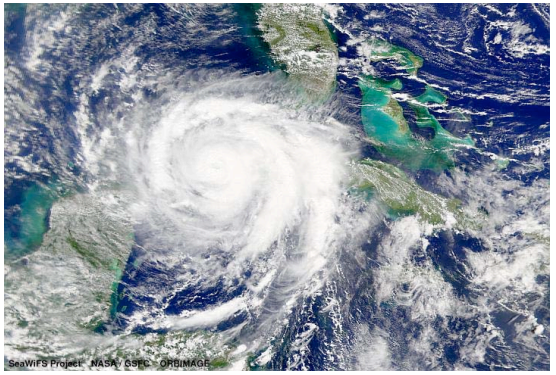
# CLIM-314/GGS-314
# Severe & Extreme Weather
# (Syllabus)

Spring, 2015

Associate Prof. Zafer Boybeyi

# Instructor and Contact information

Zafer Boybeyi
Associate Professor

Research I, Room 217
Mail Stop 6A2

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Phone: (703) 993-1560

# Office Hours

Associate Prof. Zafer Boybeyi

Office Hours:
Monday: 10:00am – noon
Wednesday: 10:00am - noon
Additional hours by appointment

Tentative Travel:
February 23-27, 2015 (Visiting Istanbul Technical University)

# Severe & Extreme Weather

- ✓ This course focuses on severe and extreme weather, covering the key concepts from thermodynamics, radiation, and dynamics that are essential for understanding severe and extreme weather events
- ✓ This course would be useful for any student wanting a one-semester overview of our weather

# Severe & Extreme Weather

## Goals:

To provide students:

- ✓ an overview of the physical and dynamical processes which control the state and evolution of the Earth's weather
- ✓ an understanding of the key scientific discoveries and remaining unanswered questions in severe and extreme weather
- ✓ an overview of the primary scientific principles and analytical tools used in weather studies, including numerical weather prediction models

# Severe & Extreme Weather

## Required Text Book:

*Severe & Hazardous Weather*

Robert M. Rauber, John E. Walsh and Donna J. Charlevoix


Kendall/Hunt Publishing Company, 2008

ISBN 978-0-7575-5043-0

# Severe & Extreme Weather

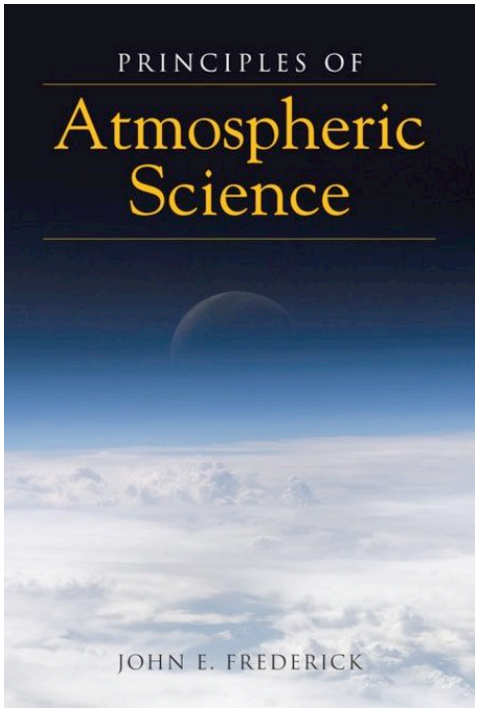
**Recommended Text Book:**

*Principles of Atmospheric Science*

John E. Frederick

Jones and Bartlett, 2008

ISBN 0763740896



# Course Outline

Class format will consist of:

- ✓ Lectures covering material (chapters) in the suggested text book
- ✓ Homework assignments
- ✓ Class discussion on current severe weather events
- ✓ Midterm exam
- ✓ Final exam

# Severe & Extreme Weather

Text book's chapter structure:

- ✓ Major content (Be sure to read everything before you come to class!)
- ✓ Chapter summary
- ✓ Review questions (Excellent review for exams)
- ✓ Problems

# Severe & Extreme Weather

Format:

- ✓ There will be approximately two lecture topics covered per week. These lectures will include class discussion of topical issues.
- ✓ Chapters from the required textbook will provide the basic framework of the course and most of the qualitative discussions.
- ✓ While the John Frederick text (recommended) will provide supplemental quantitative material which will be provided to you via class notes (i.e., power point presentation).

# Severe & Extreme Weather

Course Website:

http://camp.cos.gmu.edu/CLIM-314.html

- ✓ General Information
- ✓ Syllabus
- ✓ Lecture Notes (username & password protected)

Username: gmuconference

Password: camp405

# Severe & Extreme Weather

Course Content:

- ✓ Chapter 1 (Properties of The Atmosphere)
- ✓ Chapter 2 (Meteorological Measurements)
- ✓ Chapter 3 (Weather Maps)
- ✓ Chapter 4 (Forecasting and Simulating Severe Weather)
- ✓ Chapter 5 (Climate, Climate Change & Global Warming)
- ✓ Chapter 6 (Atmospheric Stability)
- ✓ Chapter 7 (Forces & Force Balances)
- ✓ Chapter 8 (The Development of High & Low Pressure Systems)
- ✓ Chapter 9 (Airmasses & Fronts)
- ✓ Chapter 10 (Extratropical Cyclones Forming East of The Rocky Mountains)
- ✓ Chapter 11 (Extratropical Cyclones Forming Along The East & Gulf Coasts)
- ✓ Chapter 12 (Freezing Precipitation & Ice Storms)
- ✓ Chapter 13 (Lake-Effect Snowstorms)

