

# METR 121: Meteorology

## Online Synchronous

### Spring 2021 (01/19 – 04/30/2021)

**Sections:** 701  
**Time:** TR, 11:10 am – 12:05 pm (01/19 – 04/30/2021)  
**Location:** Online Zoom Meeting: <https://wku.zoom.us/j/94258670092> (with passcode)

**Instructor:** Dr. Xingang Fan, Professor  
**Email:** [xingang.fan@wku.edu](mailto:xingang.fan@wku.edu)  
**Office:** EST 360  
**Office hours:** Through Zoom: <https://wku.zoom.us/j/93703445390>  
Tue/Wed 12:30 – 2:30 pm, or email me for a different time

#### Course Description:

METR 121: Meteorology will introduce the fundamental processes and elements associated with Earth's atmosphere and weather and will provide you with a comprehensive background in basic meteorology. METR 121 has a self-paced lab that will engage you in the application of theoretical meteorological concepts learned in the lecture part of the course.

**Required Text Reading:** *Essentials of Meteorology*, 8<sup>th</sup> Edition, by C. Donald Ahrens

#### IMPORTANT NOTE:

To enhance your learning experience and provide affordable access to the right course material, this course participates in an inclusive access model called First Day Access. This First Day program provides access to required materials at a discounted price automatically, typically through links in Blackboard without any code. For more information and FAQs go to [customer.care.bncollege.com](http://customer.care.bncollege.com).

**WKU will bill** you at the discounted price as a course charge for this course.

It is NOT recommended that you Opt-Out, as these materials are required to complete the course. You can choose to Opt-Out on the first day of class until the Add/Drop date, but you will be responsible for purchasing your course materials.

To access the eTextbook, go to your WKU Blackboard account for this course. Within the menu item eTextbook", there is a link with "METR121" that connects you to the MindTap site where you can **read the textbook** and take various practices. Please follow the instructions therein to ensure that your computer and browser are set up correctly and for registering for MindTap account (you may use your existing account if you have one already with MindTap for other courses).

#### General Education:

This course **fulfills** the Category D Science general education requirement for students entered WKU in Spring 2014 or earlier. It will help you attain the following general educational goals:

- *An understanding of the scientific method and knowledge of natural science and its relevance in our lives.*

#### Learning Objectives for Colonnade Program:

For students entering WKU in Fall 2014 and later, this course **fulfills** the Colonnade Program's requirements for the Natural and Physical Sciences subcategory of the Explorations (Lab) Category. As part of that program, METR 121 has the following learning objectives:

Students will demonstrate the ability to:

1. *Demonstrate an understanding of the methods of science inquiry.*
2. *Explain basic concepts and principles in one or more of the sciences.*
3. *Apply scientific principles to interpret and make predictions in one or more of the sciences.*
4. *Explain how scientific principles relate to issues of personal and/or public importance*

### **Learning Objectives for METR 121:**

The course objectives for METR 121 are designed to integrate fully with the Colonnade Program. Upon successfully completing METR 121, you will be able to:

- *Show an understanding of the scientific method and knowledge of natural science and its relevance in our lives.*
- *Identify the gases of the atmosphere, their relative concentrations, and the significant characteristics of those gases.*
- *Distinguish between various forms of energy and energy transfer processes as well as distinguish the difference between sensible and latent heat.*
- *Describe how sun angle and length of daylight change during the year and how these changes produce the seasons.*
- *Describe how the role of water vapor and carbon dioxide produce the greenhouse effect and discuss the key scientific issues associated with climate change.*
- *Successfully convert temperature values across the Fahrenheit, Celsius, and Kelvin temperature scales.*
- *List the four essential climate controls and discuss the basic daily and annual cycles of air temperature.*
- *Determine various representations of humidity in the atmosphere (e.g., vapor pressure, mixing ratio, dew point, relative humidity, etc.).*
- *Successfully determine the stability of the atmosphere, given an environmental lapse rate.*
- *Recognize various cloud types and formation processes along with the different forms of precipitation.*
- *List and describe the forces that act on the atmosphere to produce wind and recognize wind circulation patterns on a variety of scales.*
- *Classify air masses and characterize the types of surface fronts that separate them.*
- *Distinguish the formation processes and scales of mid-latitude cyclones, thunderstorms, tornadoes, and hurricanes.*
- *Distinguish between watches and warnings for severe thunderstorms, tornadoes, and hurricanes and describe the spatial and temporal risk associated with each severe weather event.*
- *Distinguish among the various methods of weather forecasting and describe the basics of numerical weather prediction.*
- *Participate in a forecasting competition.*

