

MIDDLESEX COUNTY COLLEGE
EDISON, NEW JERSEY
DEPARTMENT OF NATURAL SCIENCES

Course ID and Name: SCI 157: Introduction to Meteorology

Department: Department of Natural Sciences

Chairperson: Dr. Donna Howell

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Prerequisites: MAT 013 or appropriate score on the College Placement Test.

Co-requisites: N/A

Course Description:

An introduction to meteorology, providing an overview of the atmosphere, temperature, measurements and energy balance, as it pertains to air gasses, clouds, precipitation, wind, storms, and fronts. Weather predictions and forecasting instrumentation are integral parts of this course, including internet sources and weather satellite transmissions. How human actions, whether intentional or unintentional, may influence the atmosphere will be discussed. Appropriate laboratory experience is provided.

General Education Status: Science

Credits: 4**Lecture Hours:** 3**Lab Hours:** 2

Learning Outcomes:

Upon successful completion of this course, student will be able to:

- 1.Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
- 2.Analyze and interpret meteorological charts and graphs.
- 3.Develop a two-day forecast with an outlook for seven days using meteorological data available on the internet.
- 4.Develop an overall understanding of the behavior, motion, and stability of the atmosphere.
- 5.Use basic meteorological instruments.

Course Requirements:

Students must attend every lecture and laboratory session. Lecture performance is evaluated by exams, homework assignments, and quizzes. Laboratory performance is measured by practical examinations, laboratory reports, quizzes and observation of student laboratory technique.

Assessment tool	% of final grade
3 Lecture Exams	40%
Cloud Identification Test	10%
1 Final Exam	20%
Laboratory Exercises	10%
Weather data analyses final Project	10%
Weather Presentation, Homework, Class Exercises, Pop quizzes, and attendance	10%

GRADING STANDARD:

Upon completion of the course, grades will be assigned as follows:

A = 90 – 100%

B+ = 86 - 89%

B = 80 - 85%

C+ = 76 - 79%

C = 70 - 75%

D = 60 - 69%

F = <60%

Course Content Areas:

1. Introduction to the atmosphere
2. Heating the earth's surface and atmosphere
3. Seasonal and daily temperature variations
4. Dew, fog and clouds
5. Precipitation
6. Wind: Small scale, local systems, and global circulation
7. Air masses and fronts
8. Mid-latitude cyclones
9. Thunderstorms and tornadoes
10. Hurricanes
11. Weather forecasting
12. Climate change

Textbooks for Course:

<u>Author</u>	<u>Title</u>	<u>Publisher</u>	<u>Copyright</u>
Frederick K. Lutgens, Edward J. Tarbuck,	Atmosphere: An Introduction to Meteorology, The, Plus Mastering Meteorology with eText -- Access Card Package, 13 th Edition	Prentice Hall	2016

Dennis G. Tasa, <http://www.pearsonmylabandmastering.com/northamerica/masteringgeography/>

Online
Component

Lecture Outline

I Chapter 1 An Introduction to the Atmosphere
Chapter 2 Heating Earth's Surface and Atmosphere
II Chapter 3 Temperature
Chapter 4 Moisture and Atmospheric Stability
III Chapter 5 Forms of Condensation and Precipitation
IV Chapter 6 Air Pressure and Winds
V Chapter 7 Circulation of the Atmosphere
VI Chapter 8 Air Masses
VII Chapter 9 Weather Patterns
VIII Chapter 12 Weather and Forecasting
IX Chapter 10 Thunderstorms and Tornadoes
X Chapter 11 Hurricanes
XI Chapter 13 Air Pollution
XII Chapter 14 The Changing Climate
XIII Chapter 15 World Climates
XIII Chapter 16 Optical Phenomena

Lab Outline

Week	Title	Assignment
Week 1	Introduction to the Atmosphere	Class Exercise (handouts from Exercises in Meteorology)

		<p>Chapter 2 The Atmosphere Exercise 2.1a-f pg 15</p> <p>Chapter 2 The Atmosphere Exercise 2.2a-e pg 16</p> <p>The Atmosphere Introduction to Meteorology pg 26 -31</p> <p>2. Analyze and interpret meteorological charts and graphs.</p> <p>4. Develop an overall understanding of the behavior, motion, and stability of the atmosphere.</p>
	Give it some thought	
	Heating Earth's Surface and Atmosphere	<p>Class Exercise:</p> <p>Myth Busters: Reason for the Seasons & Egg balancing on the Equinox</p> <p>1. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.</p>
		<p>Laboratory 1: Greenhouse Gases</p> <p>1. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.</p>
	Give it some thought	End of Chapter assigned textbook questions
Week 2	Temperature Data and the Controls of Temperature	<p>Class Exercise:</p> <p>Temperature Conversion Handout</p> <p>Isotherms and Isobars (include low and high pressure systems)</p> <p>2. Analyze and interpret meteorological charts and graphs.</p> <p>Laboratory 2:</p> <p>Specific Heat Land vs Water</p> <p>1. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.</p>
		<p>Laboratory 3:</p> <p>Climate controls (handout from Exercises in Meteorology pg 45)</p> <p>Climate Controls (Lab 13 pg 143-151)</p>

