Course overview:
This course focuses on introducing thunderstorms, tornadoes, squall lines, mesoscale convection systems, and their interactions with synoptic scale weather. We will also discuss impact synoptic scale weather, such as frontal cyclones, blizzards, and cold waves. We will also look at methods of observing, analyzing, and predicting convective and mesoscale weather including the interpretation of satellite and radar images. A key reason for this course is to understand middle-latitude, mesoscale weather systems. By “mesoscale” we mean storms that are significantly smaller than frontal cyclones (i.e. typical horizontal length < 1000 km) and have typical lifetimes shorter than a day. These systems are dominated by convection. Their winds are not geostrophic. Mesoscale weather is dramatic, spectacular, and sometimes deadly. 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: General Meteorology (or instructor’s permission).

Textbook:

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

<table>
<thead>
<tr>
<th>Undergraduate Students:</th>
<th>Graduate Students:</th>
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<tbody>
<tr>
<td>Class participation</td>
<td>Class participation 10%</td>
</tr>
<tr>
<td>Exam #1</td>
<td>Exam #1 20%</td>
</tr>
<tr>
<td>Exam #2</td>
<td>Exam #2 20%</td>
</tr>
<tr>
<td>Final exam</td>
<td>Final exam 40%</td>
</tr>
<tr>
<td>Total</td>
<td>Final term paper 10%</td>
</tr>
<tr>
<td>100%</td>
<td>Total 100%</td>
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</tbody>
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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.

Tentative course schedule:
Week 1: Aug. 25 (Tu) & Aug. 27 (Th)
  Lecture 1  Course introduction
  Lecture 2  Properties of the atmosphere (CH1)
  Lecture 3  Meteorological measurements (CH2)
Week 2: Sep. 1 (Tu) & Sep. 4 (Th)
  Lecture 4  Radar and satellite (CH2)
  Lecture 5  Weather maps (CH3)
  Lecture 6  Numerical models (CH4)
Week 3: Sep. 8 (Tu) & Sep. 10 (Th)
  Lecture 7  Climate and climate change (CH5)
  Lecture 8  Atmospheric stability and stability indices (CH6)
Lecture 9  Forces and balanced motions (CH7)
Week 4: Sep. 15 (Tu) & Sep. 17 (Th)
  Lecture 10  Pressure systems (CH8)
  Lecture 11  Airmasses and fronts (CH9)
  Lecture 12  Frontal cyclones in the lee of the Rockies (Lee cyclones, CH10)

Week 5: Sep. 22 (Tu) & Sep. 24 (Th)
  Lecture 13  Frontal cyclones on the east and Gulf coasts (Nor’easters, CH11)
  Lecture 14  Exam #1 Review (Sep. 22, Tu)
  Lecture 15  Exam #1 (Sep. 24, Th)

Week 6: Sep. 29 (Tu) & Oct. 1 (Th)
  Exam#1 answers and explanations
  Lecture 16  Freezing precipitation and ice storms (Ch 12)
  Lecture 17  Lake-effect snowstorms (CH13)

Week 7: Oct. 6 (Tu) & Oct. 8 (Th)
  Lecture 18  Cold waves (CH14)
  Lecture 19  Blizzards (CH15)
  Lecture 20  Mountain snowstorms (CH16)

Week 8: Oct. 13 (Tu) & Oct. 15 (Th)
  Lecture 21  Mountain windstorms (CH17)
  Lecture 22  Air mass & multicell thunderstorms (CH18)
  Lecture 23  Mesoscale convective complexes (CH18)

Week 9: Oct. 20 (Tu) & Oct. 22 (Th)
  Lecture 24  Squall lines (CH18)
  Lecture 25  Supercell thunderstorms (CH18)
  Lecture 26  Tornades I (CH19)

Week 10: Oct. 27 (Tu) & Oct. 29 (Th)
  Lecture 27  Tornades II (CH19)
  Lecture 28  Tornades III (CH19)
  Lecture 29  Tornades IV (CH19)

Week 11: Nov. 3 (Tu) & Nov. 5 (Th)
  Lecture 30  Exam #2 review (Nov. 3, Tu)
  Lecture 31  Exam #2 (Nov. 5, Th)

Week 12: Nov. 10 (Tu) & Nov. 12 (Th)
  Exam#2 answers and explanations
  Lecture 32  Hailstorms (CH20)
  Lecture 33  Lightning (CH21)

Week 13: Nov. 17 (Tu) & Nov. 19 (Th)
  Lecture 34  Downbursts (CH22)
  Lecture 35  Floods (CH25)

Week 14: Nov. 24 (Tu) & Nov. 26 (Th)
  Lecture 36  Final review & Term-Paper Presentations for Graduate Students

Final exam: Thursday, Dec. 10, 9:45 am-11:45 am
Honesty Statement:

FIU defines academic misconduct in the Student Conduct and Honor Code (Code) as, “any act or omission by a Student, which violates the concept of academic integrity and undermines the academic mission of the University in violation of the Code.” Code violations include, but are not limited to: academic dishonesty, bribery, cheating, commercial use, complicity, falsification, and plagiarism. The Code is available here: https://studentaffairs.fiu.edu/get-support/student-conduct-and-academic-integrity/student-conduct-and-honor-code/index.php

Virtual Class Meetings

- All students are expected to attend class meetings through Zoom on Tu/Th at 11am-12:15pm.
- If you are unable to attend a class meeting through Zoom for any reason, I ask that you let me know beforehand via email.
- I strongly encourage you to turn on your camera during our class meetings on Zoom. By doing so, our time together will feel more like a face-to-face meeting, and it will help us cultivate a sense of community.
- During our class meetings, use the “chat” function on Zoom to ask questions, share your responses to the questions I pose, and share your comments about the day’s lesson. Let’s make our lessons and discussions as engaging and rich as possible!

Safe Participation Statement

We recommend students attend the Zoom sessions in a quiet location where they may actively participate. In all cases, NEVER attend the Zoom session while operating a motor vehicle.