### **Course Format and Expectations:**

1. This course is online and synchronous, which means you are required to join the Zoom meeting at scheduled times. Please turn on camera and mic in the Zoom meeting as if you are attending in a classroom, except for special reasons with prior notice.
2. You are required to READ thoroughly (not glance or skim) through each textbook chapter prior to class discussions; and complete the ONLINE QUIZ for that chapter posted on Blackboard. These quizzes will help you preview the materials for the class and review for the exams. There are a total of eleven (11) quizzes, one for each chapter to cover. Total possible quiz points for the semester are 77 points, which accounts for 14% of your final grade. Due date/time is given in the instructions of each quiz. The quizzes will be available online for at least one week with unlimited attempts allowed, therefore, NO make-ups after due time. *It is strongly recommended that you take it AFTER you read the chapter.*
3. You are required to watch recorded lecture notes **before** classes and attend two 55-min lectures each week through Zoom meeting. To ensure for the best engagement and participation, the class periods are mostly focused on discussions and Q&As, including but not limited to such as Google Form quizzes.
4. You are required to complete eleven (11) self-paced LAB exercises. **NOTE** that the lab part of this class is listed under a different instructor and there will be a different course section on your Blackboard courses. All earnings from the 11 Lab works are worth of 100 points, which comprises 18% of your final grade for THIS course. It's your sole responsibility to make sure you complete this weekly activity. I will only receive an overall lab grade at the end of the semester from the lab instructor to add into your final grade of this course. For daily or ongoing issues related to the lab, join the lab TA's Zoom at scheduled times (usually made available in the second week) and pay attention to your lab instructor's announcements.
5. For this online course, the only way that I can reach out to you is through your **WKU email** that is associated with your Blackboard account. So, make sure to check your WKU emails regularly (at least twice a day).

### **Attendance Policy:**

Meteorology is a physical science in which knowledge accumulates gradually. Regular attendance in the lectures and participation in class discussions is **required**.

**Attendance** will be taken throughout the semester, mostly through the Google Form quizzes given during the class time. Overall attendance and class participation points will be 78 or equivalent (14% of your final grade).

Full attendance will earn you 10 bonus points. Each un-excused absence will result in a 5-point penalty that is deducted from your total points. The first two unexcused absences will forfeit your bonus attendance points. ALL excused absences require valid written documentation via email (doctor's note, notes from coach, military or court service notes, or your advisor's note with your department head's signature for other emergencies). Simply not feeling well and miss the class will NOT be counted as valid excuses.

Join the class on time! Early leaving is as bad as coming in late. It's your responsibility not to miss the time that attendance is being taken.

### **Exams:**

TWO mid-term exams and ONE final exam, each worth of 100 points and will consist of multiple choices questions. The exams will be virtually proctored. Learn your material is the key to get the grades you deserve. By the nature of this course, all exams will be cumulative although each exam will focus on the specific chapters outlined in the syllabus. Please note that having an **understanding of the earlier materials** is essential for your learning outcomes throughout the semester, which typically results in a satisfactory grade.

Grades:	Items	Points Possible	Weight
	Exam 1	100	18 %
	Exam 2	100	18 %
	Exam 3 (i.e., Final Exam)	100	18 %
	Overall Lab score (to be received from lab instructor)	100	18 %
	Online Quizzes from reading chapters (7 points each)	77	14 %
	Attendance and Class participation (e.g. Google Forms)	78	14 %
	<b>Total</b>	<b>555</b>	<b>100 %</b>

Letter Grades: A: 90-100% B: 80-89% C: 70-79% D: 60-69% F: <60%

This section and other related policies in this syllabus are the guidelines for how your grades are calculated. Blackboard grade center is used only for the purpose of displaying the items. I trust all who are enrolled in this class will be able to calculate grades for your own.

