

Meteorology

GEOG 2200, Fall 2011, 3cr.

TR 12:30-1:45; Lab F 12:30-1:45; McKay C284

Dr. Elizabeth Gordon, GeoPhysical Sciences

Welcome to Meteorology! Meteorology (from Greek, *meteoros*, which means "high in the air") is the study of the atmosphere and processes that cause weather. You already have some familiarity with many of the topics that will be covered in this course because you encounter weather every day. We will explore the fundamental scientific principles that describe weather and atmospheric processes, which will enable you to interpret real-time meteorological data and forecast the weather. The focus of the course is on mid-latitude phenomena, but tropical and severe weather will also be discussed. Although there are no prerequisites for the course, it is expected that you have fulfilled mathematics requirements for admission to the college.

By the end of the course, you should understand:

- The composition, vertical structure, and properties of Earth's atmosphere
- Energy flow in the earth-atmosphere system
- Atmospheric moisture and the role of water in energy transport
- Origin, movement, and results of interaction among major air masses
- Factors that lead to severe weather (hurricanes, tornadoes, thunderstorms)
- Remote sensing of the atmosphere
- Interpretation of weather maps and instruments used to collect meteorological data
- Human impacts on natural atmospheric processes, such as air pollution and global warming

This course satisfies the Quantitative Lab Science requirement for LA&S. To meet this requirement, you must demonstrate proficiency in quantification and problem-solving strategies, which include:

- Using appropriate methods to collect data
- Analyzing, interpreting, and graphically presenting data
- Communicating scientific results and their implications

Course Information

My office (McKay C265) is located across the hall from our classroom. You can be certain to find me there during **office hours** (T11-12:30; W9:30-11), or you can arrange to meet me at a different time. Email (egordon3@fitchburgstate.edu) is the best way to communicate, but you can also call (978.665.3083) if necessary. A Blackboard site (blackboard.fitchburgstate.edu) will also be maintained - you'll find announcements, syllabus, lecture notes, readings, resources, and grades posted there.

The **textbook** for the course is: *The Atmosphere: An Introduction to Meteorology* Lutgens, Tarbuck, and Tasa, 11th Ed., 2010. Prentice Hall Publishers. ISBN 978-0-321-58733-6.

You will need a **calculator** that can perform basic scientific functions; cell phone calculators are not allowed. You will also need a **laptop** for several of our labs.

Ensuring your success

Follow these basic steps in order to achieve course goals.

Attend class every day

Prepare for class by completing readings and assigned material on time

Participate in class discussion and **engage** in learning activities

Review course materials along the way

Your responsibilities

Graded activities and assignments (20%)

We will work through numerous exercises, both during class and to be completed on your own. Several of the in-class activities will be collected during the semester and will count toward your overall course grade. **You must be in attendance to receive credit for activities completed during class**, but your lowest two grades will be dropped to allow for illness and emergencies. Several assignments will be completed on your own time. All assignments must be submitted by the deadline; no late work will be accepted.

Some assignments include [*The Math You Need, When You Need It*](#) (TMYN) modules. TMYN is designed to promote your success in the quantitative aspects of this course by reviewing some key math concepts and placing those in a geoscience context. We will work through the first module together, but the remainder will be completed outside class time. You **must** complete the assigned module by the deadline, which will be scheduled immediately prior to their use in class. Your module assessments will count toward your total assignment score.

Labs (20%)

Lab exercises will often be completed within the time allotted, but you will submit a type-written lab report that includes results, graphs, and answers to lab questions. Detailed calculations may be hand-written. You will have one week to complete each lab - late labs will not be accepted. Make-up labs are not scheduled, but the lowest lab grade will be dropped. **You must be in attendance and arrive on time to receive credit for the lab.** Given that this course satisfies Fitchburg State's lab science requirement, **if you are tardy or absent to more than three labs, you will not pass the course.**

Tests (40%)

Three tests will be given during the semester, and will include topics from class discussion, assigned readings, and learning exercises. The lowest test grade will be dropped. Make-up, essay tests will be allowed for *documented* emergency situations only, unless prior arrangements have been made.

