MET 3003, GENERAL METEOROLOGY (U01/12442)

FLORIDA INTERNATIONAL UNIVERSITY

Spring 2013

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Time and location: MWF, 10:00-10:50AM, GC-276

Office Hours: MW 2:00-3:00 PM, TH 11:00-12:00 AM, or by appointment.

Prerequisites: PHY 2048 or PHY 2053, or permission of the instructor.

Text: ***The Atmosphere, An Introduction to Meteorology***, by Frederick K. Lutgens and Edward J. Tarbuck, 11th Edition (10th and 12th Editions are also acceptable), 2010, IBSN-13-0-321-58733-6. Supplementary class notes. You can reach an on-line version of this syllabus at:

http://www.fiu.edu/~willough/met_3003/0_Syllabus.pdf

And a file with links to the course notes at:

http://www.fiu.edu/~willough /met_3003/0_LINKS.html

Course description: A quantitative introduction to the Earth's atmosphere. Topics include: local and large-scale weather, clouds and convection, solar and infrared radiation, general circulation and climate, and a bit of meteorological dynamics.

Course Goals and Objectives: This course is the first in a series designed to constitute an Atmospheric Science Track within FIU Department of Earth Sciences. It provides an introduction to the profession of meteorology and a description of the atmosphere for undergraduate students majoring in physical sciences or engineering. We will answer questions such as these:

- What do meteorologists do and how do other professions relate to meteorology?
- What are the history, composition, and broad-scale structure of the atmosphere?
- What are the roles of heat and moisture in the atmosphere?
- What determines the strength and direction of the wind?
- What determines the structure and behavior of middle-latitude and tropical weather systems?
- How do clouds, rain, snow, and hail form?
- How and why does the climate change?

Course organization and philosophy: I hope and expect that you are self-selected for motivation and interest in the atmosphere. The lectures are important. Please, **no cell phones, texting, or off-line conversations during class.** This is a reasonably demanding

course, but the class is small enough for substantial interaction and individual attention. Make a genuine effort, and you should do well.

Although *Lutgens & Tarbuck* is a frequently-revised, widely-used text for first courses in meteorology, it is more elementary than the level on which I will teach. I'll provide supplemental notes on more quantitative topics. This book is easy to understand. Please read the assignments before we cover them in class, and bring the book each time we meet because we will refer to some of the figures. I welcome thoughtful questions. The book has a companion website with key concepts and practice tests. You can log into it using access information in the front of the text. This material can be a valuable add-on to what we do in class. I may draw a few test questions from the study materials on this site.

I see meteorology as a descriptive natural science that often speaks the language of physics and mathematics. You need to learn some basic mathematical ideas here, but we will be selective and focus on essential concepts. Attending the lectures, doing the reading, participating in discussion, and taking careful notes will be keys to success in MET 3003.

Homework	20%
Exam #1	20%
Exam #2	20%
Final Exam	40%
Total	100%

We will have occasional homework, particularly while we're studying Chapters 1-4. A focused effort and understanding of the material should be enough to complete the homework successfully. I encourage you to work together, but don't copy. There will also be two exams and a final. Format of the exams will be multiple choice, fill in the blank, short (1-2 paragraph) essay, draw and label a sketch, and problems like ones you will have seen in the homework. Homework and exams will contribute to grades as indicated in the table above on the left, and I plan to use a standard 90-80… scale, as shown to the right, for assigning letter grades.

Grading Scale	
100-90	A
89-80	B
79-70	C
69-60	D
below 60	F

A word about intellectual dishonesty, which I define as claiming someone else's work or ideas as your own. I won't tolerate it, and it is a certain way to have a bad outcome in MET 3003. Everyone is trustworthy unless proven otherwise.

After the first week of class, when you all have sorted out your usual seats, I will photograph the classroom and use the image to refresh my memory about your names. I will also photograph the classroom at the time of each exam so that I have a record of who was actually sitting where. You are to have no hats, hoodies, dark glasses of cell phones available during exams.

Daily Weather: We will use the Internet connection in our classroom and local observations to discuss interesting weather during the first few minutes of each class. Three informative web sites are:

The Marshall Spaceflight Center's GOES Satellite viewer:

http://weather.msfc.nasa.gov/GOES/

The Miami Weather Service Radar:

http://radar.weather.gov/ridge/radar.php?rid=AMX

And the NCEP web-based surface weather analysis:

http://www.hpc.ncep.noaa.gov/html/sfc2.shtml

On your way to class each day, please notice the clouds, temperature, humidity, and wind. This time of year the fronts pushing south from the snowy north can be spectacular, and by spring we'll be able to watch some good sea-breeze convection.

MET 3003 TOPICS AND READING ASSIGNMENTS

Class	Month	Date	Topic	Reading
1	JAN	7	Meteorology	Ch. 1
2		9	The Atmosphere	
3		11	Classical gasses	Notes
4		14	Gas laws, continued	
5		16	Heat in the Atmosphere	Ch. 2
6		18	Heat and Energy	
		21	**MLK Day NO CLASS**	
7		23	Heat Budget	
8		25	Air Temperature	Ch. 3
9		28	Variation and measurement of temperature	
10		30	Moisture and Humidity	Ch. 4
11	FEB	1	Properties and measurement of H_2O	
12		4	Stability of dry air	
13		6	Stability of moist air	
14		8	Exam #1 Review	Ch. 1-4
15		11	**Exam #1**	
16		13	Clouds	Ch. 5
17		15	Cloud physics	
18		18	Hydrometeors	
19		20	Pressure	Ch. 6
20		22	Pressure variations	
21		25	Winds and forces	
22		27	Balanced winds	
23	MAR	1	Atmospheric circulations	Ch. 7

24		4	Atmospheric circulations (cont.)	
25		6	Air Masses	Ch. 8
26		8	Weather Patterns	Ch. 9
		11-15	**Spring break, NO CLASS**	
27		18	Weather Patterns (cont.)	
28		20	Thunderstorms & tornadoes	Ch. 10
29		22	Thunderstorms & tornadoes (cont.)	
30		25	Weather Forecasting	Ch. 12
31		27	Forecasting (cont.)	
32		29	Exam review (*excluding Ch 11*)	Ch. 5-12
33	APR	01	**Exam #2**	Ch. 5-12
34		03	Pollution	Ch. 13
35		05	Pollution (cont)	
36		08	World Climates	Ch. 15
37		10	World Climates (cont.)	
38		12	Climate change	Ch. 14
39		15	Climate change (cont.)	
40		17	Atmospheric Optics	Ch 16
41		19	Review	ALL
			FINAL EXAM, TBA	Cumulative

No	**Course Learning Outcomes**	
1	Be able to describe weather elements such as temperature, pressure, humidity, clouds, and hydrometeors	
2	Be able to describe the structure evolution and dynamics of synoptic, meseoscale and convective scale weather systems.	
3	Be able to relate the occurrence of weather elements to synoptic, meseoscale and convective scale weather systems.	
4	Be able to describe the flows of energy, mass, and moisture through weather systems and through the general circulation of the atmosphere.	

5	Demonstrate ability to compute hydrostatic pressure, moisture variables, and balanced winds.	
6	Be able to present results and communicate ideas effectively	