

0702M132

Introduction to Meteorology and Climate

Instructor: TBA

Time: Monday through Friday (June 17, 2019 - July 19, 2019)

Office Hours: 2 hours (according to the teaching schedule)

Contact Hours: 90 (50 minutes each)

Credits: 6

Location: MBA Center

Office: MBA Center 107

E-mail: TBA

Course Description

This course focuses on the concepts and current issues of meteorology, basic physical principles used in explaining the structure of the atmosphere, weather processes, and storms, elements of weather observations, weather instruments and reporting. This course provides background for those who can utilize meteorology in their weather related activities.

Required Textbook(s)

Meteorology Today: An Introduction to Weather, Climate, and The Environment, 11th edition, Cengage Learning, C. Donald Ahrens, Robert Henson, 2015, ISBN 1305480627, 9781305480629

Prerequisites

No prerequisites

Course Goals

After the course the student shall be able to

- * Describe the atmosphere's structure and how meteorological parameters (temperature, air pressure, humidity) vary in time and space
- * Describe the global circulation of the atmosphere, frontal systems and atmospheric motions on a local scale
- * Describe the Earth's climate and factors affecting it

* Describe how meteorological observations are performed and how they are used in the forecast work

Course Hours

The course has 25 sessions in total. Each class session is 180 minutes in length. The course meets from Monday to Friday.

Course Schedule

Please note that the schedule is meant to give an overview of the major concepts of this course. Changes may occur in this calendar as needed to aid in the student's development.

Week 1

Chapter 1 Earth and Its Atmosphere

- λ Overview of the Earth's Atmosphere
- λ Vertical Structure of the Atmosphere
- λ Weather and Climate

Chapter 2 Energy: Warming Earth and the Atmosphere

- λ Energy, Temperature and Heat
- λ Heat Transfer in the Atmosphere
- λ Radiant Energy
- λ Radiation: Absorption, Emission, and Equilibrium
- λ Solar Particles, the Aurora, and Space Weather

Chapter 3 Seasonal and Daily Temperatures

- λ Why Earth Has Seasons
- λ Local Seasonal Variations
- λ Daily Warming and Cooling of Air Near the Surface
- λ Applications of Air Temperature Data

Chapter 4 Atmospheric Humidity

- λ Circulation of Water in the Atmosphere
- λ The Many Phases of Water
- λ Evaporation, Condensation, and Saturation
- λ Humidity

Quiz 1

Week 2

Chapter 5 Condensation: Dew, Fog, and Clouds

- λ The formation of Dew and Frost
- λ Condensation Nuclei
- λ Haze
- λ Fog
- λ Foggy Weather

λ Clouds

Chapter 6 Stability and Cloud Development

λ Atmospheric Stability

λ Determining Stability

λ Cloud Development

Chapter 7 Precipitation

λ Precipitation Process

λ Precipitation Types

λ Measuring Precipitation

Chapter 8 Air Pressure and Winds

λ Atmospheric Pressure

λ Surface and Upper-Level Charts

λ Newton's Laws of Motion

λ Forces That Influence the Winds

λ Winds and Vertical Air Motions

Quiz 2

Week 3

Chapter 9 Wind: Small-Scale and Local Systems

λ Scales of Atmospheric Motion

λ Small-Scale Winds interacting with the environment

λ Local Wind Systems

λ Determining Wind Direction and Speed

Chapter 10 Wind: Global Systems

λ General Circulation of the Atmosphere

λ Jet Streams

λ Atmosphere-Ocean Interactions

Chapter 11 Air Masses and Fronts

λ Air Masses

λ Fronts

Chapter 12 Middle-Latitude Cyclones

λ Polar Front Theory

λ Where Do Mid-Latitude Cyclones Tend to Form

λ Vertical Structure of Deep Dynamic Lows

λ Upper-Level Waves and Mid-Latitude Cyclones

λ The Necessary Ingredients for a Developing Mid-Latitude

λ Vorticity, Divergence, and Developing Mid-latitude

Midterm

Week 4

Chapter 13 Weather Forecasting

λ Weather Observation

λ Acquisition of Weather Information

λ Weather Forecasting Tools

λ Weather Forecasting Methods

- λ Time Range of Forecasts
- λ Accuracy and Skill in Weather Forecasting
- λ Weather Forecasting Using Surface Charts
- λ Using Forecasting Tools to Predict the Weather

