

SUNY COLLEGE AT ONEONTA  
DEPARTMENT OF EARTH AND ATMOSPHERIC SCIENCES

**Mesoscale Meteorology**  
METR 375, Section 01: Fall Semester 2015

Dr. Melissa Godek

**Lecture Period:** TR 10:00am – 11:15am  
**Venue:** Science I Bldg, Room 309  
**Textbook:** Markowski, P. & Richardson, Y (2010) *Mesoscale Meteorology in Midlatitudes*.

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**My Office:** Science I Bldg, Room 311A  
**Office Hours:** M 12 – 1:00pm, WF 10:00 – 11:00am (or by appointment)  
**Email:** Melissa.Godek@oneonta.edu  
**Phone:** 607.436.3375  
**Website:** on Blackboard

**Course Objectives:** Mesoscale Meteorology is a course that focuses on atmospheric analysis for the purpose of understanding and forecasting weather patterns and processes that significantly impact humans at smaller temporal and spatial scales than what you've focused on in pre-requisite courses. In fact, much of what you've learned about the atmosphere thus far does not apply to the mesoscale, so you will learn a lot of new material in this class! Basic knowledge of meteorology, climatology, U.S. geography and the general atmosphere will help us develop these understandings so it is expected that you are already familiar with these discipline basics (such as general synoptics and dynamics). Throughout the course we will examine and build an understanding of the mesoscale, including important boundaries, instabilities, convective weather patterns and severe storm features. Stability indices, boundary layer processes, deep moist convection, mesoscale convective complexes, supercell thunderstorms and tornadoes are a few examples of topics we will learn about in this course. The qualitative understanding of these system make-ups and evolutions is emphasized in lectures though at times we focus more on quantitative understandings.

**College Catalog Description of Course:** METR 375: This course will examine weather-related phenomena that occurs on the mesoscale. Subject matter will include, but not be limited to local circulations, upslope/downslope flows, thunderstorm evolution and morphology, severe storm analysis, and frontal rainbands. Course will emphasize qualitative as well as quantitative analysis. Prerequisites: METR 340 & METR 350 and MATH 174, 3 semester hours.

**Course Design:** This upper level course consists of approximately 2½ hours of traditional and interactive (requiring student participation) lecture each week. A research project will also be expected of you, which includes a final paper and presentation. I encourage you to take thorough notes on the material I present in class. Questions on the course material are always welcomed and strongly encouraged while class is in session. If at any point during the semester you find yourself struggling with this course, please see me *as soon as possible* in office hours or set up an appointment to meet with me. Be aware that this senior level course is demanding from a conceptual standpoint! Success in this course guarantees that you will need to spend a lot of time

reading the text, utilizing office hours, and reviewing daily concepts. There will be less “busy work” in this class to reflect the amount of time I expect you to put in to studying. As a result, examination is the emphasis in your course assessment. This class will not include any form of extra-credit assignments. However, I do post my daily lecture Powerpoints on Blackboard and advise you to regularly review them. Since active student engagement is required for the successful completion of this course I strongly advise that you come to every class on time. Please Note: You are responsible for making up all material if you are ever absent.

### **Course Evaluation:**

- 4 Exams 55%
- 4 Quizzes 10%
- 10 Assignments 15%
- Research Paper 10%
- Research Presentation 10%

**Exams:** Throughout the course of the semester, you will be given 4 exams on information from the lectures (& pertinent text chapters/handouts/assignments). The format will include a combination of multiple choice, true/false, matching, fill in the blank, and short answer essay questions. Collectively, the exams make up 55% of your final grade in this class. The most recent material will always be emphasized on a new exam, usually the past five or six days of class, but each is comprehensive out of necessity because of the nature of the material being presented. In other words, since most atmospheric concepts can only be understood by building upon previously learned concepts, the exams will all be cumulative in some form. All students are expected to take my exams at the scheduled times. No make-up exams will be offered unless you are absent with a) 1 week prior arrangements that have been approved by ME or b) official doctor approved documentation of serious illness or a personal/ family emergency. *Please note that university health center documentation of a visit is insufficient for missing an exam!!*

**Quizzes:** At four times throughout the semester you will given a short quiz on the material presented in class that day. These quizzes make up 10% of your final course grade and are designed as straightforward, short questions so that you will have plenty of time to complete them. These quizzes assess your comprehension of the day’s material and may be a reflection of class involvement and participation. Often, they serve as a way to boost up your final course grade. Plan to attend class on the day of a quiz! Please take note of the days they are offered on the syllabus. Reading the text material before coming to class on the day of a quiz is strongly advised. No make-up quizzes will be offered unless you are absent with a) 1 week prior arrangements that have been approved by ME or b) official doctor approved documentation of serious illness or a personal/ family emergency. *Please note that university health center documentation of a visit is insufficient for missing a quiz!!*

