

MET 4010C METEOROLOGY (4 credits)

MET 4010C – Meteorology

Tuesday, Thursday 1:00-2:50

Fall 2005

NES 104

Dr. Jennifer Collins

Department of Geography, College of Arts and Sciences, USF

COURSE DESCRIPTION: Meteorology covers the structure, composition, and physical basis of the atmosphere. Topics include atmospheric composition and structure, energy and moisture flows of the earth/atmosphere system, weather observations, cloud and precipitation development, atmospheric circulations and weather systems.

PURPOSE: 4010C is designed to acquaint students with a broad spectrum of knowledge in the field of meteorology. A few fundamental principles of physics/chemistry are used as a starting point to help describe the composition and structure of the atmosphere, the influence of solar and terrestrial radiation, weather measurement technology, and the evolution of large and small scale weather patterns/systems. Meteorology is an interdisciplinary science that spans many subject-areas and covers various spatial scales (e.g. global, regional, and local). There will be a lab component of the course. The emphasis of this component will be on meteorological observations/measurements, their interpretation, and some basic applications of these data including a moderate dose of "hands on" weather map analysis. Students will use the Weather lab (NES 222) and become familiar with interpreting the weather using meteorological software.

PREREQUISITES: GEO 2200 or CI

COURSE OBJECTIVES: The basic outcomes expected of students taking this course are as follows:

The students should be able to:

- a. Describe the physical principles and interactions that govern the composition, structure and behavior of the earth's atmosphere.
- b. Obtain an increased knowledge of the terminology used to describe the atmosphere and weather phenomena.
- c. Obtain a greater ability to interpret meaning and extract information from either personal observations of the weather or watching/listening to media weather reports.
- d. Develop skills to perform and interpret weather map analyses.
- e. Effectively work in groups.

REQUIRED TEXT: "Meteorology Today", C. Donald Ahrens, West Publishing Company, 2003 (7th edition).

RECOMMENDED TEXT: "Weather", Paul E. Zehr, R. Will Burnett, and Herbert S. Zim, Golden Press, 1987.

READING ASSIGNMENTS: Students should immediately read Chapter 1 of the required text prior to the second class meeting. After this, students are expected to read the appropriate chapter(s) prior to the corresponding topic being covered in lecture. This usually means about a chapter per week. The course outline at the end of this syllabus provides the main topics, their general order of presentation, and corresponding chapter(s) from the required text. It is important and in your best interests to preview the material in the chapters prior to lecture.

SUPPLIES: pencil, eraser, calculator, red pencil, blue pencil, ruler. Cell phones may NOT be used instead of a calculator.

GRADING:

- **25%** of the course grade is based on class work/**homework** assignments/projects to be assigned throughout the semester.

All homework should be typed. Hand-written homework will not be accepted. No late homework will be accepted.

- **25%** of the grade will be based on two **tests**. Tentative test dates are scheduled for Tuesday October 11th and Thursday November 17th. Test dates are subject to change with a one week notice.

Tests will be of at least one of the following types: multiple choice/short answer/problem/essay variety

- **25%** of the grade is based on a comprehensive **final exam** given on the following date:

-- **Thursday, DEC 15 (Exam starts at 1pm)**

■ All students must take the final exam.

- **20%** of the grade will be based on pop quizzes. Therefore class attendance is necessary. Pop quizzes cannot be made up without legitimate paperwork and cannot be started if you come in late to class. The lowest pop quiz grade will be dropped, however, I do not drop zero's.

- **5%** of the grade will be for participation.

I will use the following standard conversions to assess letter grades:

92.5-100%	A	89.5-92.4%	A-		
86.5-89.4%	B+	82.5-86.4%	B	79.5-82.4%	B-
76.5-79.4%	C+	72.5-76.4%	C	69.5-72.4%	C-
66.5-69.4%	D+	62.5-66.4%	D	62.4-60% < 60%	Fail (F grade)

You will **not** be allowed to do additional work in order to improve your grade.

ATTENDANCE: Students are expected to attend class. Be advised that this is not a correspondence course!!! Lecture material will sometimes not be in the text, yet test/exam material will be entirely based on what was covered in lecture. Hence, good attendance and note taking are extremely important. Tests will include material up to and including that covered in the class period just prior to the test period. You will receive advanced warning regarding what chapters the tests cover. Please be ready for class at the scheduled time – frequent lateness will be penalized by the instructor.

Unexcused absences that result in a missed test/exam will automatically result in a zero grade for that measure. An oral make-up exam will normally be given to those in the advent of an excused absence. No make-ups will be given to those students without a **documented** and valid excuse. The only valid reasons for an excused absence are as follows:

- Illness documented by a physician--not just a note saying that you visited the infirmary.
- Participation in official college-sponsored activities with appropriate documentation.
- Death or illness in the immediate family or friend.
- Jury duty with appropriate legal documentation.

Make-up examinations will be granted only if the circumstances are documented, and **advanced** arrangements are made for the situations described in b and d. This should be arranged with the faculty member teaching the course.

Students who anticipate the necessity of being absent from class due to the observation of a major religious observance must provide notice of the date(s) to the instructor, in writing, by the second class meeting.

SPECIAL FACILITIES: Individuals who have any disability, either permanent or temporary, which might affect their ability to perform in this class, are encouraged to inform the instructor at the start of the semester. Adaptations of methods, materials or testing may be made as required for equitable participation.

INCOMPLETE GRADES: Incomplete grades (I) will not be given in this course except under exceptional circumstances, based on written documentation, and at the discretion of the instructor.

CLASS CANCELLATION POLICY

A class topic schedule is provided in this syllabus. If classes are "officially" cancelled, expect the next scheduled class to cover the missed material, exam, etc. On a rare occasion that the instructor is not on time, the students must not leave. After 15 minutes, a student should come to my office to find me and then go to the department's secretary to find the instructor. Students should not leave unless a department member dismisses you. The instructor will make every attempt to be on time and inform the students if a class is to be cancelled.