		<p>2. Analyze and interpret meteorological charts and graphs.</p> <p>4. Develop an overall understanding of the behavior, motion, and stability of the atmosphere.</p>
	Give it some thought	End of Chapter assigned textbook questions
	Moisture and Cloud Formation	<p>Class Exercise</p> <p>Diagram for water cycle</p> <p>4. Develop an overall understanding of the behavior, motion, and stability of the atmosphere.</p> <p>Use of Psychrometer</p> <p>Start of outside weather data collection for final weather analyses project. Temperature, Humidity, Dew Point, Wind speed, Wind Direction, Sun Angle, Shadow Length, Air Pressure, Percent Cloud Coverage, Cloud Types</p> <p>5. Use basic meteorological instruments.</p>
		<p>Laboratory 4: Exercise D: Atmospheric Moisture and Relative Humidity</p> <p>Adiabatic Cooling</p> <p>2. Analyze and interpret meteorological charts and graphs.</p>
	Give it some thought	End of Chapter assigned textbook questions
Week 3	Forms of Condensation and Precipitation	<p>Class Exercise</p> <p>Bergeron Process</p> <p>4. Develop an overall understanding of the behavior, motion, and stability of the atmosphere.</p>
		<p>Laboratory 5:</p> <p>Cloud in a bottle</p> <p>1. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.</p>
	Give it some thought	End of Chapter assigned textbook questions

Week 4	Air Pressure and Wind	Laboratory 6: Wards Model Air Pressure Simulation Climate Controls (Lab 13 pg 152 – 153) 1.Students will use the scientific method of inquiry, through the acquisition of scientific 4.Develop an overall understanding of the behavior, motion, and stability of the atmosphere.
	Give it some thought	End of Chapter assigned textbook questions
Week 5	Circulation of the Atmosphere	Class Exercise World Map 2. Analyze and interpret meteorological charts and graphs.
	Give it some thought	End of Chapter assigned textbook questions
Week 6	Air Masses	Laboratory 7: Wards Model Air Masses and Frontal Simulations 1.Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
	Give it some thought	End of Chapter assigned textbook questions
Week 7	Midlatitude Cyclones	Class Exercises (handout from Exercises in Meteorology pg 143) 4.Develop an overall understanding of the behavior, motion, and stability of the atmosphere.
		Laboratory 8: Midlatitude Cyclones 4.Develop an overall understanding of the behavior, motion, and stability of the atmosphere.
	Give it some thought	End of Chapter assigned textbook questions
Week 8	Thunderstorms and Tornadoes	Laboratory 9: Lab 11 Thunderstorms and Tornadoes 4.Develop an overall understanding of the behavior, motion, and stability of the atmosphere.
	Give it some thought	End of Chapter assigned textbook questions

Week 9	Hurricanes	Laboratory 10: Hurricanes 4.Develop an overall understanding of the behavior, motion, and stability of the atmosphere.
	Give it some thought	End of Chapter assigned textbook questions
Week 10	Weather Analysis and Forecasting	Class Exercise Weekly weather forecasting student presentations 3.Develop a two-day forecast with an outlook for seven days using meteorological data available on the internet.
	Give it some thought	End of Chapter assigned textbook questions
Week 11	Air Pollution	Laboratory 11: Smog City 3.Develop a two-day forecast with an outlook for seven days using meteorological data available on the internet. 4.Develop an overall understanding of the behavior, motion, and stability of the atmosphere.
		Laboratory 12: Proxy Data (Tree Cuts) 2. Analyze and interpret meteorological charts and graphs.
	Give it some thought	End of Chapter assigned textbook questions
Week 12	The Changing Climate	Laboratory 13 BIO INTERACTIVE 2. Analyze and interpret meteorological charts and graphs.
	Give it some thought	End of Chapter assigned textbook questions
Week 13	World Climates	Class Exercise World Map Final 3 month weather analyses completed 3.Develop a two-day forecast with an outlook for seven days using meteorological data available on the internet.
	Give it some thought	
Week 14	Optical Phenomena of the Atmosphere	Laboratory 14 Optics Rainbows 1.Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

	Give it some thought	End of Chapter assigned textbook questions
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