ATMS 313: SYNOPTIC WEATHER FORECASTING

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Meeting Times: Tu, Th; 2:00-3:20; 109 Atmospheric Sciences
                        F; 10:00-10:50; G27 Foreign Languages Building

Credits: 4 hours

Prerequisites: ATMS-303 (Synoptic-Dynamic Weather Analysis)

Required Text: *Midlatitude Synoptic Meteorology* by Gary Lackmann.
ISBN: 978-1-878220-10-3

Course Description: Now it's finally time to learn how to forecast the weather! During this course, you will learn the basics of numerical modeling, how models are used to predict the weather, and how to apply various forecasting techniques to forecast many different aspects of the weather, including high and low temperatures, precipitation amounts, precipitation types, sky cover, wind speed and direction, visibility, thunderstorms, and severe weather. We will also complete our study of synoptic meteorology, covering frontogenesis, Q-vectors, and isentropic analysis. Although forecasting methods will be presented to you, it is important to remember that there is no one way to forecast the weather, and *that the only way to truly learn how to forecast is by actually making forecasts.* As such, forecasting will be a major component of class homework assignments, especially during the second two-thirds of the semester.

Course Websites: A wealth of forecasting links, some of which will be discussed in class, are available on the course website, http://compass2g.illinois.edu. Use these links or your favorite weather sites as a starting point for your weather forecasts. Other materials, including lecture notes, homework assignments, and handouts will be uploaded to this site throughout the semester. Note that downloading lecture notes from Compass is **not** an adequate substitute for attending class; these notes are intended to provide you with some of the imagery shown during the lectures. Many key details will be missing from these summaries and will be given in class.

COURSE WORK

Lab Assignments: Lab assignments will be assigned weekly throughout the semester. In the first third of the course, these assignments will generally consist of forecasting exercises or questions regarding a map analysis. In the second two thirds of the course, you will be responsible for writing a forecast discussion at least once a week, modeled on the forecast discussions issued by the National Weather Service. Forecast discussions will be due at 0300 UTC on the evening of the day on which they are assigned. Students will be expected to complete all assignments and may work together on homework, but *verbatim copying will NOT be tolerated under any circumstances*. Traditional assignments turned in late will be penalized 20% for each day they are late; if a forecast discussion is not submitted by 1200 UTC, it will receive a grade of zero. Not completing homework assignments on a regular basis is the most efficient way to risk failing this class.

Exams: There will be two evening midterm exams during the semester and a cumulative final exam held during the final exam period. **You are required to take exams during the scheduled time. Exams cannot be made up except in extremely unusual circumstances and absolutely must be cleared with me in advance.**

Tentative Exam Dates: Wednesday, February 25, 6:30-8:30pm
                                                Thursday, April 9, 6:30-8:30pm
                                                Thursday, May 14, 8:00-11:00am (Finals Week)

Grading: Your grade will be calculated as follows:

15% Mid-Term Exam I	A+	> 97%	C	72 - 77%
15% Mid-Term Exam II	A	92 - 97%	C-	70 - 71%
20% Final Exam	A-	90 - 91%	D+	68 - 69%
35% Homework Assignments	B+	88 - 89%	D	62 - 67%
5% Forecast Contest Participation	B	82 - 87%	D-	60 - 61%
5% Forecast Contest Standing	B-	80 - 81%	F	< 60%
5% Class Attendance and Participation	C+	78 - 79%		

If you regularly attend class, complete your homework assignments, forecast for the contest, and prepare for your exams, you should not be in danger of failing this class.

Forecasting Contest: You will complete a numerical forecast for the class forecasting contest every class day (separate from the WxChallenge). This forecast consists of the high temperature, the low temperature, and the total rainfall (or, in the case of snowfall, liquid equivalent) between 0600-0600 UTC the day following each class meeting. The city will vary from class to class and will be determined by me. These forecasts will be used in the class forecasting contest and must be submitted electronically at http://www.atmos.uiuc.edu/go/fcst. More information on the forecasting contest, including scoring methodology, will be distributed in the second week of the semester.

All forecasts are due at 0000 UTC the evening of a class period. (For a class that meets on Tuesday at 2:00 pm, all forecasts will be due at 0000 UTC Wednesday, or by 6:00 pm CST/7:00 pm CDT Tuesday evening.)

Extra Credit: Each student who participates in the WxChallenge, a nationwide collegiate weather forecasting contest, will receive 1/4 a percentage point added to his or her final grade for each forecast city in which at least 6 (out of a possible 8) forecasts are entered. If you fail to forecast for at least 6 days for a city, you will receive no reward for that city. There are 5 forecast cities for the spring semester (each over a two week period with four forecasts entered per week, Monday-Thursday), so the maximum extra credit reward is 1.5 percentage points for the entire semester. For each city in which any student beats the national forecaster consensus, an additional 1 percentage point to be added to his or her semester grade. Note that WxChallenge forecasts consist of high and low temperatures, maximum wind (NOT gust) speed, and total precipitation (liquid equivalent, not snowfall) to the nearest hundredth of an inch for the following day. Your performance (or lack thereof) in this contest will not affect your grade in any way other than the addition of these extra credit points. Extra credit is offered for participation in WxChallenge because it is a fun way to encourage you to look at the weather every day.

