Description: This class is organized as follows

For this semester, class emphasis is on weather & climate (meteorology), i.e., the atmospheric branch of the ESS. We will first cover the principles of meteorology, and then we apply these principles to solving weather & climate problems. Throughout the class, you will be asked, as part of your homework or lab work, to explore various global datasets hosted by NASA and NOAA. Satellite database will be one of the major data sources. You will also learn to use Matlab to explore these databases.

Prerequisites: EAS 106 and/or EAS 217

Suggested Textbooks:

1. Essentials of Meteorology: An Invitation to the Atmosphere, by C. Donald Ahrens, published by Brooks Cole. Or

Grading: Homework sets: 50%; midterm: 20%; final: 30%

Office hours: T & Th, 11:30-12:30 at the classroom or by appointment (x7026)

Course Objectives:

(Objective 1: learn some principles of the atmospheric science):

1) Describe the atmospheric composition and structure;
2) Understand earth-atmospheric energy balance and related topics (e.g., why does the Earth have seasons?);
3) Describe cloud and precipitation processes; understand atmospheric stability;
4) Understand mechanisms for winds and atmospheric circulation

(Objective 2: *Apply these principles to solving weather & climate problems*):

1) Understand distribution, formation and impacts of hurricanes;
2) Describe the El Niño phenomenon and understand its connection to regional and global climate;
3) Understand mid-latitude weather patterns and know some weather forecasting basics;
4) Understand current issues with global warming and climate changes.

**Course Outline:**

*Introduction* (1 class): scope of the class; terminology; pretest (don’t worry; it won’t affect your grade).

**Part I Fundamentals:**

1. (1 class) Atmospheric composition and structure
2. (2 classes) Earth-atmosphere energy balance
3. (2 classes) Humidity, clouds and precipitation
4. (2 classes) Atmospheric pressure, forces and winds
5. (2 classes) Observing the atmosphere

**Part II Applications to weather and climate problems:**

1. (2 classes) Atmosphere-ocean interactions I: Hurricanes
2. (2 classes) Atmosphere-ocean interactions II: El Niño
3. (2 classes) Fronts and mid-latitude cyclones
4. (2 classes) Weather forecasting & climate prediction
5. (2 classes) Human influences on climate; global warming debate

**Part III Fun stuff:**

(1-2 classes) Review of Al Gore’s *An Inconvenient Truth*

**Part IV Concluding remarks:**

(1-2 classes) Frontier research topics in atmospheric science; recent advancements; career future; posttest (like the pretest, this won’t affect your grade)