MET 1010: Introduction to Weather and Climate

Department of Geography
College of Liberal Arts & Sciences, University of Florida

COURSE SYLLABUS

Instructor:	**Dr. Esther Mullens**	Term:	Fall 2021
Office:	**TUR 3138**	Class Meeting Days:	**Tues, Thurs**
Phone:		Class Meeting Hours:	**P4&5 (T), P4 (R)**
Email:	**emullens@ufl.edu**	Class Location:	**MCCA3194 (T), TUR 3012 (R)**
Office Hours:	Tues and Thurs 1-2.30pm, or by appointment*	Course Credits:	3 hours

*Office hours in-person or via zoom. You will be required to wear a mask while in my personal office.

I. Course Overview

In this class we will learn the scientific fundamentals of Earth's atmosphere and weather systems, and gain understanding of how Earth's climate system operates. We will learn about energy balances, global and regional circulation, airmasses, fronts, and storms. We will discuss weather modeling and forecasting and evaluate how Earth's climate is changing. Throughout, we will consider the impacts of weather and climate on society and the natural environment.

II. Pre-requisites: None

III. General Education Objectives

This course is a physical science (P) subject area course in the UF General Education Program.

Physical science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the physical sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern physical systems. Students will formulate empirically-testable hypotheses derived from the study of physical processes, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

These general education objectives will be accomplished through:

- Explaining the fundamental basic science underlying the Earth system. Each class, lecture content will provide the theoretical and scientific basis for how Earth's atmosphere works, tackling different facets of this system and its impacts as we move from week-to-week.
- In-class content that will be reinforced through multimedia, interactive exercises, and group-work
- Defining key concepts and terms in atmospheric science, to differentiate weather from climate, and to explain how weather systems evolve using what we know of the physical science.
- Quiz and project work will help students to test their understanding and apply their learning to regions of the world that interest them.

IV. Student Learning Outcomes

Learning Goals for this course

- Students will be able to **define** the terminology and tools of basic meteorology,

- Students will **describe** fundamental concepts regarding the Earth's climate, energy flows, atmospheric profile, circulation, and weather systems.
- Students will **explain** the physical processes and vulnerabilities associated with the development and evolution of extreme weather, and its impacts on society and the natural world.
- Students will be able to **identify** key features on weather maps, including temperature, humidity, and winds.
- Students will **compare and contrast** weather versus climate and **explain** how climate variability and change impacts their region (e.g., Florida) or another region of interest.
- Students will **apply** their knowledge by interpreting weather forecast model data and describing their prediction for a selected region.
- Students will **critically evaluate** and **communicate** ideas and physical concepts in a global context
- Students will **obtain** key skills that employers desire, such as critical thinking, problem-solving, individual and group work, and written/oral communication.

General Education Learning outcomes: At the end of this course, students will be expected to achieve the following learning outcomes in content, communication, and critical thinking:

Content: *Students will identify, describe, and explain the basic concepts, theories and terminology of natural science and the scientific method; the major scientific discoveries and the impacts on society and the environment; and the relevant processes that govern biological and physical systems*

- **Achievement of this learning outcome** will be assessed through in-class activities, including (but not limited to) short written and/or map-based exercises, current or recent case studies, iClicker quizzes and surveys. Outside of the classroom, students will participate in online short answer assessments, quizzes, and the semester-long project, which will holistically address course content through testing student ability to construct clear and evidence-based information about the weather and climate of two regions of their choice. Two exams (midterm, and final) will examine student ability to retain, understand, and apply what they have learned without the aid of substantial notes.

Communication: *Students will learn to communicate scientific knowledge, thoughts, and reasoning clearly and effectively*

- **Achievement of this learning outcome** will be assessed through assignments that challenge them to write and communicate clearly using various styles. For example, the semester project consists of a series of "Weather Blogs" that require students to translate what they are learning into the context of regions of their choice, requiring a combination of course application, and personal research. This information should be synthesized into a narrative-based examination that is both educational and imaginative. In-class activities, and individual exercises help students to develop clear and accurate lines of reasoning and evaluate the credibility of their arguments. Clear rubrics are provided in Canvas for each form of communication required for this course.

