Syllabus: ATMO 170A1 Online
Introduction to Weather and Climate
Fall 2020

Course Description:

An introduction to the science of weather and climate. Topics are selected from atmospheric composition, energy balance, wind systems of the world, midlatitude cyclones and fronts, cloud types and formation, precipitation processes, severe weather, tropical cyclones, and climate change. Emphasis is placed on the importance of physics, chemistry, mathematics and biological processes to understanding weather and climate change. Fundamental principles of physics (e.g. conservation of energy, mass, momentum) are used to explain weather phenomena that can have strong impacts on human welfare and economic livelihood such as wintertime snow and ice storms, heat waves, drought, floods, thunderstorms, tropical cyclones, air-sea interactions (El Nino/La Nina events), regional air pollution, ozone depletion, and extreme weather events associated with a warming climate.

Course Homepage and Schedule:

http://www.atmo.arizona.edu/courses/mullen/home.html

Instructor:

Prof. Steven L. Mullen (DrM for short; easy to remember; quick to type)
Office: Harshbarger 234C (north side of 2nd floor)
Location: **http://www.atmo.arizona.edu/courses/mullen/HARSH.png**

Teaching Assistants:

Mr. Andrew Hoopes
Office: Harshbarger 203 (east side of 2nd floor, near elevator)

Office Hours (Office hours are subject to change with advance notice.)

Dr. Mullen: TR 12:00 − 1:30 pm MST (UTC-7) or by appointment.
All meetings will be held only by zoom until further notice.
Email: **mullen@arizona.edu**

Mr. Hoopes: MW 9:00 − 10:30 am MST (UTC-7) or by appointment.
All meetings will be held only by zoom until further notice.
Email: **cahoopes@arizona.edu**

The teaching team requests that you email them before coming to the office so an exact time can be scheduled to avoid simultaneous arrivals of students.

Course Goals

By the end of this course, students should be able to:

1) Interpret online weather products that are routinely produced by the National Centers for Environmental Prediction of NOAA and other online weather sites.

2) Critically evaluate the soundness of “weather and climate science” that appears in the mainstream media.
3) Make informed decisions on what to do about projected changes in extreme weather and climate that society faces.

Course Objectives

During this course, students will…

1) Gain a basic understanding of the fundamental conservation laws of physics.
2) Gain an understanding of how the laws of physics govern the evolution of the weather and climate of the earth’s atmosphere.
3) Learn about various weather systems that affect different regions of the world.

Learning Outcomes

By the end of this course, students should able be to:

1) Explain how the distribution of heating of the earth by the sun and energy transfer through the atmosphere drives weather and climate change.
2) Read surface weather maps and upper-air maps, and understand the connection between surface weather and conditions aloft in midlatitudes.
3) Recognize from weather maps commonly occurring, large-scale atmospheric phenomena, including midlatitude cyclones, upper-level troughs and ridges, jet streams, and trade winds, and their impact on local weather.
4) Identify commonly occurring, high-impact mesoscale weather phenomena such as severe thunderstorms and hurricanes, and recognize the larger-scale weather conditions in which they form.
5) Identify the primary cloud types and types of precipitation, and recognize their underlying formation mechanisms in terms of concurrent weather conditions.
6) Explain the impact that weather and climate have on life, and that life has on the evolution of the atmosphere and climate.

Attendance and Class Participation Policy

The UA’s policy concerning Class Attendance, Participation, and Administrative Drops is available at https://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop. Attendance is not taken in this iCourse

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable: https://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences preapproved by the UA Dean of Students (or dean’s designee) will be honored. See https://policy.arizona.edu/employment-human-resources/attendance.

Although “physical” attendance is not formally recorded for an iCourse course, students need to follow the schedule that is posted on the course homepage and not wait until the last minute to start and finish assignments.

Future absences will be excused if the instructor is given reasonable advance notice for participation in university-sponsored activities such as NCAA sporting

events or civic responsibilities such as jury duty, military deployment, etc. An after-the-fact excuse for an absence will be granted only for a very serious or life-threatening illness if the student provides documentation from their health-care provider that *they were too incapacitated to participate in an online class that does not formally meet*. Regardless of reason for absence, students are 100% responsible for all material that they miss and completing it in a timely manner.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at https://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop.

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable: https://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences preapproved by the UA Dean of Students will be honored. See https://policy.arizona.edu/employment-human-resources/attendance.

