic engagement.

Technology: Access, Requirements, Resources, Support

To help ensure that UMBC students are equipped for academic success, the Division of Information Technology (DoIT) provides a wealth of resources and support, including tips for getting online and minimum specifications to consider when purchasing a computer. To learn more about the resources and support that DoIT offers to students, visit doit.umbc.edu/students. If you are experiencing technological difficulties or if you lack reliable access to computer hardware or an internet connection, please notify the course instructor as soon as possible.

COVID-19: Safety Expectations and Guidelines

Students enrolled in this course are expected to adhere to all UMBC policies, rules, and regulations, including COVID-19 emergency health and safety rules, policies, guidelines, and signage enacted for the UMBC community.

Academic Integrity

UMBC's policy on academic honesty is in effect. By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal. These principles and policies apply in both face-to-face and online classes. Resources for students about academic integrity at UMBC are available at https://academicconduct.umbc.edu/resources-for-students/.

If you have any questions concerning plagiarism, refer to the Purdue Online Writing Lab (OWL) at http://owl.english.purdue.edu/owl/printable/589

Resources to Help you Succeed in Courses

Many students need additional support to succeed in courses. Helpful resources:

- UMBC's Academic Success Center (ASC) provides a range of resources to support students as they progress toward degree completion. They will continue to offer all of their services online.
- The ASC has created a specialized set of Online Learning Resources.

In addition, check out the following resources:

- Tutoring and Instructional Support: Online tutoring and writing support, supplemental instruction, study sessions, academic success meetings, placement testing, academic advocacy, first year alerts, and academic success meetings.
- Academic Advocates: Advocates work one-on-one with students who need support navigating academic and institutional challenges that may adversely affect their persistence, progression and timely completion of degree. No matter how complex the concerns (i.e., personal, academic, or financial), Academic Advocates will work together with students to review their progress, present options toward graduation, map out a plan for success, and facilitate communication and connections with the appropriate campus resources.

Enrollment Dates and Deadlines

Students must be familiar with the academic policies and enrollment dates and deadlines as published in the Undergraduate Catalog and the Academic Calendar. They are also responsible for managing their course enrollment(s) accordingly.

Accessibility and Disability Accommodations, Guidance and Resources

Support services for students with disabilities are provided for all students qualified under the Americans with Disabilities Act (ADA & ADAAA) and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that would create equal access for students when barriers to participation exist in University courses, programs, or activities.

If you have a documented disability and need to request academic accommodations in your courses, please refer to the SDS website at sds.umbc.edu for registration information and office procedures.

SDS email: disAbility@umbc.edu
SDS phone: (410) 455-2459

If you will be using SDS approved accommodations in this class, please contact me (instructor) to discuss implementation of the accommodations.

Religious Observances

UMBC Policy provides that students should not be penalized because of observances of their religious beliefs, students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the responsibility of the student to inform the instructor of any intended absences for religious observances in advance, and as early as possible. For questions please contact the Office of Equity and Inclusion at oei@umbc.edu.

Hate, Bias, Discrimination and Harassment

UMBC values safety, cultural and ethnic diversity, social responsibility, lifelong learning, equity, and civic engagement. Consistent with these principles, UMBC Policy prohibits discrimination and harassment in its educational programs and activities or with respect to employment terms and conditions based on race, creed, color, religion, sex, gender, pregnancy, ancestry, age, gender identity or expression, national origin, veterans status, marital status, sexual orientation, physical or mental disability, or genetic information.

Students (and faculty and staff) who experience discrimination, harassment, hate or bias or who have such matters reported to them should use the online reporting form to report discrimination, hate or bias incidents; reporting may be anonymous.

Sex and Gender Based Violence, Harassment and Discrimination

Any student who is impacted by sexual harassment, gender-based harassment, sexual assault, sexual coercion, relationship violence, domestic violence, sexual exploitation, sexual intimidation, sex, gender-based stalking or retaliation or gender or pregnancy discrimination is encouraged to seek support and resources. You can access support and resources even if you do not want to take any further action. You will not be forced to file a formal complaint or police report. Please be aware that the University may take action on its own if essential to protect the safety of the community. As an instructor, I am considered a Responsible Employee, per UMBC's Policy on Prohibited Sexual Misconduct, Interpersonal Violence, and Other Related Misconduct I am required to report disclosures of possible violations of the Policy to the Title IX Coordinator, even if the experience occurred before youattended UMBC.

While I want you to be able to share information related to your life experiences through discussion and written work, I also want you to understand that I must report Sexual Misconduct to the Title IX Coordinator so that the University can inform you of your rights, resources and support.

If you need to speak with someone in confidence, who does not have an obligation to report to the Title IX Coordinator, about an incident, UMBC has the following Confidential Resources available to support you: The Counseling Center: 410-455-2742; University Health Services: 410-455-2542; For after-hours emergency consultation, call 301-314-7651.

Other on-campus supports and resources:

The Women's Center (for students of all genders): 410-455-2714;

Title IX Coordinator, 410- 455-1250.

Child Abuse and Neglect:

Please note that Maryland law requires that I report all disclosures or suspicions of child abuse or neglect to the Department of Social Service and/or the police.

Pregnancy

UMBC's Sexual Misconduct, Interpersonal Violence, and Other Related Misconduct Policy expressly prohibits all forms of Discrimination and Harassment on the basis of sex, including pregnancy. Resources for pregnant students are available through the University's Office of Equity and Inclusion. In addition, students who are pregnant may be entitled to accommodations under the ADA through the Student Disability Service Office, and/or under Title IX through the Office of Equity and Inclusion.

Title IX/ Sexual Misconduct

Title IX protects people from discrimination based on sex, including sexual and gender based harassment, sexual assault, sexual coercion, relationship violence, domestic violence, sexual exploitation, sexual intimidation, sex and gender based stalking and retaliation, in education programs or activities that receive Federal financial assistance. As a university that receives Federal financial assistance, UMBC complies with the requirements set forth in Title IX. UMBC does not discriminate on the basis of sex.

At UMBC, Title IX reports may be made through the online reporting form or you can contact the University's Title IX Coordinator to file a report or for inquiries:

Mikhel Kushner, Title IX Coordinator
Office of Equity and Inclusion
Administration Building, Room 914
410-455-1250
kushner@umbc.edu

UMBC's Sexual Misconduct Policy and Procedures

The Office of Equity and Inclusion is responsible for ensuring UMBC's compliance with state and federal training requirements. Both faculty/staff sexual violence prevention training are offered online through SafeColleges. Online student training will also be offered in Fall 2021. Please visit website for more information about training. The University of Maryland, Baltimore County ("University" or "UMBC") values safety, cultural and ethnic diversity, social responsibility, lifelong learning, equity, and civic engagement. Consistent with these principles, the University does not discriminate in offering equal access to its educational programs and activities or with respect to employment terms and conditions on the basis of a UMBC community member's race, creed, color, religion, sex, gender, pregnancy, ancestry, age, gender identity or expression, national origin, veterans status, marital status, sexual orientation, physical or mental disability, or genetic information. At UMBC, discrimination reports may be made through the online reporting form or you can contact the University's Office of Equity and Inclusion to file a report or for inquiries:

OEI@umbc.edu
410-455-2735

Addition information is available:

U.S. Department of Education Office for Civil Rights
400 Maryland Avenue, SW
Washington, D.C. 20202-1328
OCR@ed.gov800-421-3481
TDD 800-877-8339