Department of Earth & Climate Sciences   Spring 2018
San Francisco State University

ERTH 260 – Homework 1
100 Points
Due Wednesday 1 February 2017

Answer on the back or on separate sheets in complete sentences.

The first lab assignment is designed to get you thinking about the impact of a meteorological phenomenon, in this case a tornadic thunderstorm.   In a way, it is meant to stimulate thought on your part about what you would need to know in order to say something about the meteorology of such a storm. I realize you may know nothing about thunderstorms and have not thought about this before.

Below is a section of the syllabus in which I gave a very incomplete list of the various topics we might cover this semester. This assignment asks you your own perception about your state of your knowledge in these areas and what areas you think might be important to learn in order to understand thunderstorms, like the Joplin tornadic thunderstorm.

Topics Covered.

1. Introduction
2. Guidelines for good physical problem solving; working with dimensions and units
3. Composition and Structure of the Atmosphere
4. Radiative Energy
    a. Laws of Radiation
    b. Principle of Conservation of Energy
5. Atmospheric Moisture
6. Measures of Humidity
7. Clouds
8. Precipitation Formation
9. Atmospheric Instability
10. Basic Laws Governing the Development and Evolution of Atmospheric Circulation Systems iin Theory and Practice
    a. Ideal Gas Law
    b. Conservation of Energy/First Law of Thermodynamics Review
    c. Hypsometric Relation
    d. Equation of Motion Review
    e. Conservation of Mass Applied to the Atmosphere
11. Development of motion and weather patterns/systems
    a. Scales of circulation overview
    b. Mass conservation scaled for the synoptic-scale atmosphere and its implications
    c. Models of the General Circulation of the atmosphere and their limitation as conceptual models
    d. Synoptic scale systems in the middle latitudes and tropics: wave cyclones and hurricanes
12. Operational Applications and Techniques
    a. Use of sounding analysis in support of thunderstorm forecasting
    b. Synoptic-scale weather systems in three dimension (wave cyclones)
    c. Synoptic-scale weather chart analysis and forecasting
    d. Thunderstorm types, including supercell thunderstorms
    e. Severe weather analysis and forecasting
    f. Ensemble forecasting

1. Think about the Joplin tornadic thunderstorm. List five of the topics listed above that you believe you would need to directly master (or know plenty about) in order to understand the Joplin storm.   (50 points)

   These might be very obvious. For each topic, state briefly why you feel you would need to know this. I'll start you out here, and this counts as one of the five, so you need to come up with only four more.

   I think I need to know a lot about "Precipitation Formation" because I know that thunderstorms produce a lot of rainfall and hail.

2. Now, list five areas in the topic list above that you think you know something about (whether from other classes, or your own self-education). Next to each state briefly how you got this knowledge (i.e, "…from a high school physics classs…" etc.) (50 points)