MET 4301, DYNAMIC METEOROLOGY I (ID: U02, 87175)

FLORIDA INTERNATIONAL UNIVERSITY

Fall 2017

Instructor: Dr. Hugh Willoughby, Office: AHC5 363. Phone: 305-348-0243. Email: hugh.willoughby@fiu.edu.

Time and location: Lecture: MWF, 1:00-1:50 PM, AHC5 357

Office Hours: Mon 10:00-11:00 AM, Tue 1:00-2:00PM, Wed, 2:00-3:00 PM, or by appointment.

Prerequisites: PHY 2048, Physics with Calculus I (You need to understand partial derivatives.)

Text: ***An Introduction to Dynamic Meteorology, 5th Edition*** by James R. Holton and Gregory J. Hakim, Elsevier, 2012, 532 pp.

You can reach an on-line version of this syllabus at:

http://faculty.fiu.edu/~willough/met_4301/0_Syllabus.pdf

And links to the course materials and notes at:

http://faculty.fiu.edu/~willough/met_4301/0_LINKS.html

Course description: This course provides a rigorous introduction to the dynamics of synoptic-scale weather. The focus will be on middle-latitude systems, with some introduction to the tropics and climate. I will assign regular problem sets. They will constitute a significant part of your grade.

Course Goals and Objectives: We will treat synoptic scale dynamics in considerable detail. The key concepts are Rossby-wave dynamics, potential vorticity, height-tendency & omega equations and baroclinic instability. 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 that dominate synoptic-scale weather in middle latitudes. 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.

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.

Holton's Dynamic Meteorology is the classic undergraduate dynamics text. It presents a demanding range of topics. I will try to simplify the key concepts so that you understand them from both descriptive and mathematical perspectives. 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 doing the problems carefully will be essential to success.

Participation & Problems	30%
Exam #1	20%
Exam #2	20%
Final	30%
Total	100%

For the most part the lectures will deal with concepts, processes, and detailed analysis. The problems are designed to reinforce them. There will be two in-class exams and a comprehensive final. Format of the mid-tem and final exams will be problems from the homework, some short essay, and draw-and-label a sketch. Participation, problems, mid-term, 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.

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 4301. Everyone is trustworthy unless proven otherwise.

MET 4301 Topics and Reading Assignments

WEEK	Month	Day	Topic	Reading
1	AUG	21-25	Introduction & Forces	*H&H,* CH 1, pp 1-18
2	AUG-SEP	28-01	Hydrostatics & Math Review	*H&H,* CH 1, pp 18-26
	SEP	04	Labor Day, **NO CLASS**	
		06-15	Irma, **NO CLASS**	
3		18-20	Math Review (cont)	
4		22-29	Momentum Equations (*27th HEW @TLH*)	*H&H,* CH 2, pp 31-43
5	OCT	02-06	Continuity & Thermodynamic Equations	*H&H,* CH 2, pp 45-64
6		09-13	Isobaric Coordinates	*H&H,* CH 2, pp 22-23, CH 3, 67-69
7		16-20	Balanced Flows	*H&H,* CH 3, pp 69-77, 81-89
8		23-25	**Review and Exam #1 (Wed 25th)**	CH 1 - 3
9	**OCT-NOV**	27-01	Circulation & Vorticity (*25th HEW @ TLH*)	*H&H,* CH 4, pp 95-110
10	NOV	03-08	Vorticity and Potential Vorticity Equations	*H&H,* CH 4, pp 111-120
		10	**Veteran's Day NO CLASS**	
11		13-17	Energy Equation	CH 2, pp 50-56, notes
12		20-22	**Review and Exam #2 (WED 22nd)**	CH 4 + Energy
		23&24	Thanksgiving, **NO CLASS**	
13	NOV-DEC	27, 28, 01-06	Synoptic-Scale Systems and Quasigeostrophic (QG) Approximation	*H&H,* CH 6, pp 171-208
14	DEC	8	Final Exam Review	Cumulative
			FINAL EXAM	**TBA**