#### **Extra Credits:**

Earn it early and throughout the semester. Don't wait until too late.

There will be chances to EARN EXTRA CREDIT through participating weekly weather forecast contest and other occasional assignments. The more you participate, the better chances to earn extra points!

NO Extra Credit is given on an individual basis, especially near the end of the semester. Please refrain from asking.

**Academic Honesty:** Cheating absolutely will not be tolerated. Students are expected to adhere to the Western Kentucky University Code of Student Conduct.

#### **Disability Services:**

In compliance with University policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Student Accessibility Resource Center located in Downing Student Union, 1074. SARC can be reached by phone number at 270-745-5004 [270-745-3030 TTY] or via email at [sarc.connect@wku.edu](mailto:sarc.connect@wku.edu). Please do not request accommodations directly from the professor or instructor without a faculty notification letter (FNL) from The Student Accessibility Resource Center.

#### **Departmental Drop Policy:**

The Department of Earth, Environmental, and Atmospheric Sciences strictly adheres to the course drop policy found in the Undergraduate and Graduate Catalogs. **It is the sole responsibility of individual students** to meet the cited deadlines for dropping a course. In exceptional cases, the deadline for schedule changes (dropping a course) may be waived. The successful waiver will require written description of extenuating circumstances and relevant documentation. Poor academic performance, general malaise, or undocumented general malaise, or undocumented general stress factors are not considered as legitimate extenuating circumstances. Since granting of waivers are rare, we urge you to follow the established guidelines.

# Tentative Course Outline and Reading Schedule

(This tentative schedule is subject to changes and adjusts in extenuating circumstances.)

Week	Date	Day	Topic	Read Ch.	Quiz due Thu 23:59	Forecast Friday 23:59	Lab due Friday 14:00
1	01/19	Tue	Introduction & Chapter 1 Earth Atmosphere	1			
	01/21	Thu	Earth's Atmosphere	1	01/21:Quiz_01		
2	01/25	Tue	Energy and Heat Transferring	2			
	01/27	Thu	Warming the Earth & Atmosphere	2	01/27:Quiz_02	Round1:Fcst1	
3	02/01	Tue	Air Temperature	3			
	02/03	Thu	Humidity and Saturation	4	02/03:Quiz_03	Round1:Fcst2	Lab1
4	02/08	Tue	Condensations: Fog, Dew, Frost, & Clouds	4			
	02/10	Thu	<i>Review</i>		02/10:Quiz_04	Round1:Fcst3	Lab2
5	02/15	Tue	<b>EXAM #1</b>				
	02/17	Thu	Atmospheric Stability	5		Round1:Fcst4	Lab3
6	02/22	Tue	Cloud Development	5			
	02/24	Thu	Precipitation	5	02/24:Quiz_05	Round1:Fcst5	Lab4
7	03/01	Tue	Air Pressure and Winds	6			
	03/03	Thu	Air Pressure and Winds	6	03/03:Quiz_06		Lab5
8	03/08	Tue	Atmospheric Circulations	7			
	03/10	Thu	Atmospheric Circulations	7	03/10:Quiz_07	Round2:Fcst1	Lab6
9	03/15	Tue	<i>Review</i>				
	03/17	Thu	<b>EXAM #2</b>			Round2:Fcst2	Lab7
10	03/22	Tue	Air Masses and Fronts	8			
	03/24	Thu	Mid-Latitude Cyclones	8	03/24:Quiz_08	Round2:Fcst3	Lab8
11	03/29	Tue	Mid-Latitude weather systems	8			
	03/31	Thu	Weather Forecasting	9	03/31:Quiz_09	Round2:Fcst4	Lab9
12	04/05	Tue	Weather Forecasting	9			
	04/07	Thu	Thunderstorms	10	04/07:Quiz_10	Round2:Fcst5	Lab10
13	04/12	Tue	Tornadoes	10			
	04/14	Thu	Hurricanes	11	04/14:Quiz_11		Lab11
14	04/19	Tue	Severe weather				
	04/21	Thu	<i>Review</i>				
15	04/27	Tue	<b>Final EXAM (Exam #3), open between 9:00 am – 5:00 pm, Zoom &amp; Blackboard</b>				

Last modified: Jan 12, 2021. ©Xingang Fan.