

Syllabus: Mesoscale Meteorology

Course ID# 19789

Credits: 3

Course Overview: This course examines regional and local-scale (i.e. mesoscale) meteorological phenomena and the processes that drive them. Topics examined include cold air damming, lake effect snow, atmospheric instabilities, boundary layer phenomena, the dry line, and atmospheric convective storms (thunderstorms, squall lines, supercells, tornadoes).

Instructor: Dr. Jana Houser Office: 1124 Derby
 Email: houser.262@osu.edu Office hours: Wednesdays 10:30-12:15, Open door
 *I will be working from the office on Mon and Wed. Other days of the week, I will be working remotely, but will be accessible by email and Zoom.

Class Information: **Meeting Times:** Monday, Wednesday 12:45-2:05 (Derby 140)
Prerequisites: Geog 5941
Textbook: Strongly Recommended Text: *Mesoscale Meteorology in Midlatitudes* by Paul Markowski and Yvette Richardson. (I don't require it but will be following content of the book very closely!) ISBN: 978-0-470-74213-6

*PLEASE NOTE: If you email me a question that you can find the answer to on the syllabus, or online somewhere, I will refer you back to the syllabus without answering your question!

***IMPORTANT INFORMATION:** If you have extenuating circumstances or are feeling ill, and you notify me BEFORE CLASS, I will run a Zoom for the class to enable remote participation.

ZOOM INFO: <https://osu.zoom.us/j/99202781795?pwd=1iVpmdJDb1BcCpuapQKaIKKbt1TkPl.1>
 Meeting ID: 992 0278 1795 Password: 373405

***NOTE: This course is executed following the “Team-based Learning” pedagogical method. As such, there will be distinct differences between this course and the traditional lecture-style class.**

Recommended course equipment: In order to complete activities, it is strongly recommended that you purchase a digital pen with either a tablet or a laptop that will allow you to write directly on the digital word document assignments.

COURSE VIDEO LECTURES are provided as supplemental learning tools at <https://drive.google.com/drive/u/0/folders/1UI0MQH8Yr3E4w7Gu0q40cJL6nNmaCWcu> . These lectures walk you step by step through the Powerpoint presentations used for course material.

Course Goals: Students should be able to do the following upon successful completion of this course:

- 1) *Explain* the evolution and behavior of mesoscale weather phenomena and processes.
- 2) *Apply* basic atmospheric physics and equations governing mesoscale phenomena to solve phenomena specific problems.
- 3) *Evaluate* synoptic-scale and mesoscale weather conditions from map analyses and surface conditions in order to *predict* when and where various mesoscale phenomena are likely to occur.
- 4) *Synthesize* data from skew-T's, hodographs, and numerical forecast models to identify regions favorable for the development of mesoscale phenomena.
- 5) *Identify* and *analyze* mesoscale phenomena as they are occurring, and *predict* where the phenomena will occur 1-3 days in advance from local and national daily weather observations using surface, radar and satellite data.

Grading: Final grades will be assigned according to the standard system and **will not be curved** (In other words, if you have an 89.4% you earn a B+, not an A-):

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
>92.5%	89.5 – 92.5%	86.5 – 89.5%	82.5 – 87.5%	79.5 – 82.5%	76.5 – 79.5%	72.5 – 76.5%	69.5 – 72.5%	66.5 – 69.5%	62.5 – 67.5%	59.5 – 62.5%	<59.5%

Assessment:

Exams (2; 15% each): 30%

Final Project: 15 %

Weekly quizzes (in class): 25%

Weekly Homework: 20

Class participation: 10%

Exams (30%): There will be two exams for this course: two midterms during the semester (tentatively 2/19, and 4/7).

Final Project (15%): In place of a final exam, there will be a final project assigned in late March. The project will require students to track the prospects of a severe weather outbreak for 3 consecutive days leading up to the event. More information and details are posted on Carmen under the Course Information on the Home Page.

