MET 4302, DYNAMIC METEOROLOGY II, ID U01 13904)

FLORIDA INTERNATIONAL UNIVERSITY

Spring 2018

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: 10:00-11:00 AM MW and 2:00-3:00 PM TH, or by appointment. I'm generally in my office during working hours except when I'm in class or a meeting.

Prerequisites: MET 4301, Dynamics I.

Text: ***An Introduction to Dynamic Meteorology, 5th Edition*** by James R. Holton & Gregory J. Hakim, Elevier, 2013, 532 pp.

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

http://faculty.fiu.edu/~willough/met_4302/0_Syllabus.pdf

PDFs of the lecture notes are available at:

http://faculty.fiu.edu/~willough/met_4302/0_LINKS.pdf

Course description: This course provides a rigorous undergraduate introduction to the dynamics of (primarily) synoptic-scale weather. The focus will be on middle-latitude systems, with some introduction to the tropics and climate.

Course Goals and Objectives: We will treat synoptic scale dynamics in considerable detail. The key concepts are approximations that adapt the Navier-Stokes equations to description of synoptic-scale motions at latitudes where the Coriolis Parameter is $\sim 10^{-4}$ s^{-1}. By "synoptic-scale" we mean storms that have horizontal scales greater than 1000 km and last for several days. The prime examples are baroclinically unstable 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.

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 augment discussion of key concepts so that you will find the course challenging and arrive at descriptive and mathematical understanding. 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. Thus, attending the lectures, doing the reading, participating in discussion, taking careful notes and doing the problems carefully will be essential to success.

Participation	10%
Problems	30%
Midterm Exam	25%
Final	35%
Total	100%

For the most part the lectures will deal with concepts and processes, and the problems will 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 4302. Everyone is trustworthy unless proven otherwise.

WEEK	Month	Day	Topic	
1	JAN	08-12	Linear Waves	CH 5, pp 127-144
		15	MLK Day, **NO CLASS**	
2.2-2.3		17-19	Buoyancy Waves	CH 5, pp 144-150
3		22-26	Buoyancy Waves (cont.)	
4	JAN-FEB	29-02	Inertia Buoyancy Waves	CH 5, pp 150-159
5	FEB	05-09	Rossby Waves	CH 5, pp 213-219
6		12-16	Rossby Waves (cont.)	
7.1-7.2		19-21	**Review and Midterm Exam**	CH 5
7.3-8	FEB-MAR	23-02	Baroclinic Instability	CH 7, pp 213-229
9	MAR	05-09	Baroclinic Instability (cont.)	
		13-16	Spring Break, **NO CLASS**	
10		19-23	Vertical motion and energy	CH 7, pp 229-234
11		26-30	Forced secondary circulations	CH 9, pp 287-290
12	APR	02-06	Equatorial waves	CH 11, pp 401-409
13.1-13.2		09-11	Eq. waves (cont)	
13.3		13	Final Exam Review	Cumulative
		16-20	**HEW at AMS Hurricane Conference. No Class**	
	TBA	24	Final Exam	

No	**Course Learning Outcomes**	
1	Demonstrate broad working knowledge of the Navier-Stokes (N-S) Equations as applied to the Atmosphere and of such simplifications as the Quasigeostrophic Approximation.	
2	Be able to apply the perturbation method to the N-S equations to obtain linear equations that describe real Atmospheric motions.	
3	Demonstrate a working knowledge of atmospheric wave propagation, instabilities, models and observations	
4	Demonstrate ability to apply dynamic analysis to synoptic-scale weather, the general circulation, and climate.	
5	Be able to present results and communicate ideas effectively	