

**ATM OCN 100/101**  
**WEATHER AND CLIMATE**

*Spring 2017*

Instructor: Prof. Jonathan E. Martin  
  
Room 1425A, AO&SS Building, 1225 West Dayton St.  
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Meeting Times: MWF 11:00 am Social Sciences 6210

Students in both AOS 100 and AOS 101 will meet at the same time for lecture!

Office Hours: Wednesday 12:30-2:30 and also by appointment (which can be made most easily by e-mail or after class)

Textbook: **Introduction to Weather and Climate Science**  
Jonathan E. Martin

Grading: Seven (7) homework assignments will be given, you can drop one of the seven. Three exams during the term will be given and a final exam (which will only be very slightly longer than the other three).

6 Homeworks @ 4% each	24%
3 1 hr exams @ 18% each	54%
1 Final exam @ 22%	<u>22%</u>
	100%

HOMEWORK IS DUE *BEFORE LECTURE* ON THE DUE DATE  
(OR ANYTIME BEFORE THAT)!

HOMEWORK ASSIGNMENTS MUST BE TURNED IN BY THAT TIME,  
**NO EXCUSES.**

*Students taking 101 should be aware that the lab section will not be a rehash of lecture; it will be a supplement to the 100 lectures. An independent letter grade for the lab will be assigned to each 101 student and will constitute one-fourth of his/her final grade for 101.*

*<http://marrella.aos.wisc.edu/aos100.101/aos100.html>*

You will most likely use this page alot so try accessing it immediately.

T. A.'s: AOS 100 - Maria Madsen  
Rm 835 AOS mmmadsen@wisc.edu

AOS 101 (Sections 301 and 303) - Simran Raju  
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AOS 101 (Section 302)

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It is the rare person who is not excited, or has not been excited at some time in his/her lifetime, by the weather. The atmosphere influences almost every facet of our lives and presents us with a thrilling subject for study this semester. I am eager to transfer to you some of the excitement I feel for the weather; both its phenomenological beauty and its physical elegance. We will do this by examining, piece by piece, a number of important physical concepts that explain atmospheric phenomena. We will end up speaking intelligently about fascinating and dazzling entities like cyclones, severe weather, and hurricanes.

I realize that a large number of you are non-science majors and are taking the course to fulfill a science requirement. One of my side goals during this term is to convince you that there is no such thing as “Humanities thinking” or “Business thinking” or “Science thinking” - **there is just thinking**; and success in this course will require thinking! Good luck to you and take advantage of your time in this class.

You will notice in the syllabus that I have indicated readings from the book. Students often want to know how much of the reading is going to show up on exams. You can be certain that everything you read will be closely related to the lectures. **When studying for exams, however, if something in the book is not covered in lecture (rare but possible), it will not be on the exam. DAILY ATTENDANCE in class is the only way to be sure what has been covered in lecture!!!**

## SYLLABUS

<u>DATE</u>	<u>SUBJECT</u>	<u>READING</u>
<b><u>WEEK 1</u></b>		
W 1-18	Intro. to course, What is the Atmosphere?	pp. 3-5
F 1-20 <b>HW #1 OUT</b>	What can we measure about the atmosphere?	“
<b><u>WEEK 2</u></b>		
M 1-23	Composition of Earth’s atmosphere.	pp. 5-9
W 1-25	Composition continued, Force, Area, Kinetic Energy	pp. 9-10
<u>DATE</u>	<u>SUBJECT</u>	<u>READING</u>
F 1-27	Temperature and Pressure	pp. 11-12

### **WEEK 3**

M 1-30	Relationship between Temp., and Pressure; Ideal Gas Law	pp. 12-15
W 2-01	Gas Law continued	“
F 2-03 <b><i>HW #1 DUE</i></b> <b><i>HW #2 OUT</i></b>	Vertical Structure of the Atm.	pp. 15-19

### **WEEK 4**

M 2-06	What is Energy? Forms of Energy	pp. 20-27
W 2-08	What is Heat? Heat transfer	“
F 2-10	Conduction and Convection and Heat transfer	pp. 27-30

### **WEEK 5**

M 2-13	<b>EXAM 1</b>	
W 2-15	Radiative transfer and wave energy	pp. 35-36
F 2-17 <b><i>HW #2 DUE</i></b> <b><i>HW #3 OUT</i></b>	Boltzmann and Wein's Laws	pp. 36-38

### **WEEK 6**

M 2-20	Absorption, transmission and reflectance	pp. 38-40
W 2-22	Concept of Radiative balance, Kirchoff's Law	“
F 2-24	Atmospheric “windows”, Greenhouse effect	pp. 40-45

### **WEEK 7**

M 2-27	The daily and seasonal temp cycles	pp. 45-52
W 3-01	Seasonal cycle continued	“

<u>DATE</u>	<u>SUBJECT</u>	<u>READING</u>
F 3-03 <b><u>HW #3 DUE</u></b> <b>HW #4 OUT</b>	Scattering of light,	pp. 53-59

**WEEK 8**

M 3-06	Why is the sky blue?	“
W 3-08	Humidity and how we measure it	pp. 63-69
F 3-10	<b>EXAM #2</b>	

**WEEK 9**

M 3-13	Condensation and Fog formation	pp. 69-70
W 3-15	Cloud formation, Why does rising air cool?	pp. 70-78
F 3-17 <b><u>HW #4 DUE</u></b> <b>HW #5 OUT</b>	Buoyancy and the concept of instability.	“

**(SPRING BREAK MARCH 20-MARCH 24)**

**WEEK 10**

M 3-27	Atmospheric Stability and relevance for severe weather	“
W 3-29	Precipitation formation; Why don't all clouds precipitate?	pp. 78-85
F 3-31	Forces and Force balance; Pressure gradient force	pp. 89-96

**WEEK 11**

M 4-03	The Coriolis Force	“
W 4-05	What forces control the wind <i>above</i> the surface? Geostrophic balance	pp. 96-100
F 4-07 <b><u>HW #5 DUE</u></b> <b>HW #6 OUT</b>	Friction - What forces control the wind at the surface?	“

<u>DATE</u>	<u>SUBJECT</u>	<u>READING</u>
<b><u>WEEK 12</u></b>		
M 4-10	<b>EXAM #3</b>	
W 4-12	Surface winds near cyclones and anticyclones	pp. 101-105
F 4-14	The continuity of mass, How does this influence weather?	pp. 105-113
<b><u>WEEK 13</u></b>		
M 4-17	Convergence and Divergence, Vertical air motions	“
W 4-19	Extratropical cyclones, What are they? Who cares?	pp. 113-121
F 4-21	<b><u>HW #6 DUE</u></b> <b><u>HW #7 OUT</u></b>	“
<b><u>WEEK 14</u></b>		
M 4-24	Cyclones and fronts, Vertical structure	“
W 4-26	Vertical shear of the geostrophic wind	pp. 121-124
F 4-28	Thunderstorms	pp. 124-129
<b><u>WEEK 15</u></b>		
M 5-01	Severe Thunderstorms and Tornadoes	“
W 5-03	The tropical atmosphere	pp. 133-135
F 5-05	<b><u>HW #7 DUE</u></b>	pp. 135-139
FINAL EXAM	Saturday May 6, 2017	7:45 AM      Room TBA

(Remember, it will really be like a fourth exam with a little more material, but you'll still get the full two hours!)