Final exam (20%)

Everyone must take the cumulative final exam during the time designated by the Registrar.

Field trip

A field trip to the [Blue Hill Observatory](#) will be scheduled.

Tentative schedule

| Week of | Topic | Lab | TMYN module |
|---------|----------------------------------|-------------------------|--------------------------------|
| Sept 1 | Course introduction | Intro to modules | Density |
| Sept 5 | Introduction to the Atmosphere | Weather tools | |
| Sept 12 | Atmospheric heating | Heat transfer | Graphing |
| Sept 19 | Temperature data | Contour maps | Unit Conversions |
| Sept 26 | Atmospheric moisture | Measuring humidity | Rates |
| Oct 3 | Atmospheric stability | Adiabatic processes | Rearranging equations |
| Oct 10 | Clouds and precipitation | Clouds | |
| Oct 17 | Pressure and winds | Measuring wind | Unit conversion, revisit |
| Oct 24 | Upper level winds | Analyzing wind patterns | |
| Oct 31 | Atmospheric circulation | El Nino | |
| Nov 7 | Air masses and fronts | No lab (Veterans Day) | |
| Nov 14 | Mid-latitude weather | Weather maps | |
| Nov 21 | Thunderstorms and tornadoes | No lab, holiday | |
| Nov 28 | Hurricanes | Hurricane lab | Rearranging equations, revisit |
| Dec 5 | Weather forecasting | Satellite imagery | |
| Dec 12 | Air pollution & Changing Climate | CO2 data | Graphing, revisit |

Classroom policies

Technology

In accordance with the University's Policy on Classroom Decorum, **mutual respect and common courtesy** will be the guiding principles in the classroom. To achieve this, everyone will **turn off and store cell phones** and other electronic devices for the duration of every class.

Attendance

There are several reasons that you will want to attend class, including:

It improves your **learning**.

Credit for classroom graded work will only be earned if you are there to complete it.

You must attend labs in order to pass the course.

Attendance is therefore expected for lecture, and required for labs. Please communicate with me about absences, whether due to planned or emergency situations.

Academic integrity

All Fitchburg State students are held to the highest standards of [academic integrity](#). Although much of our class will be group-based learning, **credit will only be earned for work that is your own**. Note that academic dishonesty includes cheating, fabrication, plagiarism, and facilitating dishonesty; any student who violates standards for academic integrity by engaging in such activities will be subject to the appropriate disciplinary action.

Learning accommodations

Any student with a need for learning accommodations should make arrangements through [Disability Services](#) (665-3427) early in the semester. Please discuss these arrangements with me as soon as possible to ensure appropriate planning.

Sustainable practices

[Recycling](#) bins, which are located in the classroom, should be used for all appropriate items (including paper, soda cans, plastic bottles, etc). Please discard non-recyclable items (e.g., Styrofoam) in the wastebasket. Consider reducing your use of non-reusable items overall.

Grading

Grades will be assigned in accordance with Fitchburg State's grading policy:

| <i>Points earned</i> | <i>Grade</i> | 83 - 85 | 3.0 | 69 - 70 | 1.7 |
|----------------------|--------------|---------|-----|---------|-----|
| 95 - 100 | 4.0 | 80 - 82 | 2.7 | 67 - 68 | 1.5 |
| 92 - 94 | 3.7 | 77 - 79 | 2.5 | 64 - 66 | 1.3 |
| 89 - 91 | 3.5 | 74 - 76 | 2.3 | 60 - 63 | 1.0 |
| 86 - 88 | 3.3 | 71 - 73 | 2.0 | 0 - 59 | 0.0 |

Grades that fall between intervals will be rounded to the higher number.