Weekly quizzes (25%): At the beginning of every **Monday's** class, there will be a quiz that will evaluate students' preparation for that week's material. The quiz will be taken twice, back to back, once independently and once in your group. Both grades will count for credit according to the percentages determined the first day of class. If you are absent, you can make arrangements to take the quiz individually if you contact me **within 24 hours** of the absence. If you are absent, your individual grade will also count as your group grade. You can have **two makeups** during the semester. If you are late to class, you will NOT be granted extra time to complete your quiz. Your lowest quiz grade (only 1) will be dropped.

Weekly Homework (20%): Most weeks, there will be a homework assigned and available after class on Monday. Some weeks, depending upon the pace of classroom instruction time, you might be working on these problems during class. **Homework will be due on SUNDAY at 9:00 pm.** Late assignments will be accepted, but with a point deduction appropriate for the tardiness. Each day late will be a 5% point deduction. Homeworks will have varying point values, but each will be weighted equally into your final grade.

Class participation (10%): This is graded based upon group evaluation. Each group member will anonymously evaluate the others' preparation and participation in group quizzes and activities. The average of an individual's responses will be used as this grade unless there is an obvious outlier in the evaluations. See Group Evaluation Rubric handout or BB document.

Class Time: Monday's class will begin with the quiz, then will consist a series of 'mini lectures'. **You are expected to come to class on Monday having already read through the week's course materials, which will be available on Carmen at 5:00 PM Wednesday of the prior week.** You will be polled to see what the 'muddiest topics' (i.e. the things that confuse you most) are, and the mini lectures will focus on explanations of these topics. For Wednesday's class, we will revisit topics that are not well understood and/or address student questions, we will do a series of group discussion questions, and if there is time, we may end class by working on homework. These questions are similar to exam questions and are therefore good study tools.

Attendance: Attendance is not directly a factor in a student's grade; however, reduced attendance will be reflected in your peer evaluation/class participation grade. Furthermore, if a student misses a class, you will receive a 0 for their quiz for that day unless you have contacted me in accordance to the statements in the 'Quizzes' section above. This work must be handed in by the following class period unless a longer medical leave is granted by a university physician. Other class members are not to be consulted about information

presented in makeups. Only two such makeups will be allowed during the semester except for extenuating circumstances. After two missed classes, students will receive a 0 for missed materials unless there are special circumstances.

Inclement Weather:

In the case of inclement winter weather, classes will transition to a virtual framework. The zoom link is found on the FIRST PAGE of the syllabus, and in the Announcements section of the Carmen Page.

AI: The use of AI (e.g. Chat GPT) in assisting you to complete assignments, projects, or any other course material is NOT allowed for this class.

Other Details, Policies and Procedures: Mesoscale Meteorology

1. Classes will begin AT 12:45 whether you are here or not. Please try not to be late as this disrupts the class environment.
2. **Make-up exams will only be allowed if arrangements have been made PRIOR TO the exam date** and will only be accepted for extenuating circumstances.
3. Grades and course materials will be updated and posted on Canvas.
4. If you have special needs for any reason, I will only be able to grant you special permissions if you have the appropriate documentation of your disability and your needs.
5. **Cell phones and other electronic devices ARE ONLY PERMITTED** for use in the classroom or the lab for polling purposes, for completing assignments or if you have a specific need that requires their use. In such situations please notify me of your need and provide any university documentation that supports it.
6. **Students are expected to have their cameras ON during the entire duration of Zoom meetings if you are remotely attending.** I do not care if you just rolled out of bed, or if you are in last night's clothes, but I want to see your face, as do your classmates.
7. **Students are expected to treat each other courteously and professionally. Students who compromise the effectiveness of the learning environment will be asked to leave.**

Academic Misconduct: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-48.7 (B)). For additional information, see the Code of Student Conduct.

If academic misconduct is suspected, the professor reserves the right to impose one or both of the following consequences:

1. A grade penalty, such as an F, may be imposed on the project or in the course.
2. A formal student conduct referral may be filed with the Office of Community Standards and Student Responsibility.