Critical Thinking: *Students learn to formulate empirically testable hypotheses derived from the study of physical processes or living things; apply logical reasoning skills effectively through scientific criticism and argument; and apply techniques of discovery and critical thinking effectively to solve scientific problems and to evaluate outcomes*

- **Achievement of this learning outcome:** Students will reason with course content, current and recent literature, and visual data in the class activities, homework, and projects to gain competence in interpreting meteorological information. Students will learn to construct science-based arguments for describing key processes in weather and climate, and to at times examine contrasting information and discern and explain what is true or false, or somewhere in-between.

V. Materials and Supplies:

Laptop Computer

The live portion of this course will be held in two locations. On TUESDAYS, we meet at MCCA3194, and on THURSDAYS we meet at TUR 3012. Both locations are generic classrooms, with access to power points but with no computer terminals. Students may bring a personal computer to class for note taking (this is not required for most in-class activities unless I specifically state so. At times, the instructor may request that you put the lid down, in which case do so! Any required software (such as Microsoft Excel, Word, Power Point) will be available on students' laptops through UF Apps at https://info.apps.ufl.edu.

iClicker

iClicker technology will be used in this class. **You must use** the iClicker cloud (iClicker Reef) for computer and/or smartphone, which is available through subscription. For more information: https://www.iclicker.com/pricing.
You may use your smartphone or tablet to participate in iClicker activities, however you should expect to keep your phone out of sight or on your workspace face down at all other times!

VI. Required Texts and Useful Online Resources

There is no required text for this class however, it is **recommended** that you have a copy of the following text if you desire a more complete and deeper understanding of the material and/or plan to major in a related field…

"Understanding Weather and Climate (4th Edition and up)", by Aguado and Burt. This book is available via Amazon and other retailers. The e-book is acceptable. We will not be using the subscription to online material provided by the publishers of this book. Contact me with any questions.

Supplemental reading options will be provided from that text. However, the course notes and other readings available via canvas will be comprehensive and cover the needed material. Course notes will be supplied through **https://elearning.ufl.edu/.**

VII. Course Format, Activities, and Basis for Evaluation

This is primarily a lecture-based class, but with as much 'active learning' as I can reasonably stuff in given class size and resources. During the peak of the pandemic, we all became accustomed to online learning, with the advantages of recorded lectures and so on. However, UF has now returned to full in-class instruction, and as such, there will be no recording of lectures with the exception of circumstances such as instructor absence. **Important material will be covered in every class**. We will use a combination of slide-based lectures, multimedia presentations, and in-class and online participation. The relevant class notes, and readings, will be available on canvas at least 24-hours prior to the class. Please be prepared to read, print and/or retain those notes. I strongly advise that you listen well during class and take good notes for yourself. Laptop-based notes are acceptable; however, research has demonstrated that hand-writing your notes leads to better outcomes in terms of retention and class performance, therefore I encourage you to use this approach if you are able. The subject of weather and climate cannot be fully appreciated without the synthesis of the many topics we learn about throughout the semester. **This course will cover an abundance of material**; therefore, it is particularly important that you keep up with the assignments as well as attending class regularly. Your participation score and overall performance in this course will suffer if you regularly skip class.

Evaluation and Grading: A minimum grade of C is required for general education credit.

- **Attendance and participation (15%):** Your presence in class is highly valued by me and your peers, so please make it a priority. Attendance will be logged through participation in iClicker polls and/or surveys and counts for 5% of your grade. You are permitted two (2) unexcused absences for the semester. If your absence is approved by me then it will not be counted against your final grade (see absence policy). Participation (10%) involves their engagement in class activities (e.g., map analysis, iClicker graded quiz, pair and share and so on) and fulfillment of those activities to good standard (rubric is provided on Canvas). Students that have an excused absence may still be responsible for completing the in-class activity in their own time.

