

# North Hennepin Community College

## PHYS 1120: Meteorology

### A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 3

Lab Hours/Week: 2

OJT Hours/Week: \*.\*

Prerequisites: None

Corequisites: None

MnTC Goals: Goal 03 - Natural Science

This course is designed for people who desire to learn about the weather. This course helps the student learn to observe and interpret the sky, to read weather maps, and to understand the sequence of meteorological phenomena. The topics to be covered include: air temperature, humidity, condensation, clouds, air pressure, wind, atmospheric circulation, weather forecasting, computer modeling, thunderstorms, tornadoes and hurricanes. (3 hours lecture, 2 hours lab)

**B. COURSE EFFECTIVE DATES:** 09/10/1997 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. The following topics will be covered: the atmosphere (composition and mechanics), solar energy and its effects on the earth/atmosphere system, the earth's response in the form of temperature and moisture patterns, clouds and precipitation, pressure and its effects on the local and global scale, weather systems, air masses, fronts, weather forecasting, thunderstorms, tornadoes, hurricanes, climatology, and global climate change.

#### **D. LEARNING OUTCOMES (General)**

1. Communicate experimental findings, analyses, and interpretations both orally and in writing. (MnTC Goal 3, Competency 3; NHCC ELO 1) Specific to this course, objectives will include:
2. Ability to trace the heat transfer processes of conduction, conduction, and radiation and learn how they eventually warm the Earth.
3. Ability to use the heat transfer mechanisms to understand how air temperature is distributed throughout the atmosphere.
4. Ability to understand the six basic phase changes of water and how energy is transferred throughout the atmosphere. Then, using this ability learn the physics of how clouds are formed. Also, be able to recognize the ten basic cloud formations of everyday life.
5. Ability to extend the formation of clouds into the physics of precipitation. Examine the two basic mechanisms of precipitation growth in warm and cold clouds. And finally, learn about all of the basic forms of liquid and solid precipitation.
6. Ability to understand the physics of moving air (wind) as they relate to differences in pressure and temperature through the analysis of the forces acting on a parcel of air.
7. Knowledge of the local wind systems of the world from the small dust whirls to the giant Monsoon circulation pattern. Become familiar with the different cellular models of global wind circulations and address the limitations as seen by real world examples.
8. Familiarity with the most important air-sea interactions of the general circulation: El Nino, La Nina, the Southern Oscillation, and the Pacific, Atlantic, and Polar Oscillations.
9. Ability to understand the concept of Air Masses which directly lead into the concept of Fronts. Look at all four types of fronts from both the horizontal and vertical prospective. Then, use these concepts to gain an understand of the largest of all weather systems: the Mid-Latitude Cyclone. Examine the six basic segments of the life cycle of the mid-latitude cyclone.
10. An understanding of the composition of the atmosphere and how the mixture of gases and particles interact to provide a comfortable climate for the inhabitants of Earth.
11. Ability to understand the differences and similarities of the two basic types of thunderstorms: the air mass and severe thunderstorm. Gain an understanding of the electrification of thunderstorms and the safety rules dealing with lightning.
12. Knowledge of the role of wind shear in the severe and tornadic thunderstorm. Examine the formation and life cycle of tornadoes and be able to translate this into observable cloud patterns. Become familiar with the safety rules for severe thunderstorms and tornadoes.
13. Understanding of the formation and life cycle of the tropical cyclone. Familiarity with the four major hazards associated with land falling Hurricanes.
14. Analyze, interpret, and make predictions regarding atmospheric phenomena by applying appropriate scientific theories, principles, and concepts. (MnTC Goal 3, Competencies a and b, MnTC Goal Area 2, Competencies a, b, and c; NHCC ELOs 1, 2, 4)
15. Demonstrate how the knowledge of meteorological principles can be used to help evaluate current science related issues in society, such as Global Warming and Ozone Depletion. (MnTC Goal 3, competency d; MnTC Goal Area 2, Competencies a, b, and c; NHCC ELO 3)
16. Demonstrate ability to organize and present scientific material in a coherent manner; communicate experimental findings, analyses, and interpretations both orally and in writing. (MnTC Goal 3, Competency c; NHCC ELOs 1, 2, 4)

## **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

### Goal 03 - Natural Science

1. Demonstrate understanding of scientific theories.
2. Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
3. Communicate their experimental findings, analyses, and interpretations both orally and in writing.

## **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

## **G. SPECIAL INFORMATION**

1. Knowledge of Human Cultures and the Physical and Natural World--Through study in the sciences, mathematics, social sciences, humanities, histories, languages, the arts, technology and professions.
2. Intellectual and Practical Skills--Including: Inquiry and analysis; Critical and creative thinking; Written and oral communication; Quantitative literacy; Information literacy; Teamwork and problem solving.
3. Personal and Social Responsibility and Engagement--Including: Civic knowledge and involvement--campus, local and global; Intercultural knowledge and competence; Ethical reasoning and action; Foundations and skills for lifelong learning.
4. Integrative and Applied Learning--Including: Synthesis and advanced accomplishment across general education, liberal studies, specialized studies and activities in the broader campus community.