STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

COURSE OUTLINE

ESCI 110

Introduction to Meteorology

Prepared By: Dr. David C. Bradford

CANINO SCHOOL OF ENGINEERING TECHNOLOGY
PHYSICS

A. TITLE: Introduction to Meteorology

B. COURSE NUMBER: ESCI 110
SHORT TITLE: Introduction to Meteorology

C. CREDIT HOURS: 3

D. WRITING INTENSIVE COURSE (OPTIONAL): N/A

E. COURSE LENGTH: 15 weeks in regular session or equivalent in special sessions

F. SEMESTER(S) OFFERED: This is a general elective that may be offered any semester. Primarily it will be offered during summer and winter sessions.

G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:
There will be three 50 minute lectures per week or equivalent.

H. CATALOGUE DESCRIPTION: This is an introductory meteorology course with topics covering the structure of the atmosphere, meteorological measurements, air movement, air masses and fronts, violent storms and climate. No prerequisites.

I. PRE-REQUISITES/CO-COURSES: None

J. GOALS (STUDENT LEARNING OUTCOMES):
By the end of this course, the student will be able to:

Course Objective	Institutional SLO
1. Describe the composition and structure of the layers of the earth's atmosphere.	2. Critical Thinking
2. Understand the methods and role of energy transfer behind seasons, the water cycle and eventually weather.	2. Critical Thinking
3. Describe the interrelationships between atmospheric pressure gradients, Earth's rotation, and resulting atmospheric circulation.	2. Critical Thinking
4. Predict changes in the atmosphere's conditions given the appropriate atmospheric data.	2. Critical Thinking
5. Describe the structure and prognosis of major storms.	2. Critical Thinking
6. Discuss climate and climate change; past, present, and future in the Anthropocene epoch	2. Critical Thinking

K. TEXT: Aguado & Burt, 2012. *Understanding Weather & Climate, 6/E,* Prentice Hall*, Upper Saddle River, NJ 07548*

L. REFERENCE:

Danielson, Levin, and Abrams**,** Meteorology**,** 2nd Ed., McGraw-Hill, 2003

M. EQUIPMENT: The student will need to have access to a computer with internet connection.

N. GRADING METHOD: A-F

O. MEASUREMENT CRITERIA/METHODS: Methods use to measure student process will include objective quizzes, essay assignments and graded threaded discussions on Blackboard.

P. DETAILED TOPICAL OUTLINE:

I. Composition and structure of the Atmosphere
   A. Thickness of the atmosphere and changing density
   B. The vertical profile based on temperature
   C. Permanent gases, variable gases, and aerosols
   D. Evolution of the atmosphere; historical and daily
   E. Weather basics: pressure, wind, temperature, and humidity

II. Solar Insolation and the Seasons
   A. Why we have seasons
   B. Kinds of energy and energy transfer mechanisms
   C. Measuring temperature

III. Energy Balance and Temperature
   A. Absorption, reflection, scattering, and transmission of electromagnetic radiation (light).
   B. Energy transfer between the surface and the atmosphere
   C. Greenhouse effect (Venus as an example of a runaway Greenhouse effect)
   D. Global temperature distributions
   E. Influences on temperature by land, water, latitude, altitude, and circulation
   F. Change of state of H_2O and temperature

IV. Atmospheric pressure and wind
   A. What is pressure
   B. Vertical and horizontal pressure changes
   C. Equation of state
   D. Measurement of pressure
   E. Pressure gradients and hydrostatic equilibrium
   F. Forces affecting the speed and direction of the wind
   G. Surface winds, upper atmosphere winds, and large air mass winds
   H. Measuring wind speeds

V. Atmospheric moisture
   A. Evaporation and condensation
   B. Indices of water vapor content
   C. Distribution of water vapor
   D. Measuring humidity

VI. Cloud Formation and Precipitation
   A. Mechanisms that lift air
   B. Static stability and the environmental lapse rate
   C. Inversions
   D. Cloud types and what they tell you about the atmosphere
   E. Growth of cloud droplets
   F. Forms of precipitation

VII. Modeling Atmospheric Circulation and Pressure Distributions
   A. The three cell model
   B. Winds in the upper troposphere

C. Wind/ocean interactions
D. Major wind systems
E. Air masses and fronts

VIII. Disturbances
A. Mid-latitude cyclones
B. Lightning, thunder, and tornadoes
C. Tropical storms and hurricanes

IX. Human Effects on Weather
A. Atmospheric pollutants
B. Heat islands

X. Earth's Climates
A. Defining climate
B. Parameters used to classify different climates
C. Different climates around the world

XI. Climate change: past, present, future
A. The time scales of climate change
B. Past climates and correlations with their atmospheres
C. Factors that can force climate change
D. Feedback mechanisms and tipping points
E. Environmental impact

Q. LABORATORY OUTLINE: N/A