# Severe & Extreme Weather

Course Content (Con't):

- ✓ Chapter 14 (Cold Waves)
- ✓ Chapter 15 (Great Plains Blizzards)
- ✓ Chapter 16 (Mountain Snowstorms)
- ✓ Chapter 17 (Mountain Windstorms)
- ✓ Chapter 18 (Thunderstorms)
- ✓ Chapter 19 (Tornadoes)
- ✓ Chapter 20 (Hailstorms)
- ✓ Chapter 21 (Lightning)
- ✓ Chapter 22 (Downbursts)
- ✓ Chapter 23 (El Nino, La Nina & Southern Oscillation)
- ✓ Chapter 24 (Tropical Cyclones)
- ✓ Chapter 25 (Floods)
- ✓ Chapter 26 (Drought)
- ✓ Chapter 27 (Heat Waves)

# Severe & Extreme Weather

Class Duration: (Jan 19, 2015 – May 13, 2015)

Tentative Schedule:

| | |
|---|---|
| Jan 21 | Introduction |
| Jan 26 & 28 | Chapters 1 & 2 |
| Feb 2 & 4 | Chapters 3 & 4 |
| Feb 9 & 11 | Chapters 6 & 7 |
| Feb 16 & 18 | Chapters 5 & 23 |
| Feb 23 & 25 | Chapters 8 & 9 |
| March 2 | Chapter 10 |
| March 4 | Midterm Exam |
| March 9 & 11 | (Spring Break) |
| March 16 & 18 | Midterm Exam |
| March 23 & 25 | Chapters 11 & 12 |
| March 30 & Apr 1 | Chapters 13 & 14 |
| Apr 6 & 8 | Chapters 15 & 16 & 17 |
| Apr 13 & 15 | Chapters 18 & 19 & 20 |
| Apr 20 & 22 | Chapters 21 & 22 & 23 |
| Apr 27 & 29 | Chapters 24 & 25 |
| May 4 | Chapters 26 & 27 |
| May 11 | Final Exam (10:30am – 1:15pm) |

# Severe & Extreme Weather

## Learning Outcomes

- ✓ By the end of the semester this course student will have developed a basic understanding of the following:
  - ✓ Characterization of severe & extreme weather
  - ✓ Dynamics & physics of severe & extreme weather events
  - ✓ Solar heating which drive atmospheric thermodynamics and motions
  - ✓ Earth's energy budget
  - ✓ Atmospheric moisture and the role of water in severe weather considerations.
  - ✓ Cloud formation & precipitation
  - ✓ The atmospheric issues related to global change
  - ✓ Severe weather prediction

# Severe & Extreme Weather

Tentative Grading Policy:

- Homework: 20%
  - Every passing day from due date, 10% off
- Midterm Exam: 30%
- Final Exam (Comprehensive): 40%
- Participation: 10%

*You are responsible for all material from the text, and any additional assigned readings.*

# Severe & Extreme Weather

- ✓ LAPTOPS are permitted in class for taking notes.
- ✓ But PLEASE don't use laptops during class time for other activities such as web surfing and email.

# Suggested Readings

Advanced Readings:

- An Introduction to Atmospheric Physics, David G. Andrews, Cambridge University Press, 2000.
- An Introduction to Dynamic Meteorology, J.R. Holton, 4th Edition, International Geophysics Series, 2004.
- Basic Physical Chemistry for the Atmospheric Sciences, Cambridge University Press, 2000.

# Severe & Extreme Weather

Useful websites:

American Meteorological Society:
http://www.ametsoc.org/

National Aeronautics and Space Administration:
http://www.nasa.gov

National Oceanic and Atmospheric Administration:
http://www.noaa.gov/

The Weather Channel:
http://www.weather.com/

# GMU Honor Code

- GMU is an Honor Code university; The principle of academic integrity is taken very seriously and violations are treated gravely.

**Honor Code:** *To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this* **Honor Code**

Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

http://catalog.gmu.edu/content.php?catoid=5&navoid=410#Honor

# Academic Integrity

- What does academic integrity mean in this class?
  - Essentially when you are responsible for a task, you will perform that task.
  - When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form.
  - Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions.
  - When in doubt (of any kind) please ask for guidance and clarification.

# Students with Disabilities

- If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Resources at 703/993-2474.
- All academic accommodations must be arranged through that office.

# Important Dates

- ✓ January 27 – Drop Deadline: This is the last day to drop a course without losing tuition money.
- ✓ February 10 – Drop Deadline: This is the last day a student may drop a course. Students will receive a 33% tuition refund. After this date, students may withdraw from a course, but only according to strict guidelines.
- ✓ February 20 – Drop Deadline: This is the last day a student may drop a course. Students will receive a 67% tuition refund. After this date, students may withdraw from a course, but only according to strict guidelines.

# Other Useful Campus Resources

WRITING CENTER: A114 Robinson Hall; (703) 993-1200;
http://writingcenter.gmu.edu

UNIVERSITY LIBRARIES "Ask a Librarian"
http://library.gmu.edu/mudge/IM/IMRef.html

COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS):
(703) 993-2380;
http://caps.gmu.edu

The University Catalog,
http://catalog.gmu.edu
is the central resource for university policies affecting student, faculty, and staff conduct in university affairs.