Physics 123: Physics of the Atmosphere.

Physical principles of atmospheric phenomena; composition and structure of the atmosphere, energy flows to, from, and through the atmosphere, and the resulting air motions and weather from small to planetary scales.

Overview

The course offers an inquiry-based survey of the science of the atmosphere. Background information on the properties of the atmosphere, the principles governing weather and climate, the main interactions between the atmosphere and other parts of the Earth system, and the implications of these interactions for humankind are presented. Various relevant topics of current interest are included, and methods of analysis are developed through the study of current meteorological data. Printed and online components of the labs provide twice-weekly investigations to reinforce concepts and to better explore the atmosphere's workings using actual (archived or real-time) weather events. This is a 3-credit, one-semester, lab-based science course; it is offered as two hours of lecture plus two one-hour laboratory sessions per week.

Syllabus **PHYS 123 - Physics of the Atmosphere** **Fall 2011**

Dr. Stolzenburg mstolzen@phy.olemiss.edu 662-915-5252
office: Lewis Hall, room 124 Office hours: T,Th 3:30-5:00

Required Text: *Weather Studies. An Introduction to Atmospheric Science* (4th Ed), J. M. Moran.

Required Lab Manual: *Weather Studies Investigations Manual 2011-2012*

Class schedule:

Lectures - M,W 3:00-3:50 pm (sections 1, 2) in Lewis Hall, Room 109
Labs (required) - M,W 4:00-5:00 pm (section 1); T,Th 2:30-3:30 pm (section 2).
Final Exam: Thursday, Dec. 8, starting at 4:00 pm

Planned Lecture Outline

Week	Topics (Chapter in text, reading assignment)
1	Atmospheric Optics and Acoustics – light and color, sound propagation, physical basis of various optical and acoustical phenomena in the atmosphere. **(Ch. 14)**
1	Monitoring the Weather – data sources, weather systems, weather maps, satellite and radar imagery. **(Ch. 1)**
2	Atmospheric Origin, Composition and Structure – evolution of the atmosphere, models, the scientific method, describing and monitoring atmospheric layers. **(Ch. 2)**
3, 4	Solar & Terrestrial Radiation – EM spectrum, radiation laws, solar input, the seasons, stratospheric ozone, outgoing radiation, greenhouse effect, global warming. **(Ch. 3)**
5	Heat, Temperature, and Atmospheric Circulation – heat transfer processes, specific heat, latitudinal and other heat imbalances, air temperature variations. **(Ch. 4)**

Test 1 on ~ Sep. 26, 2011

6, 7	Air Pressure – measurement and variation with altitude, "highs" and "lows," ideal gas law, conservation of energy, adiabatic processes. **(Ch. 5)**
7	Humidity, Saturation, and Stability – the water cycle, describing and monitoring water vapor in the atmosphere, atmospheric stability and lifting processes. **(Ch. 6)**
8	Clouds, Precipitation, and Weather Radar – cloud formation and classification, processes and forms of precipitation, locating and measuring precipitation. **(Ch. 7)**
9	Wind and Weather – physical forces governing the wind, winds in equilibrium, surface winds in weather systems, atmospheric circulations, monitoring the wind. **(Ch. 8)**

Test 2 on ~ Oct. 24, 2011

10, 11 The Atmosphere's Planetary Circulation – idealized pattern and features of atmospheric circulation, trade winds, monsoons, jet streams, El Nino/Southern Oscillation. **(Ch. 9)**

11 Weather Systems in the Middle Latitudes –flow and variations, types of air masses, frontal systems, extratropical cyclones, anticyclones, regional weather patterns. **(Ch. 10)**

12 Thunderstorms & Tornadoes – life cycle, characteristics, occurrence, hazards. **(Ch. 11)**

13 Tropical Weather Systems – hurricane characteristics, occurrence, forecasting. **(Ch. 12)**

Test 3 on ~ Nov. 30, 2011 (last day of class)

Planned Lab Schedule

Week	**Investigations (two per week)**			
1	Aug. 22, 23:	**14A**	Aug. 24, 25:	**13A**
2	Aug. 29, 30:	**13B**	Aug. 31, Sep.1:	**1A**
3	Sep. 5, 6:	none	Sep. 7, 8:	**1B**
4	Sep. 12, 13:	**2A**	Sep. 14, 15:	**2B**
5	Sep. 19, 20:	**3A**	Sep. 21, 22:	**3B**
6	Sep. 26, 27:	**4A**	Sep. 28, 29:	**4B**
7	Oct. 3, 4:	**5A**	Oct. 5, 6:	**5B**
8	Oct. 10, 11:	**6A**	Oct. 12, 13:	**6B**
9	Oct. 17, 18:	**7A**	Oct. 19, 20:	**7B**
10	Oct. 24, 25:	**8A**	Oct 26, 27:	**8B**
11	Oct.31, Nov.1:	**9A**	Nov. 2, 3:	**9B**
12	Nov. 7, 8:	**10A**	Nov. 9, 10:	**10B**
13	Nov. 14, 15:	**11A**	Nov. 16, 17:	**11B**
14	Nov. 28, 29:	**12A**	Nov.30, Dec.1:	**12B**

You should come to each lab prepared with the following: your **Investigations Manual**, a **BLUE pen**, and a **pencil with eraser**. Other needed materials will be supplied in the lab. Labs for this course are in Lewis Hall, Room 1 (basement level, access from parking lot).

Planned Grading Scheme and some important notes:

40% of course grade based on Homework and Labs.
- Homework is due at the beginning of class!
- Lab attendance is required! If you miss three or more lab meetings, you will receive no credit for the lab portion of the course.

30% of course grade based on three Tests.
- Planned dates are Sep. 26, Oct. 24 , and Nov. 30

30% of course grade based on Final Exam.
- Exam time is Dec. 8, 2011, at 4:00 pm. No exceptions; no excuses.

Overall Course Grades:
A = 90% or above
B = 80-89%
C = 70-79%
D = 60-69%
F = less than 60%

Course Website: for *American Meteorological Society Weather Studies*

www.ametsoc.org/amsedu/login.cfm Login ID:_____ Password: _____

or amsedu.ametsoc.org/amsedu/login.cfm