- **Canvas-based homework quizzes and short-answer summaries (40%):** The auto-graded homework quizzes (25%) are 15-20 question multiple choice quizzes that are available on Canvas. There are eight quizzes in total, and one pre-final exam review quiz that counts as extra-credit if completed. The three (3) lowest grades of the eight (8) quizzes will not count toward your final grade. The remaining 15% of the final grade will consist of weekly short summaries (300-500 words), which will be based on the content of the week and will take the form of questions that ask you to explain key concepts, discuss current events, and/or anything that gets you to apply what you are learning to something interesting (rubric for written work provided on canvas)

- **Project – Weather Blog (20%):** The weather blogs are a series of short-essays (no less than 500 words, and no more than 1200 per blog) that convey in a creative and entertaining way some of the course material you are learning, as applied to two locations of your choice (typically a city). The first location should be in the U.S, and the other location anywhere else in the world. Detailed Instructions will be given within the first few weeks of class. There are five total blog options, however, you may waive one at no cost to your grade (i.e., four total will be graded). If you choose to complete all five, then the lowest grade will be waived.

    - BLOG 1: Provide a concise description of the physical geography of your selected locations. Discuss the basic temperature and energy-balance climatology of your regions. Include information on the radiation budget such as the average amount of solar radiation, seasonal variations in radiation, and dominant influences on the energy balance of the region (e.g., cloud, topography, latitude…). Compare and contrast your regions.
    - BLOG 2: Discuss the precipitation climatology & origins and impacts of moisture in your regions. If the region is wet, why is it wet? If it is dry, why is it dry? Discuss the seasonal variation in moisture (humidity/precipitable water vapor) and precipitation. Do your regions experience winter precipitation (e.g., ice and snow)? Why/why not? Is precipitation influenced by the land surface in any way (e.g., due to mountains, near ocean, forest etc.)? Compare and contrast your regions.
    - BLOG 3: Using the following website, make your own forecast for the next week of weather for both of your regions (Pivotal weather under 'Models' – use 'GFS' if you are outside the U.S: https://www.pivotalweather.com). You can be creative (e.g., create audio forecast, visual forecast etc.).
    - BLOG 4: Discuss the types of extreme weather events that can occur in your regions, with specific focus on those from the second half of the semester, including thunderstorms, tornadoes, floods, droughts, monsoons, tropical storms, and winter storms or mid-latitude storms. Pick one case study per region and discuss its evolution and impacts and compare/contrast your regions.
    - BLOG 5: Discuss how anthropogenic climate change may impact your region. Specifically, consider changes in climate variability, temperature, precipitation, and possible changes in extreme events. What might be the impacts on the people that live there. On the other hand, what is that region/country or community doing or could do to adapt to the changes. Compare and contrast.

- **Midterm and Final Exam (25%):** There will be two exams. Exams are not cumulative. In other words, we will test on the material to that point in the semester for exam 1 (midterm), and then the final will test on the material between the prior exam and the one being taken. The last of the regular exams will be held when the final exam is scheduled, and it will be a longer exam and worth more of your grade. The midterm will be a multiple-choice exam, and the final composed of multiple choice (75%) and short answer (25%). You may bring one letter-sized 'cheat sheet' to each exam (you can use both sides).

Assignments and Exams	**Percent of Final Grade**
Attendance/in-class activities	5%/10%
Online Quizzes (lowest 3 grade dropped)	25%
Written summaries/short answer (lowest 2 dropped)	15%
Weather Blog (one waived/dropped)	20%
Midterm/Final Exams	10%/15%
Total	**100%**

Grading Scale (%)	
92.0 – 100	A
89.5 – 91.99	A-
86.5 – 89.49	B+
82.5 – 86.49	B
79.5 – 82.49	B-
76.5 – 79.49	C+

Grading Scale (%)	
72.5 – 76.49	C
69.5 – 72.49	C-
66.5 – 69.49	D+
62.5 – 66.49	D
59.5 – 62.49	D-
< 59.5	E

VIII. **Important Dates to Remember:**

https://catalog.ufl.edu/UGRD/dates-deadlines/2021-2022/#fall21text

Drop/Add Ends:	Fri, Aug 27
Labor Day	Mon, Sep 6
Homecoming	Fri, Oct 8
Veterans Day	Thurs Nov 11
No Class, Thanksgiving	Nov 24-26
Reading Days	Thurs-Fri, Dec 9-10
Final Exam	**Dec 15**
Fall 2021 Grades Visible on https://one.uf.edu/dashboard/	After Dec 22

