

MET-3331: Analysis and Forecasting I
Fall 2005
Dr. Jason "Jay" Shafer

MW 12:15-1:10 PM
TH 6:00-7:55 PM
Vail 449

ANALYSIS AND FORECASTING I SYLLABUS

COURSE DESCRIPTION: In order to predict future weather, one must have a firm understanding of the past and present weather. This class provides analysis techniques to accurately diagnose the past and present weather and incorporates forecasting techniques/strategies so that one can conduct their own forecasts.

COURSE OBJECTIVES: Upon completion of this class, students should be able to:

- a) Clearly understand the principal types of weather-map analyses used in meteorology
- b) Conduct analyses that apply theoretical principles and conceptual models in analyzing current and forecast weather data.
- c) Accurately forecast the weather (temperature and precipitation) over the next 0-48 hours using both observations and numerical model data
- d) Justify and verify their forecasts

EXPECTATIONS:

I expect students to ask questions and to be curious about how the atmosphere works. In the process of learning about the atmosphere, I expect you to use critical thinking skills and scientific reasoning. This process will be difficult, but I expect a sincere effort from everyone. I believe that the teacher provides the tools for students to build their understanding and that the teacher provides guidance as to how to use these tools.

CLASS WEBPAGE: <http://apollo.lsc.vsc.edu/cgi-bin/classes/met3331/met3331.cgi>

USEFUL REFERENCES (not required):

Synoptic-Dynamic Meteorology in Midlatitudes, Vol. I, Howard Bluestein, Oxford University Press, 1992.

Weather Maps, P.Chaston, Chaston Scientific, 1997.

Weather Forecasting Handbook, Tim Vasquez, Weather Graphics Technologies, 2002.

MATERIALS: Colored pencils (see bookstore), #2 pencils, large soft eraser, straight edge, and a calculator

GRADING/ASSESSMENT:

The traditional grade system (A-F) will be used for this class. Specifically,

92.5-100% A	89.5-92.4% A-	86.5-89.4% B+	82.5-86.4% B
79.5-82.4% B-	76.5-79.4% C+	72.6-76.4% C	69.5-72.4% C-
66.5-69.4% D+	62.5-66.4% D	59.5-62.4% D-	below 59.5% F

Your grade will be based on the following weightings:

Homework: 15%
Labs: 20%
Quizzes (3): 15% - Sept 21, Oct 19, Nov 9
Tests (2): 20% - Oct 5, Nov 23
Final Exam: 15% (Wed 12/14 7:15-9:15PM)

Participation: 15% (participation in local forecast contest, classroom discussions, weather briefing)

- Local forecast contest: Every Monday & Wednesday beginning Sept 5, you are required to participate – further information about this will be given during the first week of class
- Weather briefing: you are required to give ~2 solo or 4 team (2 person) briefings, these will occur during the later half of class (12:40-1:10)

EXTRA CREDIT:

Students may obtain extra credit by participating in the national forecast contest. You must participate for at least eight periods and miss no more than 10 forecasts overall to qualify for additional credit. You will receive an additional 3 points on your final grade for this participation. If you finish in the top 50% (25%) (10%) for your category, you will receive an additional 4 (5) (6) points on your final grade. In addition, for every period/city that you win in your category, you will receive an additional point. Information about the national contest will be giving during the first week of class.

LATE/MISSED WORK:

For every day a lab or homework assignment is late, 10 points (one letter grade) will be deducted. If you miss class, you are responsible for getting any missed assignments and notes.

ATTENDANCE: Students are expected to attend class; role will only be called at the beginning of the semester to verify rosters. However, an unexcused absence on the day of

a test or quiz will result in a zero grade. The only valid reasons (with appropriate written documentation) for an excused absence are as follows:

- a) Illness documented by a physician
- b) Participation in the college-sponsored activity
- c) Death of family member
- d) Jury duty
- e) Inclement weather

COMPUTER ETIQUETTE: Non-educational use of the computers during class time will not be tolerated. It is rude and detracts from the learning environment. Non-educational uses may include surfing the web, chatting with friends, or playing games. Every instance this behavior is observed, you will lose 0.5 points off of your final class grade.

CLASSROOM ENVIRONMENT: Nobody knows everything about the atmosphere. With this in mind, we encourage an open, non-threatening environment in which everyone is free to be curious and ask questions. When you have questions or don't understand something, please don't be shy. We will learn a lot from each other.

STUDENTS WITH DISABILITIES:

Lyndon is committed to providing a broad spectrum of accommodations for students with documented disabilities. Within the resources of the college, we are prepared to provide accommodations that are appropriate for the nature of the disability and the course. Any and all disabilities must be documented; please take care of this documentation as soon as possible so that we can promptly accommodate your situation.

OFFICE HOURS: My scheduled office (Vail 434) hours are:

Tuesday 1:30-2:50

Thursday 10:30-12:05

Friday 10:00-11:30

However, I'm always willing to help so please stop by at any time. During non-office hours, you may want to send an e-mail: jason.shafer@lyndonstate.edu or call 626-6225 ahead to make sure I'm available.

This syllabus is subject to change with notice.

MET 3111 OUTLINE

1. Introduction

- a) Basic definitions
- b) Local, regional geography and scales

2. Review

- a) Surface analysis
- b) Basic upper-level patterns and connections to surface
- c) Advection, gradient, laplacian, dot product, cross product, derivatives
- d) Natural coordinates and applications
- e) Middle latitude cyclone lifecycle
- g) Basic forecasting methods

3. Wind: Kinematics

- a) Divergence
- b) Deformation - frontogenesis
- c) Translation
- d) Rotation (vorticity)
- e) Analysis of wind speed and direction

4. Atmospheric Patterns

- a) Ridge and trough properties
- b) Forecasting relevance (blocking)
- c) Spatial relationship to cyclogenesis/anticyclogenesis

5. Fundamental Equations and Balances

- a) Hydrostatic balance
- b) Hypsometric (thickness) and baroclinic systems
- c) Geostrophic balance
- d) Thermal wind equation

6. Vertical Motion: holy Grail of forecasting

- a) Relationship to upper-level ridges, troughs, and the polar jet stream
- b) Relationship to middle latitude cyclones
- c) Unbalanced flows

7. Analysis and Forecasting Applications (will be done when occurring)

- a) Nor'easters
- b) Local mesoscale effects
- c) Lake-Effect Snow
- d) Cold-Air Damming

8. Precipitation forecasting

- a) Moisture, stability, lift
- b) Precipitation type
- c) Amount, duration and intensity

9. Temperature Forecasting

- a) Thermodynamic equation
- b) High, low, range
- c) Effect of clouds and humidity
- d) Relationship to large-scale pattern
- e) Low-level stability: mixing theory

10. Forecasting using numerical model output

- a) NCEP Model descriptions
- b) Interpretation of graphics
- c) MOS

Computer software topics:

- 1. GEMPAK (General Meteorological PACkage)
- 2. World-Wide Web Resources
- 3. McIDAS (Man computer Interactive Data Access System)
- 4. IDV (Integrated Data Viewer)