Chapter 14 Thunderstorms

- λ Thunderstorm Types
- λ Thunderstorms and Flooding
- λ Distribution of Thunderstorms
- λ Lightning and Thunder

Chapter 15 Tornadoes

- λ Tornadoes: A Few Facts
- λ Tornado Formation
- λ Observing Tornadoes and Severe Weather
- λ Storm Chasing and Mobile Radar

Chapter 16 Hurricanes

- λ Tropical Weather
- λ Anatomy of a Hurricane
- λ Hurricane Formation and Dissipation
- λ Hurricane Movement
- λ Naming Hurricanes and Tropical Storms
- λ Devastating Winds, the Storm Surge, and Flooding
- λ Some Notable Hurricanes
- λ Destructive Tropical Cyclones around the World
- λ Hurricane Watches and Warnings
- λ Hurricane Forecasting Techniques
- λ Modifying Hurricanes

Quiz 3

Week 5

Chapter 17 Earth's Changing Climate

- λ A World with Many Climates
- λ Climatic Classification
- λ The Global Pattern of Climate

Chapter 18 Global Climate

- λ Reconstructing Past Climates
- λ Climate Throughout the Ages
- λ Climate Change Caused by Natural Events
- λ Climate Change Caused by Human (Anthropogenic) Activities
- λ Climate Change: Global Warming

Chapter 19 Air Pollution

- λ A Brief History of Air Pollution
- λ Types and Sources of Air Pollutants
- λ Factors That Affect Air Pollution
- λ Air Pollution and the Urban Environment
- λ Acid Deposition

Chapter 20 Light, Color and Atmospheric Optics

- λ White and Colors
- λ Clouds and Scattered Light
- λ Red Suns and Blue Moons
- λ Twinkling, Twilight, and the Green Flash
- λ The Mirage: Seeing Is Not Believing
- λ Halos, Sundogs, and Sun Pillars
- λ Rainbows
- λ Coronas, Glories, and Heiligenschein

Final Exam

Course Requirements

General Class Rules are:

Be Prepared, Be Polite, Be Honest, and Be Attentive.

Specific Class Rules are:

* Do Not Interrupt - If the teacher or another student is speaking to the class, raise your hand to be recognized. Do not break in or make “side” comments to a neighbor. When I raise my hand as a signal to be quiet, stop talking and look at me.

* Stay in Your Seat - Do not walk around during class unless directed to do so. Have everything you need ready before class begins.

* Leave the Food at Home - Students may not eat or drink in the classroom. Closable containers of water are permitted.

* Cell Phones, iPods, “Devices” – Please place cell phones on silent and leave them in your bag, purse, pocket, etc. Cell phones and other devices will be confiscated and returned at the end of the day if they become an issue in the classroom.

After three confiscations of your devices, they will be turned over to the office for appropriate disciplinary actions to be taken.

Grading Policy

Type	Percentage
5 assignments (6% each)	30%
3 quizzes (10% each)	30%
Midterm	10%
Final	20%
Attendance	10%

Attendance for the exams is mandatory.

Grading Scale

The instructor will use the grading system as applied by JNU:

Definition	Letter Grade	Score
Excellent	A	90~100

Good	B	80~89
Satisfactory	C	70~79
Poor	D	60~69
Failed	E	Below 60

Attendance

Attendance is mandatory in the class. It would be recorded each class and forms part of students' participation record. Students should inform the instructor at the earliest opportunity if they need to ask for a leave. All absences may have negative effect on students' final grades. Any students with more than three unexcused absences will automatically fail the course.

Academic Integrity

As members of the Jinan University academic community, students are expected to be honest in all of their academic coursework and activities. Academic dishonesty, includes (but is not limited to) cheating on assignments or examinations; plagiarizing, i.e., misrepresenting as one's own work any work done by another; submitting the same paper, or a substantially similar paper, to meet the requirements of more than one course without the approval and consent of the instructors concerned; or sabotaging other students' work within these general definitions. Instructors, however, determine what constitutes academic misconduct in the courses they teach. Students found guilty of academic misconduct in any portion of the academic work face penalties that range from the lowering of their course grade to awarding a grade of E for the entire course.