

Instructor: Dr. Haiyan Jiang; Office: AHC5-371; Phone: 305-348-2984; Email: [haiyan.jiang@fiu.edu](mailto:haiyan.jiang@fiu.edu).  
Location: Fully-online (canvas)  
Office hours: By appointment through email only. Please communicate with me through emails only (**not the Canvas inbox**). I'll respond within 24-48 hours.

### 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. **This course includes 7 modules with 30 lectures, 21 textbook chapters, and one WxChallenge overview document as your learning materials. There will be WxChallenge competition participation throughout the semester and 6 quizzes, 1 discussion, and 1 final exam as assessments for all students. For graduate students, there will be a term paper due by the end of the semester.**

**Prerequisite:** General Meteorology (or instructor's permission).

### Textbook (required):

***Severe & Hazardous Weather--An introduction to High Impact Meteorology, 6th Edition***, by Robert Rauber, John Walsh, and Donna Charlevoix, Kendall-Hunt, 2022. ISBN: 9781792462818. Textbook information at <https://he.kendallhunt.com/product/severe-and-hazardous-weather-introduction-high-impact-meteorology-0>

**Note: 4<sup>th</sup> or 5<sup>th</sup> edition is fine too.**

### Discussion Forums

Besides the default & optional "introduce yourself" discussion at the beginning of the semester, one discussion assignment will be given in the first module. This graded and peer-reviewed assignment gives you the opportunity to introduce your academic background and describe your favorite severe weather system.

### Quizzes & Final Exam

There will be 6 quizzes, one for each module of modules 1-6, and one cumulative final exam given during module 7. Students will be able to see the results (total score only) and grades immediately after each quiz. Students can have multiple attempts for the quizzes; only the highest score before the deadline will be taken. **The final exam contains 80 multiple choice questions. It will be available on Canvas on Tuesday, Dec. 6, 2022 for 3 hours between 6pm-9pm while you are required to finish within 1 hour and 50 minutes. Students will be able to see their scores immediately after the exam.** Additionally, there will be one student feedback survey quiz given during module 3.

### Assignments

**WxChallenge Competition Registration and Participation:** Students are required to sign up and participate the nationwide WxChallenge weather forecast competition for 5 cities throughout the semester as provided on the WxChallenge website (<https://www.wxchallenge.com/>). Information about how to sign up and participate online will be given during the 3<sup>rd</sup> module. Registration and participation are separated into two assignments. These assignments are effort grades.

Your total grade will be deducted for how many days you have missed your forecasts from a total of 40 forecasts being available to you (8 days for each city for a total of 5 cities).

**Graduate Term Paper (Graduate Students Only):** Graduate students are required to do a literature review on a research topic of your choice (better related to your research/thesis/dissertation project). You are required to write a term paper report of 5-10 pages on the literature review. You don't have to include any results of yourself (You absolutely can if you do). Instead, you should just write a background review of this topic. You should read about 5-10 reference papers in this topic, and read them carefully and summarize their research methods & findings. Your paper should be 5-10 pages long (single-spaced, font size 12). Rubric for evaluation will be posted on Canvas.

**Zoom Video Conference**

Zoom is a video conference tool that you can use to interact with your professor and fellow students by sharing screens, chatting, broadcasting live video/audio, and taking part in other interactive online activities. We will be utilizing this tool to conduct **Course Q&A and WxChallenge Overview**.

**Zoom Meetings will be held on the following dates/time:**

- **Meeting 1: Course Q&A and WxChallenge Overview: Date/Start Time – End Time TBD during Sep 19-25**

**Grading**

<b>Undergraduate Students:</b>		<b>Graduate Students:</b>	
Student Feedback Survey	3%	Student Feedback Survey	3%
Discussion	5%	Discussion	5%
WxChallenge	20%	WxChallenge & Term Paper	20%
Quiz 1-6	42% (7% each)	Quiz 1-6	42% (7% each)
Final Exam	30%	Final Exam	30%
Total	100%	Total	100%

