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OFFICE HOURS: T R: 10.45-11.45pm and by appointment.

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Email: droache@mail.usf.edu (Note: email preferred method of communication)  
Phone: 4-0657  
OFFICE HOURS: M F: 2-3pm and by appointment.

We will make every effort to communicate via email to arrange a convenient time to meet if office hours are not convenient. It is always best to confirm a time before you come to the office in case we have scheduled to meet another student. We can also answer some questions over email. We can help you with problems during the course, but we do NOT help out on homework the day it is due.

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 have the opportunity to attend and participate in several field trips which should aid in their understanding of Meteorology.

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.


RECOMMENDED TEXT: Please note that I do also use the following book for supplementary information, especially equations. I will provide all these to you in class, but I did want to give you the reference: “Meteorology for Scientists and Engineers” (2nd edition) by Stull.

READING ASSIGNMENTS: Students should immediately read Chapters 1, 2 and 3 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. 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, pens (red and black (or blue). Cell phones may NOT be used instead of a calculator. You should bring these supplies to every class.

GRADING:

30% of the course grade is based on 12 class work/homework assignments/projects to be assigned throughout the course.

All homeworks should be typed. Hand-written homework will not be accepted unless stated otherwise. No late homework will be accepted.

45% of the grade will be based on two tests. Tests will be of at least one of the following types: multiple choice/short answer/problem/essay variety. The 2nd test will occur in exam week May 4 at 12.30.

20% of the grade will be based on eight 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 your grade will be for attendance and participation.

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

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
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<tbody>
<tr>
<td>92.5-100%</td>
<td>A</td>
</tr>
<tr>
<td>89.5-92.4%</td>
<td>A-</td>
</tr>
<tr>
<td>86.5-89.4%</td>
<td>B+</td>
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<tr>
<td>82.5-86.4%</td>
<td>B</td>
</tr>
<tr>
<td>79.5-82.4%</td>
<td>B-</td>
</tr>
<tr>
<td>76.5-79.4%</td>
<td>C+</td>
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<tr>
<td>72.5-76.4%</td>
<td>C</td>
</tr>
<tr>
<td>69.5-72.4%</td>
<td>C-</td>
</tr>
<tr>
<td>66.5-69.4%</td>
<td>D+</td>
</tr>
<tr>
<td>62.5-66.4%</td>
<td>D</td>
</tr>
</tbody>
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Except for any extra credit announced during the semester for the whole class, you will not be allowed to do additional work in order to improve your grade so please don’t ask at the end of the semester.

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 advance warning regarding what chapters the tests cover. Please be ready for class at the scheduled time – frequent lateness will be penalized by the instructor. Field trips are compulsory. Field trip dates will be given ahead of time. You need to let your instructor and TA know immediately if you cannot make a field-trip so that substitute work can be prepared.

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 on 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. Check Bb for notices.

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.

You are responsible for your own learning, I am here to help you.
1. Some Concepts of Physics
   ... Newton’s Laws of Motion
   ... Equation of state - Ideal Gas Law
   ... Pressure and density change with height
   ... Temperature related to molecular speeds
   ... Escape velocity
   ... Hydrostatic Equilibrium
   ... Hypsometric Equation
   ... 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 4, 5, 6, 7 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
   ... Langrangian and Eulerian water budget
   ... Stability of the atmosphere (analysis of flight data)
   ... Stuve Diagrams
   ... Precipitation Processes (collision-coalescence, Bergeron) and Precipitation Types
5. Atmospheric Pressure, Wind, and Circulation (Text: Chapters 8, 9, and 10)
   ... Atmospheric Pressure
   ... Measurement of Pressure (mercurial and aneroid barometers)
   ... Pressure Extremes
   ... Visualizing Pressure (isobars)
   ... Pressure vs. Wind Relationships and forces
   ... Full equations of motion
   ... Height contours on isobaric surfaces
   ... Mass conservation
   ... Continuity equation
   ... Incompressible continuity equation
   ... Boundary-layer pumping
   ... Wind Measurements and wind vectors (calculating direction and magnitude of the wind)

6. Air Masses and Fronts and tornadoes (Text: Chapters 11, 12, and 14)
   ... Air Mass Source Regions
   ... Types of Air Masses
   ... Fronts and Characteristics (stationary, cold, warm, and occluded) and predicting weather associated with the passage of fronts.
   ... Geostrophic adjustment
   ... Frontogenesis
   ... Synoptic weather maps
   ... Tornadoes

7. Atmosphere/Ocean (Chapter 10)
   ... Currents
   ... El Nino, La Nina

8. Hurricanes and tropical weather (Text: Chapter 15, Videos from class)
   ... Tropical disturbances (easterly waves)
   ... Tropical Systems (depressions, storms, hurricanes)
   ... Dynamics
   ... Initial spin up
   ... Subsequent development
   ... Thermodynamics
   ... Warm core
   ... Carnot cycle
   ... Structure of a hurricane
   ... Pressure distribution
   ... Tangential and radial velocity
   ... Factors necessary for hurricane formation
   ... Location of hurricane formation
   ... Destruction sources from a hurricane
   ... Hurricane names
   ... Storm Surge
   ... Atmospheric pressure head
   ... Ekman Transport
   ... Kelvin Wave
   ... Dr. Collins research in the NE Pacific basin

9. Radar analysis
   ... History of radar
   ... Types of radar
   ... Doppler velocity measurements
   ... Clean air return and ground clutter
... Radar equation for point targets and distributed targets
... Spectrum width and turbulence
... Advanced meteorological uses of radar, including polarization
... Error analysis
... GR2 Analyst software

10. Field trips