IX. Weekly Topic Schedule including Exams (Schedule is provisional and subject to change)*

Week beginning	Course Material	Module #
Aug 23	Course Introduction The Atmosphere: Composition,	0, 1
Aug 30	The Atmosphere: Radiation Budget, Energy and Temperature	1, 2
Sep 6	Atmospheric Moisture	3
Sep 13	Clouds and precipitation	3
Sep 20	Wind and Pressure	4
Sep 27	Air Masses	5
Oct 4	Fronts and jet streams	5
Oct 11	Basics of Weather Forecasting Guest speaker(s)	6
Oct 18	Exam Review **Midterm Exam (Thursday)**	**Exam tests on 1-6**
Oct 25	Mid-latitude Storms	7
Nov 1	Thunderstorms and tornadoes	8
Nov 8	Tropical Cyclones *No class Thursday*	9
Nov 15	Floods and Drought	10
Nov 22	Urban meteorology and air pollution (online recording Tues) *No class Thursday*	11
Nov 29	Climate Variability and Change	12
Dec 6	Material review *Reading day Thursday*	**Exam tests on 7-12**
Dec 13-17	**Finals Week – Final Exam Weds Dec 15**	

*For information on regular assignment due dates, see the 'cheat sheet' document on canvas, which provides general guidance on when assignments will be given and due, however depending on content progress, these dates are always

subject to change and are for general planning purposes only. The due dates specified on canvas supersede any in this document.

Math content: The study of weather and climate can include some complicated Math! However, I intend to emphasize conceptual understanding as oppose to mathematical rigor. Any equations we use will be basic, explained in detail, and will be provided to you in homework and/or exams (no memorization needed). A calculator will not be required in class unless I tell you in advance.

X. Course Policies: Attendance, Make-Ups, and Grades

COVID19: The COVID19 Pandemic continues. Vaccines are freely and easily available, and the best line of defense. Per the UF guidelines, it is strongly recommended that all students have their first shot of the C19 vaccine by the time classes start. Recent guidance (dated **Aug 6 2021**) has made mask wearing the expected norm in all indoor settings on campus, and this will include our classroom. I will be wearing a mask, and I strongly encourage you to do so as well.

If your instructor has exposure, or positive COVID test and/or COVID symptoms, then we will revert to an online format (presuming they am well enough) until they are cleared.

Attendance and Make up work: Students are required to attend class on a regular basis. Absences can be excused with proper documentation according to university policy. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

Should you need modifications or adjustments to your course requirements because of documented pregnancy, childbirth, or childcare issues, please contact me as soon as possible to discuss. Generally, modifications will be made where necessary. This also applies to C19 issues, including personal or immediate family illness, and self-isolation over suspected or confirmed C19 exposure.

Drops: Should you decide to drop the course for whatever reason, you must request to do so through the appropriate channels by the appropriate date. Failing to do so will result in a failing (F) grade for the course. For planning purposes, It is helpful to me for you to communicate with me if you are anticipating needing to drop the class.

Late Work: All assignments submitted after their respective deadlines will be assessed a penalty: ten percentage points for each day (24-hr period) that the assignment is late. Assignments will not be accepted if overdue by more than seven days. *This does not apply for an approved accommodation or excused absence.*

Examination Policies and Reading Days: Course policies are consistent with University policies on during-term exams, final exams, reading days, and make-up exams. Students must notify the instructor as soon as possible in case of absence during a class with critical content, such as an exam, and provide documentation as to the reason for the absence. If deemed an excused absence, the student will be permitted to undertake a revised exam for credit. More details can be found at https://catalog.ufl.edu/UGRD/academic-regulations/examination-policies-reading-days/.

Grade Dissemination: You can access your scores at any time using the Grade function in Canvas. The instructor will post grades within a maximum of 7-10 business days after the due date of each assignment.