**Course calendar (15 weeks)**

<b>Module Dates</b>	<b>Topics, Readings, &amp; Resources</b>	<b>Activities Due</b>
<p>Module 1 <b>Aug. 22-Sep.2</b> (2 weeks)</p>	<p><b>Textbook:</b> CH1-3 <b>Lectures:</b> Lecture 1: Course introduction Lecture 2: Properties of the atmosphere (CH1) Lecture 3: Meteorological measurements (CH2) Lecture 4: Radar and satellite (CH2) Lecture 5: Weather maps (CH3)</p>	<p><b>Discussion</b> (your academic background and your favorite severe weather phenomenon): Available on Aug. 22, Due on Sep. 2, 2022. <b>Quiz 1:</b> Available on Aug. 22, Due on Sep. 2, 2022.</p>
<p>Module 2 <b>Sep. 5-16</b> (2 weeks)</p>	<p><b>Textbook:</b> CH6-9 <b>Lectures:</b> Lecture 6: Atmospheric stability and stability indices (CH6) Lecture 7: Forces and balanced motions (CH7) Lecture 8: Pressure systems (CH8) Lecture 9: Airmasses and fronts (CH9)</p>	<p><b>Quiz 2:</b> Available on Sep 5, Due on Sep 16, 2022.</p>

Module Dates	Topics, Readings, & Resources	Activities Due
<p>Module 3 <b>Sep.19-30</b> (2 weeks)</p>	<p><b>WxChallenge Document:</b> WxChallenge Overview <b>Textbook:</b> CH10-12 <b>Lectures:</b> Lecture 10: Frontal cyclones in the lee of the Rockies (Lee cyclones, CH10) Lecture 11: Frontal cyclones on the east and Gulf coasts (Nor'easters, CH11) Lecture 12: Freezing precipitation and ice storms (CH12)</p>	<p><b>Quiz 3:</b> Available on Sep. 19, Due on Sep 30., 2022. <b>WxChallenge Competition 1</b> (Registration): available on Sep 5, Due Sep. 25, 2022 <b>Student Feedback Survey Quiz:</b> Available on Sep 19, Due on Sep. 30, 2022.</p>
<p>Module 4 <b>Oct. 3-14</b> (2 weeks)</p>	<p><b>Textbook:</b> CH13-17 <b>Lectures:</b> Lecture 13: Lake-effect snowstorms (CH13) Lecture 14: Cold waves (CH14) Lecture 15: Blizzards (CH15) Lecture 16: Mountain snowstorms (CH16) Lecture 17: Mountain windstorms (CH17)</p>	<p><b>Quiz 4:</b> Available on Oct. 3, Due on Oct. 14, 2022.</p>
<p>Module 5 <b>Oct. 17-28</b> (2 weeks)</p>	<p><b>Textbook:</b> CH18 <b>Lectures:</b> Lecture 18: Air mass thunderstorms (CH18) Lecture 19: Seabreeze thunderstorms &amp; Mesoscale convective systems (CH18) Lecture 20: Frontal squall lines (CH18) Lecture 21: Supercell thunderstorms (CH18)</p>	<p><b>Quiz 5:</b> Available on Oct. 17, Due on Oct. 28, 2022.</p>
<p>Module 6 <b>Oct. 31-Nov. 14</b> (2 weeks)</p>	<p><b>Textbook:</b> CH19 <b>Lectures:</b> Lecture 22: Tornadoes I (CH19) Lecture 23: Tornadoes II (CH19) Lecture 24: Tornadoes III (CH19) Lecture 25: Tornadoes IV (CH19)</p>	<p><b>Quiz 6:</b> Available on Oct. 31, Due on Nov. 14, 2022.</p>
<p>Module 7 <b>Nov. 14-Dec.8</b> (3 weeks)</p>	<p><b>Textbook:</b> CH20-22 &amp; 25 <b>Lectures:</b> Lecture 26: Hailstorms (CH20) Lecture 27: Lightning (CH21) Lecture 28: Downbursts (CH22) Lecture 29: Floods (CH25) Lecture 30: Final review</p>	<p><b>WxChallenge Competition 2</b> (Proof of full participation for 5 cities, 40 days of forecasts between Sep. 26-Dec. 8, 2022): available on Nov 14., Due Dec. 8, 2022 <b>Final exam:</b> Available on Dec. 6, 2022 at 8pm, Due on Dec. 6, 2022 at 10pm <b>Graduate Term Paper:</b> Available on Nov. 14, Due on Dec. 8, 2022.</p>