The deadline for students to elect to drop a course in Fall 2005 is Friday, **November 4, 2005**.

ACADEMIC DISHONESTY

Cheating is defined as follows: (a) the unauthorized granting or receiving of aid during the prescribed period of a course-graded exercise: students may not consult written materials such as notes or books, may not look at the paper of another student nor consult orally with any other student taking the same test; (b) asking another person to take an examination in his/her place; (c) taking an examination for or in place of another student; (d) stealing visual concepts, such as drawings, sketches, diagrams, musical programs and scores, graphs, maps, etc., and presenting them as one's own; (e) stealing, borrowing, buying, downloading from the Internet, or disseminating tests, answer keys, or other examination material except as officially authorized, research papers, creative papers, speeches, etc. (f) stealing or copying of computer programs and presenting them as one's own. Such stealing includes the use of another student's program as obtained from the magnetic media or interactive terminals or form cards, point out paper etc.

Any cheating will result in a grade of FF for the whole course.

BEHAVIOUR: In order to respect other students and the instructor, when the instructor enters the room, talking should be stopped. There is a place for talking in the class but only during class discussion. You will be asked to leave if there is any disruptive behavior in the classroom. You would then be responsible for any work or information missed. You would receive a zero on any tests/ quizzes given that day. No cell phones are permitted to be on in the class room. Taping of classes is not allowed unless given prior permission by the instructor.

CONFLICT of EXAMS: If you have more than THREE final exams scheduled for the same day, you must notify me 2 full weeks prior to the exam date.

OFFICE HOURS: My formally scheduled office hours are as follows:

MW: 11-12.30 either in my office (NES 210) or Weather Lab (NES 222)

However, don't feel bound by these hours. Feel free to stop by at any time as I will mostly be around. If you want to schedule a fixed time or discuss something with me over the phone, please call me at ext. 4242. My E-Mail address is jcollins@cas.usf.edu.

You are responsible for your own learning; I am here to help you.

MET 4010C COURSE OUTLINE

1. Some Basic Concepts of Physics
 - Newton's Second Law of Motion
 - Ideal Gas Law
 - Principles of Heat Transfer (advection, conduction, convection, radiation, phase changes of water)
2. Introduction to the Atmosphere (Text: Chapter 1)
 - Basic Definitions (atmosphere, weather, climate)
 - Atmospheric Composition (basic gases, trace elements, water vapor)
 - Important Trace Elements ("greenhouse" gases and ozone)
 - Vertical Structure (pressure, density, temperature)
 - "Spheres" (troposphere, stratosphere, mesosphere, thermosphere; homosphere and heterosphere; ionosphere)
3. Solar/Terrestrial Radiation/Heat and Temperature (Text: Chapters 2 and 3)
 - Earth Motions (rotational, revolutional, perihelion, and aphelion)
 - Seasons, Solstices, and Equinoxes
 - Sun and Earth Radiation Characteristics (wavelengths, interactions with atmosphere)
 - Disposition of Radiation (transparency, absorption, reflection, scattering)
 - Energy Balance of the Earth-Atmosphere System
 - Albedo of Various Substances
 - Temperature Scales (Fahrenheit, Celsius, Kelvin)
 - Temperature Terminology (daily mean)
 - Other Temperature-related Indices (heating, cooling, and growing degree days)
 - Factors Affecting Temperature (latitude, time of year, cloud cover, differential heating, proximity to water, altitude)
 - Visualizing Temperature (isotherms, charts)
4. Moisture, Precipitation, Particulates, and Stability (Text: Chapters 5, 6, 7, 8 and "PSC Cloud Boutique" [<http://vortex.plymouth.edu/clouds.html>])
 - Percent by Volume
 - Three States of Water (ice, liquid, vapor)
 - Moisture Variables (dewpoint, wet-bulb temperature, vapor pressure, mixing ratio, absolute humidity, relative humidity)
 - Cloud Formation Processes and Cloud Characteristics/Types
 - Precipitation Processes (collision-coalescence, Bergeron) and Precipitation Types

5. Atmospheric Pressure, Wind, and Circulation (Text: Chapters 9, 10 and 11)
 - Atmospheric Pressure
 - Measurement of Pressure (mercurial and aneroid barometers)
 - Pressure Extremes
 - Visualizing Pressure (isobars)
 - Pressure vs. Wind Relationships and Coriolis Effect
 - Wind Measurements
 - Differential Heating as Source for Circulation Patterns (e.g. sea and land breeze circulations)
 - Step-wise Development of Planetary or Global Circulation Features
 - Nomenclature of Planetary Circulation Features (doldrums, ITCZ, equatorial low, horse latitudes, subtropical highs, subpolar lows, polar highs, trade wind zones, zones of prevailing westerlies and easterlies, jet stream)
 - Local wind systems
6. Air Masses and Fronts (Text: Chapters 12 and 13)
 - Air Mass Source Regions
 - Types of Air Masses
 - Fronts and Characteristics (stationary, cold, warm, and occluded)
7. Atmosphere/Ocean (Chapter 11)
 - a. Currents
 - b. El Nino
8. Hurricanes and tropical weather (Text: Chapter 16, Videos from class)
 - Tropical disturbances (easterly waves)
 - Tropical Systems (depressions, storms, hurricanes)
 - Structure of a hurricane
 - Factors necessary for hurricane formation
 - Location of hurricane formation
 - Destruction sources from a hurricane
 - Hurricane names
 - Dr. Collins research in the NE Pacific basin
 - Introductions to Geographical Information Systems (GIS) and tropical cyclones: Computer lab

