

MET 3502 & 3502(L) SYNOPTIC METEOROLOGY (ID 95252)
AND SYNOPTIC METEOROLOGY LAB (ID 95253)
FLORIDA INTERNATIONAL UNIVERSITY

Fall 2009

Instructor: Dr. Hugh Willoughby, Office: PC 327B. Phone: 305-348-0243. Email: hugh.willoughby@fiu.edu.

Time and location: Lecture: MWF, 2:00-2:50 PM, PC-326; Lab Tu 3:30-5:30 PM, PC-311

Office Hours: 11:00 AM-12:00 PM, MWF; 1:00-2:00 PM, TTH

Prerequisites: MET 3003, General Meteorology.

Text: *Middle-Latitude Weather Systems* by Toby N. Carlson, American Meteorological Society, 1994, 507 pp.

You can reach an on-line version of this syllabus (lecture & lab)at:

http://www.fiu.edu/~willough/met_3502/0_Syllabus.pdf

And a link to notes, assignments and lab materials at:

http://www.fiu.edu/~willough/met_3502/0_LINKS.html

Course description: This course focuses on analysis and forecasting of middle-latitude weather systems. The lab is vital to the course content. Students who complete MET 3502 & 3502(L) will have a good start toward the essentials of the Forecaster's Art.

Course Goals and Objectives: We will treat synoptic scale weather systems in considerable detail. By "synoptic-scale" we mean storms that have horizontal scales greater than 1000 km and last for several days. The prime examples are frontal cyclones. The role of these systems in the atmospheric general circulation is to move heat and westerly momentum from the tropics to high latitudes. Their pressure and winds are nearly in hydrostatic and geostrophic balance. Because they are large enough to cover many observing stations and last many observing cycles, traditional weather maps are the primary tool of the synoptic analyst.

We will pay close attention to daily weather during the lectures, and each laboratory session will begin with a student weather briefing.

Course organization and philosophy: I hope and expect that you are self-selected for motivation and interest in the atmosphere. This is a demanding course, but the class is small enough for substantial interaction and individual attention. Make a genuine effort, and you should do well.

The book *Middle-Latitude Weather Systems* is twelve years old. It is more advanced in places than the level at which I intend to teach this course, but it contains excellent material for motivated undergraduates. By judicious selection of readings and lecture material we can cover the material without undue difficulty. I'll provide supplemental notes on the review of stability. Please read the assignments before we cover them in class, and bring the book each time we meet. I welcome thoughtful questions.

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

Participation	10%
Exam #1	25%
Exam #2	25%
Final	40%
Total	100%

For the most part the lectures will deal with concepts and processes, and the lab will introduce calculations and analyses. There will be two in-class exams and a comprehensive final. Format of the exams will be short answer, short (1-2 paragraph) essay, draw-and-label a sketch, and one or two problems that you will have seen in the lab.

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

Participation, exams, and final will contribute to grades as indicated in the table to the left, and I plan to use a standard 90-80... scale, as shown to the right, for assigning letter grades.

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 3502. Everyone is trustworthy unless proven otherwise.

Daily Weather: In addition to the briefings during Lab, we will use the Internet connection in our classroom and local observations to discuss interesting weather during the first few minutes of each class. On your way to class each day, please notice the clouds, temperature, humidity, and wind. Early in the semester, we'll still be in hurricane season, and the South Florida sea breeze may be active. Later on fronts pushing south from the snowy north will give us local realizations of synoptic-scale weather.

MET 3502 Lectures and Assignments

Class	Mon.	Day	Topic	Assignment
1	AUG	24	Introduction	pp. 1-3
2		26	Overview of frontal systems	notes
3		28	Surface weather elements	notes
4		31	Derivatives	pp. 10-12
5	SEP	2	Integrals	notes
6		4	Contour analysis	notes
		7	Labor Day, NO CLASS	
7		9	Vectors	notes
8		11	Equations of motion	pp. 3-10
9		14	Balanced winds	pp. 15-18
		16	HEW Traveling, NO CLASS	
10		18	Air masses	notes
11		21	Exam # 1 review	Classes 1-10
12		23	Exam # 1	
13		25	Divergence and vertical motion	pp. 44-51

14		28	Fronts	pp. 342-350
15		30	Frontal cyclone life cycle	pp. 221-241
16	OCT	2	Vorticity dynamics	pp. 28-51
17		5	Potential vorticity	notes
18		7	Cyclogenesis I	pp. 158-175
19		9	Cyclogenesis II	continued
20		12	Spaceborne remote sensing	notes
21		14	Satellite interpretation	pp. 234-238
22		16	Frontal-cyclone forecasting	notes
23		19	Thermal wind	pp. 19-22, 72-74
24		21	Vertical structure	notes
25		23	Rapid development	pp. 244-257
26		26	Northeasters	notes
27		28	Lee cyclogenesis	notes
		30	HEW Traveling NO CLASS	
28	NOV	2	Dry thermodynamics	pp. 68-72
29		4	Moist thermodynamics	notes
30		6	Atmospheric stability	notes
31		9	Jet-stream dynamics	pp. 364-369, 410-417
		11	Veterans' Day, NO CLASS	
32		13	Forecast verification	notes
33		16	Exam #2 review	Classes 13-33
34		18	Exam #2	
35		20	Severe weather	notes
36		23	Tornadoes	notes
37		25	Polar lows	pp. 257-262
		27	Thanksgiving Break, NO CLASS	
38		30	Tropical weather	notes
39	DEC	2	Hurricanes	notes
40		4	Review	Cumulative

MET 3502(L) Synoptic Meteorology Lab Schedule

Class	Mon.	Day	Topic	Assignment
1	AUG	25	Introduction, weather briefing and Internet resources	Briefing guide, Turn in Surface Charts and VIS Images
2	SEP	1	Surface data	Surface data guide, and interpretation assignment
3		8	Pressure analysis	Analyze surface pressure chart
		15	HEW Traveling, NO CLASS	
4		22	Winds and pressure	Wind and pressure calculations
5		29	T and TD analysis	Analyze T & TD chart
6	OCT	6	Frontal analysis	Locate fronts on surface charts
7		13	Surface analysis and time continuity	Analyze later charts in series
8		20	Satellite Imagery	Interpret surface weather from satellite images
9		27	Upper-air charts and analysis	Analyze 500 mb and 200 mb chart
10	NOV	3	Upper-air II	Continue 500 & 200 mb analyses
11		10	Stability and convection I	Skew-T log P diagram I
12		17	Stability and convection II	Skew-T log P diagram II
13		24	Jet stream analysis	Jet streaks impact on weather
14	DEC	1	LAB FINAL	Cumulative, Study guide