**Assignments:** In this course you will receive 10 short assignments/homeworks that will pertain to either the most recent material covered in lecture and the text or a topic that adds to your understanding of recent & upcoming lectures. Near the end of the course, homeworks will be related to your course project. Collectively, these will contribute to 15% of your overall course grade. From one to the next, these assignments will be diverse to reflect the broad nature of

learning styles in the course. They will vary in their make-up, including things like text questions and figure interpretations, calculations, the use of diagrams and tools, literature readings and interpretations, and mesoscale website interpretations. They serve as a very useful way to prepare for an exam and review important concepts in mesoscale meteorology. Please note on the syllabus the date that they are due since they will be collected promptly at the beginning of class. Assignments that are not stapled together neatly prior to collection will not be accepted. Late assignments will receive a deduction of 10% per day (starting from the same day, after collection). I do not accept late homeworks on the last 3 project-related assignments (8-10) of any kind, for any reason.

**Research Project (Paper & Presentation):** At the end of the semester you will be expected to conduct a research project on a topic that pertains to a mesoscale phenomenon/ event. This project is worth 20% of your final course grade. Your topic will be selected from a short list of those covered in lecture so that: 1) everyone has some guidance from a day of lecture notes & 2) no students report on largely overlapping areas. Specific details and instructions for this project will be delivered later in the course. As soon as the topics and instructions are announced (at around the timing of Exam 2) you should begin your research so that you are not swamped with work at the end of the semester. I will perform intermittent checks of your progress to attempt to keep you on track. The project will require you to conduct independent research outside of class. You will also be expected to perform a short and formal write-up of your findings that will be turned in on the last day of class (final exam time). Accompanying this paper will be a 20-minute, formal presentation of the project to the class. These presentations will be delivered on the last day of class (final exam time). No make-ups will be allowed whatsoever so please plan to attend the last day of class on time, scheduled at the final exam time. More details on the final project will be provided later in the course.

**Final grade scores will be determined from the following letter grade distribution:**

A	93% +	B	83%	C	73%	D	63%
A-	90%	B-	80%	C-	70%	D-	60%
B+	87%	C+	77%	D+	67%	E	59% –

Final grade scores may account for effort & improvement in the class & may be “curved” depending upon overall class performance.

**Required Materials:**

In this course you will regularly need a pencil/pen, the text, syllabus and a scientific calculator. Bring these to class with you. When announced, you will also need to bring assigned journal articles with you to class.

## Tentative Course Schedule:

### WEEK 1 - 4

DATE	TOPICS	READINGS & ASSIGNMENTS
Tue: 9.01.15	Course Introduction & Defining the Mesoscale	Ch. 1, pgs. 1 – 5
Thu: 9.03.15	Defining the Mesoscale Cont'd	Ch. 1, pgs. 5 – 10
Tue: 9.08.15	Moisture & Thermodynamic Processes, <i>Quiz 1</i>	Ch. 2, pgs. 11 – 13 [ <i>A1 Due</i> ]
Thu: 9.10.15	Adiabatic Processes & Thermodynamic Diagrams	Ch. 2, pgs. 13 – 16
Tue: 9.15.15	Thermodynamic Diagrams & Stability Levels	Ch. 2, pgs. 32 – 34
Thu: 9.17.15	Stability Indices	[ <i>A2 Due</i> ]
Tue: 9.22.15	<b>Exam 1</b>	

### WEEK 4 – 8

DATE	TOPICS	READINGS & ASSIGNMENTS
Thu: 9.24.15	Hodographs	Ch. 2, pgs. 34 – 40 [ <i>A3 Due</i> ]
Tue: 9.29.15	Helicity & Mesoscale Instabilities	Ch. 3, pgs. 41 – 48 [ <i>A4 Due</i> ]
Thu: 10.01.15	Mesoscale Instabilities Cont'd, <i>Quiz 2</i>	Ch. 3, pgs. 48 – 68
Tue: 10.06.15	The Boundary Layer	Ch. 4, pgs. 73 – 87
Thu: 10.08.15	Boundary Layer Convection & Lake-Effect Snow	Ch. 4, pgs. 88 – 102 [ <i>A5 Due</i> ]
Tue: 10.13.15	<b>NO CLASS: FALL BREAK</b>	
Thu: 10.15.15	Urban Boundary Layers & Frontal Boundaries	Ch. 4/5, pgs. 103 – 106, 129 – 132
Tue: 10.20.15	<b>Exam 2</b>	[ <i>A6 Due</i> ]

