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 to 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

0-470-86465-6.

354355-X.
Grading

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

**Lecture, undergraduate:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class &amp; WxChallenge participation</td>
<td>10%</td>
</tr>
<tr>
<td>Mid-term exam</td>
<td>45%</td>
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<tr>
<td>Final exam</td>
<td>45%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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</table>

**Lab:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Class participation</td>
<td>10%</td>
</tr>
<tr>
<td>Laboratory assignments</td>
<td>90%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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</tbody>
</table>

**Lecture, graduate:**

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<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Class &amp; WxChallenge participation</td>
<td>10%</td>
</tr>
<tr>
<td>Mid-term exam</td>
<td>35%</td>
</tr>
<tr>
<td>Final exam</td>
<td>35%</td>
</tr>
<tr>
<td>Final term paper</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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</tbody>
</table>

**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 Electronic Map Wall (e-WALL: http://mp1.met.psu.edu/~fxg1/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/](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:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Lecture</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 27 (Tu)</td>
<td>Lecture 1</td>
<td>Course logistics and introduction</td>
<td></td>
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<tr>
<td></td>
<td>Lab 1</td>
<td></td>
<td><em>[weather discussion method and internet resources]</em></td>
</tr>
<tr>
<td>29 (Th)</td>
<td>Lecture 2</td>
<td>Skew-T Review (1)</td>
<td></td>
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</tbody>
</table>
September
3 (Tu)  **No Class due to Hurricane Dorian**
5 (Th)  Lecture 3  Skew-T review (2)
10 (Tu) Lecture 4  Forecasting temperatures
  Lab 2  Weather discussion example & WxChallenge Overview by Rigo Olivera (FIU local manager)
12 (Th) Lecture 5  Surface weather elements
17 (Tu) Lecture 6  Contour analysis
  Lab 3  Skew-T analysis
19 (Th) Lecture 7  Review of instrumentation and data sources (1)
24 (Tu) Lecture 8  Review of instrumentation and data sources (2)
  Lab 4  Surface observations
26 (Th) Lecture 9  Airmasses, fronts, and frontal analysis

**Sep. 29 (Sun): WxChallenge Sign-up Deadline**

October
1 (Tu)  Lecture 10  Interpreting weather maps
  Lab 5  Contour analysis by hand-drawing
3 (Th)  Lecture 11  Math review: derivatives and integrals
8 (Tu)  Lecture 12  Math review: Vectors
  Lab 6  Isotherm and Isodrosotherm Analysis by hand-drawing
10 (Th) Lecture 13  Curl, LaPlacian, Total Derivative, Coordinate Systems, and Divergence
15 (Tu) Lecture 14  Governing equations
  Lab 7  Surface frontal analysis by hand drawing
17 (Th) Midterm review
22 (Tu) Midterm exam
  Lab 8  Use IDV to plot surface observations
24 (Th) Lecture 15  Balanced wind
29 (Tu) Lecture 16  Divergence and vertical motion
  Lab 9  Upper air observations – plan view by IDV
31 (Th) Lecture 17  Circulation and vorticity

November
5 (Tu)  Lecture 18  Vorticity equation
  Lab 10  Upper air observations – sounding view by IDV
7 (Th)  Lecture 19  Life-cycle of mid-latitude cyclone
12 (Tu) Lecture 20  Potential vorticity
  Lab 11  Model upper air plots by IDV
14 (Th) Lecture 21  Cyclongenesis, QG Height Tendency and Omega equations
19 (Tu) Lecture 22  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
21 (Th) Lecture 23  Applications of learned tools in evaluating and diagnosing vertical motion, upper-level troughs, and surface cyclones (2)
26 (Tu) Lecture 24  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
28 (Th) Thanksgiving Break, NO CLASS

December
3 (Tu)  Final Review
Final exam

Tuesday, Dec. 10, 12-2 PM

Graduate Term Paper Due Date:

Friday, Dec. 13 (email to Haiyan)