MEA 213 – Introduction to Atmospheric Sciences I

FALL Semester
2 Credit Hours

Course Description

This course is designed for beginning meteorology majors and other science and engineering majors interested in meteorology. Knowledge of high school-level algebra, geometry, trigonometry, chemistry and physics is required. Students should have basic computer usage skills including web browsers and email. The sequence MEA 213 (Fall semester) and MEA 214 (Spring semester) introduces students to the major concepts in atmospheric sciences and lays the foundation for more advanced courses.

Learning Outcomes

Student learning outcomes: By the end of the course you should be able to do the following things:

Specialist Vocabulary: Recognize and define the major terms that apply to meteorology.

Structure of the atmosphere: Explain the chemical composition and vertical structure of the atmosphere.

Weather maps: Read, interpret and plot station information from weather maps. Read, interpret and plot isotherms and isobars. Determine wind direction and relative magnitude from maps of atmospheric pressure.

Stability: Explain the characteristics of atmospheric profiles in stable, unstable and conditionally unstable conditions and the associated motion of air parcels within each type of profile. Identify the lifting condensation level and temperature inversions from atmospheric sounding data.

Cloud identification: Explain and make WMO okta measurements of cloud coverage. Identify basic cloud types with low, middle and high cloud bases.

Moisture: Define and calculate derived moisture parameter such as dew point, specific humidity, and mixing ratio from measured atmospheric variables.

Precipitation: Explain the physical processes that form rain, snow, hail, and freezing rain. Identify precipitation types on weather radar data.

Weather variability: Identify and explain how the diurnal cycle influences local weather variability. Identify and explain the difference between warm and cool ENSO cycles and how these influence regional weather.

Computation: Download data and programs from a ftp site. Use Matlab to: Read in 1d and 2d data sets. Use supplied functions to plot x-y graphs, time series graphs, 2D arrays, vectors and bar plots. Utilize algebraic functions to transform data. Calculate a histogram and plot results as a bar graph. Determine and plot a linear fit to x-y data.

Teamwork: Work effectively in problem-solving teams.