Atmospheric Sciences 5940
Synoptic Meteorology Laboratory
Spring 2016 Scott Lab E125

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Office: Derby Hall 1048
Office Hours:T, Th: 9:15- 9:45 a.m. or noon-1:00p.m.
Class time: T, Th 10:20 – 11:15 a.m.

Course website**: http://carmen.osu.edu**

Course Prerequisites: Concurrent Geography 5900 or Atmos. Sci. 2940. The course is a prerequisite for Geography 5941 during autumn semester.

Course Objectives: The objective of the course is to introduce students to the various methods by which meteorological and weather information is gathered, measured, and displayed, for use in weather forecasting applications. Students will become familiar with methods of obtaining information, data, and weather forecasts using the World Wide Web, and learn how to perform basic meteorological analyses using web data. This training will facilitate weather map and web usage in more advanced synoptic meteorology courses and serve as a background of applied information for dynamic meteorology classes. Specific aims of the course are to introduce
(1) basic meteorological data collection and data coding methods,
(2) the displaying of that information on surface and upper air synoptic charts,
(3) the interpretation and forecasting applications of these charts,
(4) the methods of gathering and displaying information from weather radar and upper air soundings,
(5) the basics of satellite meteorology and interpretation of satellite-based weather images,
(6) the basics of numerical modeling and model output interpretation, and
(7) the basics of isobaric analysis, frontal analysis and plotting and analysis of thermodynamic diagrams.

Course Structure: The class meets two days per week. These sessions will include lectures, demonstrations of meteorological charts and their interpretation. The course is divided into several topics, each focusing on a synoptic weather chart or series of charts and diagrams that convey information vital for the forecasting of weather. Each topic is covered in approximately one or two class sessions, the outline of which is given on the back of this sheet. The course places heavy emphasis on analysis of synoptic charts and diagrams and "hands-on" learning of the analysis procedures and methods as well as on how to find the information using internet sources. Some of the course work (approximately one formal hour per week) is therefore devoted to individual laboratory work, weather map and chart analysis, and to the task of becoming familiarized with the basic features of internet data sources, including how to access and use the stored synoptic information. Assignments will cover key topics in analysis of synoptic charts and diagrams. Students should purchase color pencils and bring them to class by week 3 (yellow, green, red, blue, at a minimum).

Course Requirements.
Your grade in this course will be determined based on the following:

1. Assignments: 50% of your grade
2. One mid-term examination worth 25%
3. Final Exam on Tuesday May 3 at 8:00 a.m.: 25%

Homework assignments will include (i) in-class assignments for which there will be no make-up, (ii) take-home assignments, and (iii) possibly a larger “project”-type assignment later in the semester. In-class homework assignments will often requiring current data analysis or analysis of current synoptic weather situations occurring at class time, or those of the past few days. All assignments will be given a grade although some may not be formally corrected - only collected to determine that the assignment work was completed. Take-home assignments will be graded as "zero" if they are not turned in by their due date. Missed assignments due to voluntary departures during

the semester will be graded as zero. Missed assignments for medical reasons, with a medical excuse, will be graded. Medical excuses are necessary for missed exams. *Any student that feels he/she may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs.*

Course Outline

TOPICS

1. Introduction. The National Weather Service; its organizational structure and technology (ASOS, NEXRAD, GOES I-M, AWIPS, and Wind Profilers)

2. ASOS (Automated Surface Observing Systems): how weather data collection is done. AWIPS. METAR/TAF Code and its translation.

3. Surface Synoptic Chart and the Station Model.
   Map analysis: Isobaric and isothermal analysis on surface synoptic charts.

4. Identification of fronts on surface synoptic charts
   The pressure tendency and tendency analysis

5. History of upper air observations. Rawinsonde network and upper air data.

6. The upper air station model and plotting station models on constant pressure upper air synoptic charts
   Using of upper-level constant pressure charts: 850 mb & charts – low level thermal advection

7. Uses of upper-level constant pressure charts: 500 mb vorticity & vorticity advection analysis
   The thermodynamic diagram; contents, how to read it, and make simple calculations.

8. Plotting skew-T diagrams and basic interpretation. Determination of atmospheric stability.
   Mid-term Examination

9. Radiosonde-based charts: Sfc-500 mb Rel. Humidity; Precipitable Water; Freezing Levels.

Spring Break

10. Operational Forecasting Models RAP, NAM, GFS, and medium & long-range forecasts
    Model Output Statistics (MOS): what they are, how to read MOS output

11. NEXRAD: component parts, and meteorological data obtained from it. Radar view angles, products, How echo strength is calculated. NEXRAD Radar Composite Summary Chart and symbols.

12. Wind profilers: how they work & the information they provide
    Upper level wind analysis: Making and using hodographs

13. Meteorological Satellites: The GOES I-M and POES satellites, history; basic imagery & interpretation.
. GOES Satellite Weather Interpretation: Identifying cloud types and other earth/atmosphere features.

14. Satellite Jet stream identification from satellites, identification of ridges and troughs
    Numerical weather prediction procedure and processes

Final Exam: Tuesday May 3, 2016, 8:00 to 9:45 a.m. in Scott E125.