

ATMO 304 – Global and Local Perspectives on Severe Weather

Semester: Spring 2023
Class time: TR, 12:00 – 13:15
Location: Sakamaki D103
Instructor: Prof. Giuseppe Torri
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Program Learning Objectives

During this semester, students will be introduced to the main types of severe weather phenomena known to mankind. These include tropical cyclones, supercell storms, tornadoes and waterspouts, hailstorms, flash floods, haboobs, Arctic cyclones, and fog. For each severe weather phenomenon that will be discussed, students will learn its structure and dynamics, the synoptic conditions leading up to it, the damages caused to property and the population, and future trends due to climate change. In addition, students will be introduced to topics in risk assessment, insurance, and pricing of derivatives related to severe weather. Finally, students will learn about the severe weather phenomena that directly affect Hawai‘i, study past as well as recent events, and how climate change will affect them.

Institutional Learning Objectives

- Communication: students will exchange ideas in class and will present a paper in front of the other students at the end of the class
- Critical thinking: students will learn to think about severe weather events and the risks associated with them.
- Career technical skills: students will learn mathematical tools and concepts that they will be able to use in a variety of jobs that they may choose for their future, from weather forecasting, to working in insurance companies, or financial consultancy

Student Learning Objectives

- Demonstrate familiarity with the main types of severe weather phenomena.
- Understand the structure and the dynamics underlying each type of severe weather, including the meteorological conditions that cause it.
- Describe the damage and the impact that severe weather phenomena can cause at a qualitative and a quantitative level.
- Understand and describe what the current research on climate change suggests about severe weather in various parts of the world.
- Demonstrate familiarity with some of the mathematical tools used to assess risk associated with severe weather.

- Describe the main types of severe weather that occur in Hawai‘i and their typical damage.
- Think critically about how changes to severe weather events will impact different sustainability solutions adopted to deal with climate change.

Grading

The final grade will be determined by a combination of weekly assignments, a final paper and presentation, in-class exams, and participation in class:

Mid-term and final exam	50%
Final paper and presentation	30%
Weekly assignments	10%
Participation in class	10%
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	100%

In converting numerical grading to letter grading, the following scale will be applied:

96-100:	A+
93-95:	A
90-92:	A-
87-89:	B+
83-86:	B
80-82:	B-
77-79:	C+
73-76:	C
70-72:	C-
67-69:	D+
63-66:	D
60-62:	D-
0-59:	F

Assignments

Every week, students will be assigned homework that they will have to hand in or email within 3 days. The main objective of the homework will be to help the students better understand the concepts they learnt in class. **Plagiarism of any form will not be tolerated.**

Calendar (tentative)

01/10	Introduction to the course
01/12	The Earth’s atmosphere
01/17	Properties of the atmosphere
01/19	Energy and heat transfer
01/24	Energy balance
01/26	Condensation in the atmosphere
01/31	Clouds and stability
02/02	Temperature extremes
02/07	No class

02/09	Humidity extremes
02/14	Precipitation processes
02/16	Precipitation extremes
02/21	Atmospheric motions
02/23	General circulation of the atmosphere
02/28	Wind systems
03/02	Air masses
03/07	Fronts
03/09	Mid-term exam
03/14	Spring recess
03/16	Spring recess
03/21	Mid-latitude cyclonic storms
03/23	Blizzards
03/28	Thunderstorm development
03/30	Thunder and lightning
04/04	Tornadoes
04/06	Hurricanes
04/11	Hurricanes
04/13	Visit to KHON2 studio
04/18	Guest lecture by Kalei
04/20	Guest lecture by finance professor
04/25	Guest lecture by Robert Ballard
04/27	Final Presentations
05/02	Final Presentations

Main reference texts

Purchasing a textbook is not required, but students interested in reading more about severe weather-related topics can consult the following:

- C. D. Ahrens and P. Samson, *Extreme Weather and Climate*, Brooks/Cole
- R. Rauber, J. Walsh, and D. Charlevoix, *Severe and Hazardous Weather: An Introduction to High Impact Meteorology*, Kendall Hunt Publishing Company
- C. A. Doswell, *Severe Convective Storms*, Meteorological Monographs, AMS

Title IX Statement:

The University of Hawai‘i is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. Staff can also direct you to resources that are in the community. Here are some of your options:

As members of the University faculty, your instructors are required to immediately report any incident of potential sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and your instructors cannot guarantee confidentiality, you will still have options about how your case will be handled. Our goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.

If you wish to remain ANONYMOUS, speak with someone CONFIDENTIALLY, or would like to receive information and support in a CONFIDENTIAL setting, use the **confidential resources available here**:

<http://www.manoa.hawaii.edu/titleix/resources.html#confidential>

If you wish to directly REPORT an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support, contact: Dee Uwono Title IX Coordinator (808) 956-2299, t9uhm@hawaii.edu.