For more information on the WxChallenge, please visit http://www.wxchallenge.com. Please contact me for more information, including on how to sign up for the contest. The contest resumes for the spring semester on Monday, January 26, and the registration deadline is Friday, January 23. Students who registered in the fall semester for the entire year need not sign up again. You must register by the deadline above in order to participate in the WxChallenge.

Additionally, any student who bests Class Consensus in our class forecasting contest will have 1% added to his or her overall grade for the course. If you beat Consensus and me and/or Chris, total of 2% will be added to your overall grade. In the event that you beat Consensus, Chris, and me, you will have a total of 3% added to your total course grade. Note that you cannot earn more than 3% extra credit through this method.

Class Participation: In the best learning environments, students participate actively in the class discussions via asking questions and contributing knowledge. Active participation in weather briefings and lectures is crucial to the development of your forecasting skills. If you have a good reason for missing class (i.e., illness, conference travel, graduate school visits, etc), please email me before class and you will be excused from class that day. It will be your responsibility to get any class notes from another student. If you are writing to be excused from class, please also inform me if you wish to be excused from that day's forecasting contest. If you have a poor excuse for missing class (i.e., oversleeping), you will receive a grade of zero for that day's activities if they are not submitted on time. Your participation grade will go down for each unexcused absence after your first two, as well for using the computers for non-class related activities during class time.

Tentative Course Schedule:

Date		Topic	Reading
Tu	01-20	Introduction; Begin Review	None
Th	01-22	Review of Fronts and the Cyclone Model	Skim Ch. 5; 12.1-12.2; 303 notes
Tu	01-27	Introduction to Atmospheric Modeling	10.1-10.2; 10.3.4; 10.7-10.7.1
Th	01-29	Gridded Model Output	11.4.1-11.4.2
Tu	02-03	Model Output Statistics (MOS)	10.7.2; 11.4.3
Th	02-05	Model Output Statistics (cont.)	
Tu	02-10	Forecasting Winter Weather **	Ch. 9
Th	02-12	Winter Weather (cont.) **	
Tu	02-17	Beating MOS Temperatures	11.3
Th	02-19	Temperature Forecasting Techniques	11.1-11.2
Tu	02-24	Weather Communication	11.5-11.6
W	02-25	**EXAM I**	
Th	02-26	Synoptic Fronts	6.4
Tu	03-03	Kinematic Frontogenesis	6.1-6.2
Th	03-05	Kinematic Frontogenesis (cont.)	
Tu	03-10	Dynamic Frontogenesis	6.3
Th	03-12	Q-Vectors	2.3: p. 47-50
Tu	03-17	Q-Vectors (cont.)	
Th	03-19	Isentropic Analysis	Ch. 3
Tu	03-24	*SPRING BREAK - NO CLASSES*	
Th	03-26		
Tu	03-31	Isentropic Analysis (cont.)	4.1-4.2; 6.5
Th	04-02	Upper-Level Fronts and the Tropopause	
Tu	04-07	Upper-Level Fronts (cont.)	
W	04-08	**EXAM II - EVENING**	
Th	04-09	Numerical Weather Prediction	10.3; 10.5
Tu	04-14	Numerical Weather Prediction (cont.)	
Th	04-16	Numerical Weather Prediction (cont.)	
Tu	04-21	Severe Weather Forecasting **	
Th	04-23	Severe Weather (cont.)	
Tu	04-28	Ensemble Forecasting	10.6
Th	04-30	Ensemble Forecasting (Cont.)	
Tu	05-05	Physical Parameterizations	10.4
Th	05-14	**FINAL EXAM, 8:00-11:00am**	

** Date of lecture is weather dependent!

COURSE POLICIES

Email: I will strive to answer all student emails in a timely matter. Email should be reserved for quick questions, especially after hours. If you have a more significant question or other problem, do not hesitate to stop by my or your TA's office during office hours or to make an appointment. Please include "ATMS-313" in the subject line when emailing me or Chris.

Respect: You will treat other students and the instructor with respect and will ensure that the classroom is a good learning environment free from disruptions such as extraneous conversation and *the ringing of cell phones*. The use of classroom computers, personal laptops, or mobile devices for non-class related activities, **including Facebook and text messaging**, is not permitted during class time. Please come to class on time. If you must come to class late or leave early, please do so without disrupting the class. Each class will start and end on time.

Academic Integrity: Students are permitted work together on homework assignments, but the final product must be your own; students turning in assignments that are blatantly copied will receive no credit. You are expected to complete your exams independently. Failure to do so will result in strict disciplinary action. Please see
http://www.uiuc.edu/admin_manual/code/rule_33.html for more information.

Special Needs: To insure that disability-related concerns are properly addressed from the beginning of the course, students with disabilities who require reasonable accommodations to participate in this class are asked to see the instructor as soon as possible in accordance with university policy. For more information, please visit
http://www.uiuc.edu/admin_manual/code/rule_4.html