Make-Up Policy for Students Who Register Late

Students who register after the second week of the semester will not be allowed to make up any missed assignments and will not be offered extended deadlines for submitting upcoming assignments.

Course Communications:

Use the class list serve atmo170a1-online-fall20@list.arizona.edu (will become active during the first week of the semester) for issues of interest to the entire class such as questions on course concepts (e.g. "What is the difference between temperature and heat?")

Email is exclusively used for all instructor-student communications.

An email only policy serves the best interests of students and instructors alike. It ensures that there is a written record of all communication between students and the instructor. Since every student at the UA has unencumbered access to email, the policy does not impose an undue hardship on anybody. The policy means:

- Students have no reason to make an impromptu phone call to my office. So please do not do so.
- I do not answer "live" calls. I do not have a voicemail for office phone.
- I do not return unsolicited student phone calls if you leave a message with the front office of my home department. An email is needed for all requests.
- If you need to discuss a private matter with DrM over the phone, you must first schedule the date and a time by email.

Details on the email policy for the course (Netiquette) and communication expectations are described in a separate document that can be found in Content section of D2L. That document is mandatory reading, and its rules are to be followed to the tee. I provide a summary of the rules for email exchanges below.

Summary of Netiquette for correspondence with the teaching team

Email must adhere to the following rules and guidelines:

- **Critical**: Only send emails from your NetID@arizona.edu account; you can accomplish this by simply sending emails from within the **email feature in Classlist**. Emails that come from other addresses go directly to spam, never to be seen by my eyes.
- **Critical**: Start the subject line with the exact wording **ATMO170**, **ATMO 170**, **ATMO170A1**, or **ATMO 170A1**; these subject lines direct your email to my **ATMO 170A1** folder, which ensures that I will see and respond to your email in a timely fashion. Emails with other subject lines will get buried in the general inbox where they can quickly drop below the bottom of the screen amidst the onslaught of messages that I receive every day.
- **Critical**: Include a concise, explicit subject line that gives the reason for your email. If the email contains new subject matter, the email must have a fresh subject line. Do not append your email to top of an older thread with a subject line not relevant to your question.
- Include a proper salutation to start the body of your email. This is always a good practice for every professional correspondence that you send.
- Have a clear and apparent purpose. Short and sweet are the operative words.
- Include all relevant information pertaining to the purpose of the email.
- Strive to use proper paragraph structure and proper grammar. Nobody is perfect, but work to be by committing to improve your communication skills.
- Include a proper closing in every email. It is a good practice to do this in every professional correspondence that you write.

If all criteria are not met, **we probably will not acknowledge your email**.

Student use of **mullen@arizona.edu** is reserved **exclusively** 1) to schedule an appointment with DrM if it is not possible to come to office hours, 2) to discuss private matters with DrM about extenuating circumstances (defined below) that could adversely affect your performance in the course, or 3) to schedule a phone call to the DrM if you are located far off campus. Use the list serve for questions related to the course material: **atmo170a1-online-fall20@list.arizona.edu**.

We strive to respond to student emails that warrant a reply within two weekdays. Replies during the weekend may be spotty at best.

Required Course Materials:

Course materials are being delivered digitally via D2L through the Inclusive Access program. (https://shop.arizona.edu/textbooks/Inclusive.asp) Please access the material through D2L immediately to make sure there are no issues in the delivery, and if you are having a problem or question, it can be addressed quickly.

You automatically have access to the course materials FREE through the first 14 days of the semester. If you do not wish to participate in Inclusive Access, you have until the add/drop day to opt-out of the program online (the opt-out procedure will be outlined in your emailed information). If you opt-out by the deadline given, access to the online content will be turned off and you will not be

billed. You **must** take-action (even if you haven't accessed the materials) to opt-out if you do not wish to pay for the materials, and choose to source the content independently. **The deadline to opt-out for 15-week courses that begin Monday, 24 August 2020 is before 9:00 pm MST Sunday, 6 September 2020**.

