BROWARD COLLEGE
COURSE OUTLINE

LAST REVIEW: 2008-09 *(i.e. 2003-2004)* **NEXT REVIEW:** 2013-14 *(i.e. 2008-2009)* **STATUS:** A *(A, I, D)*

COURSE TITLE: Weather and Climate Systems

COMMON COURSE NUMBER: ESC4074

CREDIT HOURS: 3

CONTACT HOUR BREAKDOWN *(per 16 week term)*

CLOCK HOURS: *(Voc. Course ONLY)*

Lecture: 48 Lab:

Clinic: Other:

PREREQUISITE(S):
COREQUISITE(S):
PRE/COREQUISITE(S): MAC 1105

COURSE DESCRIPTION *(750 characters, maximum)*:
This course provides an introduction to general meteorology and atmospheric sciences. It includes the composition and structure of the atmosphere and characteristics that affect it, such as temperature, humidity and pressure. The course examines the development of meteorological phenomena, such as storm systems, hurricanes, weather fronts and cloud formation. Finally, climatologic concepts will be explored. This course maintains scientific integrity and addresses technologies used in both meteorological and climatic studies.

UNIT TITLES

1. **Introduction to the "Earth and the "Geographic Grid"**
2. **Warming the Earth and the Atmosphere**
3. **Weather Elements I: Air Temperature, Humidity**
4. **Weather Elements I: Condensation, Clouds; Cloud Development and Precipitation**
5. **Weather Elements II: Air Pressure and Winds; Atmospheric Circulations**
6. **Weather Forecasting**
7. **Special Weather Phenomena: Defining Weather Hazards**
8. **The Use of Technology in Weather and Climate Studies**

EVALUATION:

Students will be assessed through a variety of means. These will include objective tests and quizzes, rubric-based authentic assessments, written assignments on relevant issues such as global warming.

UNITS

Unit 1 Introduction to the "Earth and the "Geographic Grid"

General Outcome:

1.0 The student shall understand the history and role of various scientific methods, and shall be able to employ them to solve various problems in meteorology and climate studies. The student shall demonstrate an understanding of the Earth's geodesy.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

1.1 use the scientific method to solve problems

1.2 employ metric measurements to explore Earth's mathematical properties, such as geographic grid, tilt of the Earth's axis, analemma, etc.)

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Unit 2 Warming the Earth and the Atmosphere

General Outcome:

2.0 The student shall explain how the Sun warms the Earth, and how heat energy is transferred to produce the phenomena known as climate and weather.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

2.1 understand the composition and structure

2.2 analyze and discuss the basic factors that influence the atmosphere.

2.3 examine selective absorbers and the atmospheric greenhouse effect

2.4 distinguish between weather and climate

ESC4074

Unit 3 **Weather Elements I: Air Temperature, Humidity**

General Outcome:

3.0 The student shall understand the basic properties of air, including temperature, humidity and pressure differences.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

3.1 explain temperature and heat transfer.

3.2 define the role of humidity.

3.3 define barometric pressure and how it relates to humidity as a basic property of air.

3.4 diagram the hydrologic cycle, and scrutinize how it influences the weather.

3.5 explain the concepts of absolute humidity, relative humidity, and dew point, and how they are related to each other.

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Unit 4 Weather Elements I: Condensation, Clouds; Cloud Development and Precipitation

General Outcome:

4.0 The student shall understand the process of cloud formation, and how various types of precipitation are formed. The student will understand how various types of equipment are used to measure dew point and relative humidity.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

4.1 measure components of the atmosphere, including temperature, and humidity using weather instruments such as the thermometer, thermograph, and psychrometer.

4.2 identify and assess small and large-scale structures in the atmosphere.

4.3 examine the development and structure of different cloud types.

4.4 determine the significance of cloud types for both present and future weather.

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Unit 5 Weather Elements II: Air Pressure and Winds; Atmospheric Circulations

General Outcome:

5.0 The student shall understand the role of air pressure and how winds are generated that result in large scale atmospheric circulations. Students will understand how to read weather charts.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

5.1 measure components of the atmosphere, including barometric pressure using weather instruments: barometer and barograph.

5.2 understand air masses and fronts and their significance in controlling the weather

5.3 measure air pressure to include Newton's Law of Motion, Pressure Gradient Force and Coriolis Force.

5.4 assess the primary types and source regions for air masses and discuss the difference between stable and unstable air masses.

5.5 analyze local and global wind systems.

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Unit 6 Weather Forecasting

General Outcome:

6.0 The student shall prepare a short term forecast of the weather for a particular location, which will include estimated wind direction, pressure patterns, and atmospheric conditions based on real-time data.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

6.1 compare the discontinuities across fronts and predict the type of weather associated with the three types of fronts, and frontal boundaries

6.2 apply weather forecasting tools and interpret the methods of weather forecasting.

6.3 determine the movement of weather systems.

6.4 analyze local and global weather systems

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Unit 7 Special Weather Phenomena: Defining Weather Hazards

General Outcome:

7.0 The student shall identify and analyze various weather hazards and what steps can be taken to lessen the effects of those hazards.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

7.1 examine how severe weather is formed, including hurricanes, tornadoes, lightning, microbursts and severe frontal effects.

7.2 identify and analyze the methods used to predict and track these phenomena.

7.3 understand how state of the art modeling and equipment are used to predict the formation of weather hazards.

7.4 explain what steps should be taken by the public, in the event of severe weather.

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Unit 8 The Use of Technology in Weather and Climate Studies

General Outcome:

8.0 The student shall analyze the role and use of current technology as it is applied to weather and climate studies.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

8.1 apply currently available technology in predicting meteorological outcomes

8.2 understand and systemize the patterns of climatology and transfer these to new situations

8.3 investigate the Earth's changing climate through time