Instructor: Dr. Haiyan Jiang; Office: AHCS 371; Phone: 305-348-2984; Email: haiyan.jiang@fiu.edu
TA for the lab: Jeremy Katz; Office: AHCS 358; email: jkatz029@fiu.edu
Time: Lecture: Tu/Th 11:00AM-12:15 PM;
      Lab: Tu 12:30PM-3:00PM;
Location: AHCS 357
Office hours: Tuesday & Thursday, 12:15 PM-12:45 PM or by appointment
Course Web Site: http://faculty.fiu.edu/~hajian/MET3502/MET3502.html

Course overview

This course focuses on analysis and forecasting of middle-latitude weather systems. We will examine the structure and dynamics of these systems by integrating weather observations with the current state of dynamic theory, numerical weather prediction models, and the physical principles of atmospheric thermodynamics and cloud and precipitation physics. The lab is vital to the course content. Students who complete both the lecture and lab will have a good start toward the essentials of the Forecaster’s Art. We will pay close attention to daily weather during the lectures/labs. The lab assignments include traditional hand-drawing of weather maps and computer-based map analysis using the NCAR IDV software. Graduate students will have the opportunity to work on a research-related literature review and term paper reports to increase their ability to utilize knowledge learned in their research/thesis work. Prerequisite: MET 3003, General Meteorology or instructor’s permission.

Course lectures

Electronic portions (pdf files) of course lectures will be provided on the class website for download after the lecture is given so that you can review. Notes on the board may or may not be posted, so if you miss class, please see a fellow student.

Laboratory assignments

Each week, a laboratory assignment will be assigned relating to application of the material being covered in class. Time will be provided on lab sessions for students to work on their lab assignment. Students will have time to begin the assignments in class, but students can be expected to put time in to them outside of class. Assignments will be due usually in one week. You are expected to independently solve the problems though discussions among classmates are allowed. Please hand in your assignments at beginning of the lab time on the due day. Late homework will not be accepted (result a “0” grade) unless a valid excuse is provided to the instructor. Valid excuses include death, severe illness, and field project participation. Assignments will be rated based on a percentage scale with 100% as excellent completion. You are encouraged to correct errors in your assignments if they were rated below 90%. As a result, you are able to make up for your lower assignment grade to a rate up to 90%.

Texts


Grading

The final numeric grades will be determined according to the following tables:

**Lecture, undergraduate:**
- Class & WxChallenge participation 10%
- Mid-term exam 45%
- Final exam 45%
- Total 100%

**Lab:**
- Class participation 10%
- Laboratory assignments 90%
- Total 100%

**Lecture, graduate:**
- Class & WxChallenge participation 10%
- Mid-term exam 35%
- Final exam 35%
- Final term paper 20%
- Total 100%

Computing resources for the lab

This course will require significant computer work. We will be using the Interactive Data Viewer (IDV) extensively in this course, as well as the world wide web. You should familiarize yourself with internet weather resources if you are not already. A good starting point would be the quick-link weather center on the Penn State University’s e-WALL (http://www.meteo.psu.edu/~gadomski/ewall.html). IDV is installed on the AHC357 lab computers, and you are welcome to work there anytime when classes are not in session. The class schedule is posted on the door. IDV can also be installed on your own computer (but you must have internet access at the time to run it) so you can work on assignments wherever you would like, it can be downloaded for computers using Windows, Mac, or Linux operating systems from http://www.unidata.ucar.edu/software/idv/.

Graduate Term Paper

Graduate students are required to do a literature review (at least 5-10 papers) on a research topic of your choice (better related to your research/thesis/dissertation project). You will do a 15-min PowerPoint-based in-class presentation to report your literature review results. You are also required to write a term paper report of 5-10 pages on the literature review.

Course schedule

Overview (14 weeks):

I. Class introduction and overview of instrumentation and forecast approaches (3 weeks)
II. Review of fundamental mathematical concepts (1 week)
III. Review of basic atmospheric concepts (3 weeks)
IV. Fronts and jets (1.5 weeks)
V. Vorticity equation, PV, QG equations, Cyclongenesis, and Severe Weather (4.5 week)

Tentative Schedule:

**August**
21 (Tu) Lecture 1 Course logistics and introduction
   _Lab 1_ weather discussion method and internet resources
23 (Th) Lecture 2 WxChallenge Overview by Rigo (FIU local manager)
28 (Tu) Lecture 3 Skew-T review
   _Lab 2_ Weather discussion example
30(Th) Lecture 4   Forecasting temperatures

September
4 (Tu)  Lecture 5   Surface weather elements
         Lab 3  Skew-T analysis
6 (Th)  Lecture 6   Review of instrumentation and data sources (1)

11 (Tu) Lecture 7   Review of instrumentation and data sources (2)
         Lab 4  Surface observations
13 (Th) Lecture 8   Contour analysis
18 (Tu) Lecture 9   Airmasses, fronts, and frontal analysis (1)
         Lab 5  Contour analysis by hand-drawing
20 (Th) Lecture 10  Airmasses, fronts, and frontal analysis (2)
25 (Tu) Lecture 11  Interpreting weather maps
         Lab 6  Isotherm and Isodrosotherm Analysis by handing drawing
27 (Th) Lecture 12  Math review: derivatives and integrals

October
2 (Tu)  Lecture 13  Math review: Vectors
         Lab 7  Surface frontal analysis by hand drawing
4 (Th)  Lecture 14  Curl, LaPlacian, Total Derivative, Coordinate Systems, and Divergence
9 (Tu)  Lecture 15  Governing equations
         Lab 8  Use IDV to plot surface observations
11 (Th) Lecture 16  Midterm review
16 (Tu) Lecture 17  Midterm exam
         Lab  No Lab
18 (Th) Lecture 18  Balanced wind
23 (Tu) Lecture 19  Divergence and vertical motion
         Lab 9  Upper air observations – plan view by IDV
25 (Th) Lecture 20  Circulation and vorticity
30 (Tu) Lecture 21  Vorticity equation
         Lab 10  Upper air observations – sounding view by IDV

November
1 (Th)  Lecture 22  Life-cycle of mid-latitude cyclone
6 (Tu)  Lecture 23  Potential vorticity
         Lab 11  Model upper air plots by IDV
8 (Th)  Lecture 24  Cyclongenesis, QG Height Tendency and Omega equations
13 (Tu) Lecture 25  Applications of learned tools in evaluating and diagnosing vertical motion, upper-level troughs, and surface cyclones (1)
         Lab 12  Sea level pressure evolution by IDV
15 (Th) Lecture 26  Applications of learned tools in evaluating and diagnosing vertical motion, upper-level troughs, and surface cyclones (2)
20 (Tu) Lecture 27  Applications of learned tools in evaluating and diagnosing vertical motion, upper-level troughs, and surface cyclones (3) & Graduate Term paper presentation
         Lab 13  Jet stream evolution by IDV
22 (Th)  Thanksgiving Break, NO CLASS

27 (Tu) Lecture 28  Final Review
Final exam

Tuesday, Dec. 4, 12-2 PM

Graduate Term Paper Due Date:

Friday, Dec. 7th (email to Haiyan)