You have access to the course materials FREE through the first 14 days of the semester. The cost includes access to the eBook though the entire semester. You will be charged $45.42 (Fall 2020 price) for the book by the Bursar's Office unless you cancel the subscription before 9:00 pm MST Sunday, 6 September. The Inclusive Access Program with D2L access is one of the cheapest available eBook options, but it might not be the cheapest eBook version. In fact, after testing the D2L interface to the Inclusive Access version of the textbook (which I find clunky), I recommend considering another eBook version. Kindle versions of the book are available at Amazon for $43.99 (pricing current as of 3 August 2020). An Adobe eBook version (ISBN 978-1-108-27127-1) is also available through the Publisher (Cambridge University Press) for $58.00. (Prices current as of 3 August 2020 and exclude any applicable taxes.) An advantage of Kindle and Adobe eBook versions is that you have (to the best of my knowledge) no time limit on how long you can access the book. If you purchase a digital version of the book from a third party, be certain to cancel the Inclusive Access Program within the first two weeks of the semester to avoid being billed by the Bursar's Office (before 9:00 pm MST, 6 September 2020).

For additional information on the Inclusive Access, please see FAQs at https://shop.arizona.edu/textbooks/Inclusive.asp.

"But I want a physical copy of the textbook instead of the online version. What should I do in that case?"

Step one: Cancel your Inclusive Access before the deadline above if you absolutely do not want access to the digital text.

Step two: Pertinent details on a physical copy of the textbook are the following. Hakim, G. and J. Patoux, Meteorology: *A Concise Introduction.* First Edition. ISBN: 978-11-108-40465-5 softback. ISBN: 978-1-108-41716-7 hardcover.

If you would rather have a bound copy of the textbook instead of a digital version, the ISBN is 978-1-108-40465-5 for paperback and 978-1-108-41716-7 for the hardback. Hard copies are available special order from the ASUA Bookstore, from the publisher (http://www.cambridge.org; search "Hakim and Patoux") and from several online vendors. Amazon lists the cost of a new softcover at $71.99 and a new hardcover at $117.23. (Prices are current as of 3 August 2020, excluding taxes.) Used copies may be available online for much less since the first printing of the book was January 2018. Again, if you purchase a physical copy of the book, be certain to cancel the Inclusive Access Program within the first two weeks of the semester to avoid being billed.

Note if you not use the Inclusive Access option, you will not have access to any supplemental materials that may accompany the textbook, etc.

Bottom line: wherever you get the textbook and whatever version you use is a personal decision. Just get access to textbook and start reading it. Now. There is a lot of meaty, required reading for this course, and it starts day one. The length of assigned reading from the textbook ranges between 60-80 pages per quiz.

Do not fall behind the assigned reading.
If you do, you are likely doomed.

Final Point: There may be other mandatory or extra credit readings throughout the term. They would be announced and posted in due course.

Pacing of the Course

The pacing of the course is regulated though the use of modules. There are four modules in total, and they must be taken in sequential order. Each module contains mandatory readings, associated homework assignments, and a closing quiz that emphasizes questions on material covered in that module. Each module lasts about 3.5 weeks and contains about the same amount of material as the others.

Course Grading Scale

Your letter grade for the course will be based on the following scale, where P is the percentage of total course points earned.

P ≥ 90%	90% > P ≥ 80%	80% > P ≥ 65%	65% > P ≥ 50%	50% > P ≥ 0%
A	B	C	D	E

The grading scale is designed to give every student the opportunity to earn a passing grade for the course (D or higher) if they perform to a reasonable level of achievement. An absolute scale also provides every student the opportunity to earn a superior mark (A) if they perform at a superior level.

Grading Descriptions

Course points are allocated according to the following weighting.

1) **Quizzes**: 30%. Four total quizzes. The three highest scores are retained with each retained quiz contributing 10% to the course grade.
2) **Self-assessments**: 12%. 14 total assessments. The 12 highest scores are retained with each retained assessment contributing 1% to the course grade. Self-assessments can be considered “practice quizzes”.
3) **Homework**: 28%. Approximately 8 assignments; each is worth a varying amount of credit. Three or four of the assignments are writing exercises of one to two pages in length.
4) **Term Project**: 30%. The term project will be submitted in two steps. You must submit every step on time to qualify for full credit. The project involves a diagnosis of a weather event for either KMSP (fall) or KDFW (spring).
5) **Extra Credit**: 5%. Syllabus quiz. Other avenues to earn extra credit may appear throughout the term in the form of extra credit homework assignments or extra credit questions on quizzes, but there are no guarantees.

You have no more than three weekdays (excluding UA holidays), or 72 hours, to dispute a score on a quiz or an assignment. For example, if you receive a score on Wednesday, you must raise the issue no later than the following Monday by an email that gives specific reason(s) why you believe the score is wrong. After three days pass, the original score stands.