***PLEASE NOTE: HAVING ANOTHER PERSON COMPLETE OR PROVIDE YOU WITH ASSIGNMENTS, QUIZZES OR EXAM QUESTIONS, INCLUDING MATERIALS FROM PAST YEARS IS CONSIDERED CHEATING BY BOTH PARTIES AND IS GROUNDS FOR ACADEMIC DISCIPLINE RANGING FROM RECEIVING A 0 ON THE ASSIGNMENT TO FAILURE OF THE COURSE**

If a student is caught cheating *in any capacity* on any material, disciplinary action will be taken.

Student Accessibility:

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

Religious Accommodation: Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity. (Policy: Religious Holidays, Holy Days and Observances)

Mental Health: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614--292--5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when

CCS is closed at 614-292-5766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Title IX: Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu.

Statement on Diversity: The Ohio State University affirms the importance and value of diversity of people and ideas. We believe in creating equitable research opportunities for all students and to providing programs and curricula that allow our students to understand critical societal challenges from diverse perspectives and aspire to use research to promote sustainable solutions for all. We are committed to maintaining an inclusive community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among all members; and encourages each individual to strive to reach their own potential. The Ohio State University does not discriminate on the basis of age, ancestry, color, disability, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, race, religion, sex, gender, sexual orientation, pregnancy, protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. (To learn more about diversity, equity, and inclusion and for opportunities to get involved, please visit: <https://odi.osu.edu/> or <https://cbcs.osu.edu>)

The lectures, classroom activities, and all materials associated with this class and developed by the instructor are copyrighted in the name of Jana Houser on 1/5/2025.

2025 Course Outline:

***THIS SCHEDULE IS SUBJECT TO CHANGE PENDING LECTURE PACE, TIME CONSTRAINTS AND OTHER UNFORESEEN CIRCUMSTANCES**

<i>Week</i>	<i>Class Dates</i>	<i>Topics</i>	<i>Reading</i>	<i>Quiz #</i>	<i>HW #</i>
1	1/6-1/12	Welcome, syllabus, intro, Cold Air Damming	Ch 1, 13.1, 13.2	Quiz 1	HW 1 Due 1/12
2	1/13-1/19	NO CLASS (AMS Conference)		No Quiz	No HW
3	1/20-1/26	1/20 – NO CLASS (MLK Day) Lake Effect Snow	Ch 4.5	Quiz 2 on 1/22	HW 2 Due 1/26
4	1/27-2/2	Radar Primer	Appendix	Quiz 3 1/27	HW 3 Due 2/2
5	2/3-2/9	Static stability, Skew-T's, hodographs	Ch 3.1, 3.1.1, 2.6, 2.7	Quiz 4 2/3	HW 4 Due 2/9
6	2/10-2/16	Boundary Layer	Ch 4.1-4.4	Quiz 4	HW 5 Due 2/16
7	2/17-2/23	The Dryline Exam 1 2/19: all material 1/6-2/17	Ch 4.7	Quiz 5	No HW
8	2/24-3/2	Nocturnal Low-level Jet	Ch 5.2	Quiz 6	HW 6 Due 3/2
9	3/3-3/9	Limitations of Parcel Theory, Convection Initiation	Ch 3.1.2 7,	Quiz 7	HW 7 Due 3/9
10	3/10-3/16	NO CLASS SPRING BREAK		No Quiz	NO HW
11	3/17-3/23	Thunderstorm structure, Ordinary and Multicell Convection, Supercell intro	Ch 8.1 - 8.3	Quiz 8	HW 8 due 3/23
12	3/24-3/30	Supercell forecasting, Supercells Structure	Ch 8.4	Quiz 9	HW 9 Due 3/30
13	3/31-4/6	Supercell Dynamics 1 and 2	Ch 8.4, 2.5	Quiz 10	HW 10 Due 4/6
14	4/7-4/13	Exam 2 4/7: All material 2/19-4/6 Tornadoes Intro and Climo	Ch 10.1	No Quiz	No HW
15	4/14-4/20	Tornadogenesis, MCS's	Ch 10.2, 10.3	Quiz 11	HW 11 Due 4/20
16	4/21	Mesoscale Convective Systems	Ch 9	No Quiz	No HW
	4/24 – FINAL PROJECT	PROJECT DUE: 11:59 PM			