Grading Policies for Assigning Grade Points: Information on current UF grading policies for assigning grade points may be found at https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

NOTE: There are NO opportunities for extra credit unless otherwise stated. I do drop select assignments through the course of semester. **I DO NOT EVER adjust a grade or offer extra assignments at the end of the semester to make up grade points, and I will disregard any requests on this topic**, with the exception being if a calculation error was made or in conditions of

serious documented extenuating circumstances. I may adjust grades (curve) based on the average class grade distribution, and they will curve up if they curve at all. You should work to achieve your desired grade throughout the semester and contact me with any concerns sooner rather than later.

Grades of "Incomplete": The current university policy concerning incomplete grades will be followed in this course. An incomplete grade may be assigned at the discretion of the instructor as an interim grade for a course in which you have completed a major portion of the course with a passing grade, been unable to complete course requirements before the end of the term because of extenuating circumstances, and obtained agreement from the instructor and arranged for resolution of the incomplete grade. Instructors are not required to assign incomplete grades.

XI. Course Policies: Technology and Media

Email: Each of you has a UF email address. It is vital that you maintain an active UF email account and that you **check it often**. Your instructor will post class notices at the beginning of each week. This tentative syllabus is **subject to change**, and any changes will be transmitted to you via your UF email account and Canvas (see below). Students should email the instructor if they have questions about any of the lectures, readings, assignments, or exams. You should expect a response within about 24 hours during weekdays. On holidays or weekends, expect a response on the next business day. The instructor will reasonably expect similar time frames for responses to emails sent to students.

Canvas: Course materials such as lecture slides, readings, the syllabus, and assignment instructions will be available through Canvas (https://elearning.ufl.edu). You will also find all due dates and grades on Canvas. Students must activate their UF GatorLink account in order to use Canvas. If you need help learning how to perform various tasks related to this course or other courses that utilize Canvas, please consult the above webpage. You may also contact the UF Computing Help Desk at (352) 392-HELP(4357) or helpdesk@ufl.edu.

Online Course Evaluation: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at gatorevals.aa.ufl.edu/. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at gatorevals.aa.ufl.edu/public-results/.

Recordings and Notes: It is not permitted to sell notes, recordings, or videos from this class without written consent of the instructor. Nor are students permitted to disseminate recordings, videos, or post copies of assignments or exams on the internet. You are permitted to retain class notes, readings, and course content for your own use. There are many introductory courses of this nature, and so there may be many notes floating around online. However, the notes I will provide you, as well as information from legitimate subject-relevant textbooks will be considered as the final authority on matters of grading.

XII. Course Policies: Student Expectations

Disabilities Statement:
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Academic Honesty & Conduct Policy: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor code (sccr.dso.ufl/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.

Title IX: For any concerns regarding gender-based discrimination, sexual harassment, sexual assault, dating/domestic violence, or stalking, there are resources available. To learn more or to report an incident, got to: https://titleix.ufl.edu. Also, please be advised that your instructor is required to report instances of sexual harassment, sexual assault, or discrimination.

We are an inclusive classroom: University is an opportunity to learn from one another, no matter our background, ethnicity, nationality, disability status, sexuality, gender and gender identity, religion, and socioeconomic background. From personal experience, being the first female in my family to obtain a university degree, and the first at all to attain a PhD (internationally), I am particularly cognizant that many of you may feel out of place at such a large and prestigious place as UF. This can be amplified when you represent a minority. Make no mistake, you are here because you deserve to be, and you have the potential to do great things. In this classroom, my goal is to provide a learning environment that is inclusive to all. If you are struggling or experiencing challenges to your learning, please do not hesitate to discuss with me.

Other: I have the right to institute new policies pertaining to course content, structure, and assessment during the semester without advanced notice to ensure a positive learning environment for all students.

XIII. Campus Resources for Students:

Academic Resources

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via email at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services at career.ufl.edu/.

Library Support: http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring. http://teachingcenter.ufl.edu/

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/

Student Complaints On-Campus: sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/

On-Line Students Complaints: distance.ufl.edu/student-complaint-process/

Health and Wellness Resources

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit umatter.ufl.edu/ to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit https://counseling.ufl.edu/ or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit https://shcc.ufl.edu/.

University Police Department: Visit police.ufl.edu/ or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; ufhealth.org/emergency-room-trauma-center.