Note that: **Quizzes are never curved or rounded up.**
Assignments are never curved or rounded up.
Course grades are never curved or rounded up.
Extra credit projects for individuals are never offered.

Treat every possible point as precious, because it is. Plan ahead. Do the reading; study hard; manage your time wisely. You will find that it is worth the effort.

Quiz Day Procedure:

Each quiz will consist of *approximately* 25-30 total questions in the form of multiple-choice, matching, fill-in-the-blank, numerical answers or short written answers. Quizzes focus on material that was covered since the prior quiz. You will have *approximately one minute per question* to finish a quiz from the moment that you open it. For example, you would get something like 30 to 60 minutes to complete a quiz with 30 questions (not counting any extra credit questions).

Examity: We will be using web-based service *Examity* for online authentication of test takers and proctoring of exams to provide a level of security for test taking. Examity allows students to create student profiles, to schedule a time to take the quiz, and to connect test takers with proctors on the day of the test. Examity is integrated with D2L. Instructions on how to register for Examity and its use on quiz days are given on D2L.

There are two big advantages with using the Examity proctoring service. Its use ensures that the highest standards of academic integrity are maintained in this course and it allows the quizzes to be open for 72 hours for scheduling flexibility.

The dates of the four quizzes are listed below. These dates are firm. So, put them in your planner. Now. All dates/times are local Arizona time (GMT-7) or Mountain Standard Time (MST).

Quiz 1	Quiz 2	Quiz 3	Quiz 4
Sept 15 Tuesday Sept 17 Thursday	Oct 12 Monday Oct 14 Wednesday	Nov 10 Tuesday Nov 12 Thursday	Dec 7 Monday Dec 9 Wednesday

Quizzes are active for 72 hours starting at 12:00 am MST on the top date listed. For example, **Sept 15 Tuesday/Sept 17 Thursday** means the quiz opens at 12:00 am MST Sept 15 and must be submitted by 11:59 pm MST Sept 17.

No Final Exam:

UA policy mandates that “All courses offered for credit shall include a final examination or a summative assessment (e.g. portfolios, essay, project reports).”

See *Policy Memo: Final Examination Regulations and Information* at https://www.registrar.arizona.edu/courses/final-examination-schedule-fall-2020.

The term project serves as the summative assessment in this course.

Hence, there is no final exam.

Estimated Due Date of the Mandatory Term Project

The term project will be submitted in two stages. Stage one (data and graphs) will be due sometime in early **October,** and stage two in early **November**. The project will involve a review process and opportunity for revision through interactions with the Writing Center. Again, these are estimated dates. Details about the project and exact due dates will be forthcoming later in the term.

Due Dates of Homework Assignments

There are approximately eight homework assignments, about half of which are writing assignments. Each assignment is worth a varying amount of points. Due dates will be given with ample advanced notice. There are no extensions on the homework assignments.

Scheduled Topics and Readings

See course homepage for an evolving schedule that has a list of course topics and required readings: http://www.atmo.arizona.edu/courses/mullen/home.html.

Policy on Make Up Exams and Assignment Extensions

A student may be granted permission in ***rare*** circumstances to take a quiz at an alternate time and/or hand-in assignments on a different due date if he/she is covered by one of the following conditions: 1) Travel due to participation in NCAA sporting events on test days. 2) Extenuating personal circumstances (e.g. *a debilitating* or *life-threatening* illness that requires emergency treatment or hospitalization; jury duty; military deployment).

Appropriate and verifiable documentation from the Dean of Students or the Dean's designee is required of any student who requests to take a quiz at an alternate time or submit an assignment after its due date.

Writing Requirement

ATMO 170A1, as a Tier I General Education course, is mandated as a writing intensive course (https://catalog.arizona.edu/policy/general-education-tier-one-and-tier-two). This requirement is satisfied by multiple writing assignments. One assignment includes the opportunity to revise a first draft of a paper and resubmit a presumably improved final draft based on student peer reviews. There will be writing assignments every 3 to 4 weeks that assess critical thinking skills. The capstone writing experience is a mandatory term project: Analysis of daily weather observations for Minneapolis MN (fall semester) or Dallas/Ft. Worth TX (spring semester) for a several week period. It involves the collection of data, its

graphical representation and scientific diagnosis in terms of course concepts to explain “Why the weather did what it did.” during the observation period.