### WEEK 8 – 11

DATE	TOPICS	READINGS & ASSIGNMENTS
Thu: 10.22.15	Dry Lines, <i>Quiz 3</i>	Ch. 5, pgs. 132 – 139
Tue: 10.27.15	Mesoscale Boundaries & Coastal Fronts	Ch. 5, pgs. 140 – 158 [ <i>A7 Due</i> ]
Thu: 10.29.15	Deep Moist Convection & Single-Cell Convection	Ch. 7/ 8, pgs. 183 – 209
Tue: 11.03.15	Multi-Cell Convection	Ch. 8, pgs. 209 – 213 [ <i>A8 Due</i> ]
Thu: 10.05.15	Supercell Convection	Ch. 8, pgs. 213 – 242
Tue: 11.10.15	<b>Exam 3</b>	[ <i>Professional Literature Reading</i> ]
Thu: 11.12.15	Professional Literature Discussion	

### WEEK 12 – 15

DATE	TOPICS	READINGS & ASSIGNMENTS
Tue: 11.17.15	Supercell Convection Cont'd	Ch. 8, pgs. 213 – 242
Thu: 11.19.15	Mesoscale Convective Systems	Ch. 9, pgs. 245 – 270 [ <i>A9 Due</i> ]
Tue: 11.24.15	Tornadoes, <i>Quiz 4</i>	Ch. 10, pgs. 273 – 292
Thu: 11.26.15	<b>NO CLASS: THANKSGIVING BREAK</b>	
Tue: 12.01.15	Downbursts	Ch. 10, pgs. 292 – 306 [ <i>A10 Due</i> ]
Thu: 12.03.15	Downslope Wind Storms	Ch. 12, pgs. 327 – 342
Tue: 12.08.15	Hailstorms	Ch. 10, pgs. 306 – 312
Thu: 12.10.15	<b>Exam 4</b>	

**Thu: 12.17.15**      **Research Presentations & Research Paper Due**  
**8-10:30am**

## SOME FORMAL ACADEMIC POLICIES AT SUNY ONEONTA:

**Emergency Evacuation/ Shelter-in-Place Procedures:** In the event of an emergency evacuation (*i.e.*, fire or other emergency), classes meeting in Science I are directed to reassemble at Chase Gymnasium so that all persons can be accounted for. Complete details of the College's emergency evacuation, shelter-in-place, and other emergency procedures can be found at [www.oneonta.edu/security](http://www.oneonta.edu/security).

**Interim Progress Reports:** I am required to submit Interim grades for all undergraduate students by **Thu. Oct. 22**. In this class, these will be based on early performance measures up to the date of submission.

**Students Requiring A Special Accommodation:** I will work with Student Disability Services (SDS) to provide reasonable accommodations to any student that has a documented disability. If you have a documented disability with SDS and require a special accommodation, you must notify me at the beginning of the semester (*i.e.*, within the first two weeks of class) and prior to the assignment of course material for which an accommodation is required so that I may assist you. If you will be taking an exam at the SDS center and not in our regular classroom, you will need to provide me with the proper documentation to sign in the time specified by SDS or else you will not be able to do so.

**Academic Integrity & Dishonesty:** I require that all students follow the policies on academic integrity as outlined in the College Handbook. I will report ALL incidents of Academic Dishonesty that include cheating, plagiarism, re-use of own or another's work, and all other infractions discussed in the Handbook. Any form of academic dishonesty will not be tolerated and will be penalized according to the procedures set in the College Handbook.

Please review these policies at: <http://www.oneonta.edu/collegehandbook/academic-integrity.asp>

**Class Attendance & Excused Absences:** I follow the policies in the College Handbook on excused vs. unexcused absences in this class. Please review these policies and the list of excused absences at: <http://www.oneonta.edu/collegehandbook/excused-absences>.

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I expect students to read and understand the objectives, responsibilities, and overall policies as outlined in the course syllabus. I also expect each student to read and understand the policies set forth by SUNY Oneonta pertaining to yourself, the professor (me), and this course. In this course I expect everyone to participate in a respectful & professional manner while conducting class business. The use of any and all electronic devices in class, with the exception of a laptop pre-approved by ME (*for note-taking purposes ONLY*), is prohibited. All prohibited electronic devices (*i.e.*, cell phones, wireless media & communication devices) must be turned OFF and stored away while in class. If you continuously fail to do so I will ask you to leave class. Any disruptive and/or inappropriate behavior will not be tolerated and may result in removal from the classroom.

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*The following statement must be signed by the second week of class to continue attending.*

I have read the syllabus for the **METR 375** class in the **FALL** semester of the **2015-16** academic year & not only understand the content and requirements of me but agree to and will abide by all conditions of the class as set forth in this syllabus by the professor and the SUNY College at Oneonta.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_