As noted, the term project will be discussed in greater detail later in the course.

Quantitative Requirement

There is a science literacy requirement. This means scientific notation is used for writing numbers (especially rather large or small ones). We specify units for physical quantities (e.g. meters for length, kilograms for mass, seconds for time). We attempt to quantify physical relationships based on empirical evidence, physical reasoning, governing laws of physics, and everyday life-experiences.

Student Expectations

Dedicate yourself to success. Keep an open mind. Be an active learner. Think about what you are reading as you read it. Keep up with the reading. Ask questions over the class list serve whenever you encounter difficult or confusing material. Stay positive. You earn almost 60% of your course grade during the second half of the term. The term project alone is worth 30% of your grade.

The keys to passing the course are simple, commonsense measures.

1) Devote enough time to master the course. The most successful students spend an average of 8-10 hours per week on the course. The time that you need to master the course might be a little more or a little less, and it will certainly vary from one week to the next.
2) Do every assignment. Take every quiz.
3) Submit every assignment on time. ***I do not accept late assignments in the absence of extenuating circumstances as defined in this syllabus.***
4) Log into the D2L course homepage at least three times a week (on different days) to read the latest Announcements.
5) Promptly read every email that I send.
6) Be professional. Always do your best work by giving your best effort.

The formula for success is simple:

Sincere Effort + Enough Study Time + Submitting Every Assignment on Time => Passing Grade.

Reading assignments, due dates and other requirements will be posted on D2L, either in the Announcements, the Content section and/or the Calendar. Some may also be announced by email over the D2L Classlist. You are expected to complete assignments and quizzes on your own without prodding or reminders from the teaching team. Unless you hear otherwise, you are always responsible for the reading material. You are encouraged to ask questions about the material over the course list serve or during office hours. In accordance with the policy set by the Arizona Board of Regents (ABOR), I expect every student to devote *a minimum of three hours per week for every unit of course credit* to studying, reading, etc. Since ATMO 170A1 is a three-unit online course that does not

formally meet face-to face in a classroom, the weekly expectation is a ***minimum*** of 9 hours. See ABOR Definition of One Unit of Credit: https://public.azregents.edu/Policy Manual/2-224-Academic Credit.pdf and https://catalog.arizona.edu/policy/credit-definitions.

Honors Credit

ATMO 170A1 Online is not available for Honors credit.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of an individual's effort unless otherwise instructed (e.g. group work). Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See https://deanofstudents.arizona.edu/policies/code-academic-integrity https://deanofstudents.arizona.edu/student-rights-responsibilities/student-academic-integrity-resources.

The University Libraries have some excellent tips for avoiding plagiarism; they are located at https://new.library.arizona.edu/research/citing/plagiarism. I consider the material in this link to be mandatory reading as part of the syllabus.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Providing student email addresses to a third party is not permitted. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of electronic resources provided by The University of Arizona; an example of such a violation is distributing course materials from the D2L site on a publicly assessable online site. This conduct may also constitute copyright infringement.

Classroom[1] Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed.

Students who engage in disruptive activity will be asked to cease such behavior immediately. Those who continue to disrupt the class will be reported to the Office of the Dean of Students.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See

[1] Classroom refers to the virtual classroom experience for an online course.

https://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

UA Nondiscrimination and Anti-Harassment Policy

The University is committed to creating and maintaining an environment free of discrimination and harassment; see https://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy.

Our virtual classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Face Covering Student Compliance Guidelines

Although use of face masks is not relevant to our iCourse, I remind students of the "We Wear Because We Care" guidelines for those who are in formal learning spaces. See https://deanofstudents.arizona.edu/welcome/face-coverings. You are expected to comply with the face covering directive and other public health protocols (e.g., physical distancing) in our campus spaces, using the protocol below.

Accessibility and Accommodations

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations.

Additional Resources for Students

UA Academic policies and procedures are available at https://catalog.arizona.edu/policies.

Student Assistance and Advocacy information is available at https://deanofstudents.arizona.edu/support/student-assistance.

Important Dates: https://www.registrar.arizona.edu/dates-and-deadlines.

Confidentiality of Student Records

https://registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa.

Reasonable Change Statement

Information contained in this syllabus, **other than the grading policy**, is subject to minor changes with advance notice, as deemed appropriate by the instructor.

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