Angelo State University
GEOL 1347 Meteorology
Fall 2021
Section 010 MWF 10:00-10:50am, Room: VIN 160

Instructor: Mrs. Jessica A. Garza
Email: jgarza85@angelo.edu
Office hours: VIN 130. M Noon-1pm, W 9am-10am, or contact me to set up a convenient time to meet (very flexible with virtual office hour meetings).
Office phone: (325) 486-6987

COURSE DESCRIPTION:
The course provides a through introduction to weather, clouds, atmospheric processes, ocean waves and climate that affect our world. This is an introductory, first course in meteorology for students pursuing degrees in science, engineering, technology, for teaching/education or related career fields, and for the weather enthusiast that wants to understand weather and how storms form and move. This is a non-mathematically-based course that places emphasis on the descriptive side of fundamental atmospheric principles, what the atmosphere is made of, why it is important to life, defining atmospheric air motions and cloud formations through descriptions of the various storm-types, their evolution and their impacts on society. The basics of how and why seasons occur on Earth, how the atmosphere gets and uses energy to move and how weather is forecast will be clearly and vividly provided.
Co/Pre-requisite: none.

REQUIRED MATERIALS:
- ✓ TEXTBOOK: *Meteorology Today: An Introduction to Weather, Climate, and the Environment, 12th Ed C. Donald Ahrens and Robert Henson, with MindTap Access.*

- ✓ ASU email account that you check regularly
- ✓ Blackboard course site at ASU Blackboard.
- ✓ Suggested material: colored writing utensils.

ATTENDANCE POLICY: Attendance and possible quizzes will be completed within the first 5 mins of all lecture meetings. You are expected to attend all scheduled class meetings on time. Missed In-class activity points CANNOT be made up. Please inform me well ahead of time if you will need to be absent for any reason including religious holidays. NOTE: You are NOT automatically dropped if you stop attending class. November 2 is the last day to drop a course.

STUDENT LEARNING OUTCOMES: This course is designed to familiarize the student with the processes, principles, and theories involved in Meteorology. Learning outcomes will be evaluated by homework, lab assignments, quizzes, and exams. At the end of this course, the student will be able to:

1) Analytically examine the phenomena of the solar and terrestrial radiation and understanding the energy transfer by radiation, conduction, and convection, and explain the factors that determine the transport of solar energy over the Earth's surface and describe global distribution of temperature.
2) Identify and understand clouds and storms of all types and optical features in the atmosphere. The formation of cumulonimbus vs. stratus clouds, the development of mid-

latitude cyclones vs. tropical cyclones, and the tropospheric variables that effect these meteorological structures will be explored.

3) Describe fundamental concepts, theories and physical laws relevant to how the atmosphere we live in operates. Such topics will include the laws of thermodynamics, conservation of mass, the hydrologic conceptual model, and the wave cyclone theory.
4) Practice applications of weather basics which will be applied to everyday living, thus allowing the student to plan around the dynamic atmosphere's diurnal variability and understand when it is or is not life-threatening.
5) Have a clear understanding of how weather is forecast and why some weather quantities are far easier to forecast than others.
6) Acquire hands on experience with weather observations and be able to visit a National Weather Service office where forecasting is performed around the clock.
7) Learn specific tools to help them communicate better ideas and concepts that may be abstract to others, thus they will be able to easily share learned knowledge from this course with others.
8) Clearly understand our complex atmosphere and the many constantly change weather features within it.

CORE CURRICULUM STUDENT LEARNING OUTCOMES: The following list of core curriculum student learning outcomes will be met and measured during this course.

Student Learning Outcome	Assessment Method
1. Gather, analyze, evaluate, and synthesize information relevant to a question or issue.	In-class Activities
2. Develop, interpret, and express ideas through effective visual communication.	Quizzes and Exams
3. Manipulate and analyze numerical data and arrive at an informed conclusion	Homework/In-class Assignment
4. Manipulate and analyze observable facts and arrive at an informed conclusion	Take-home Assignments
5. Work effectively with others to support and accomplish a shared goal.	In class assignments

LECTURE: A typical class meeting will combine lectures, discussions, group activities, multimedia presentations, and other demonstrations and activities to give you an opportunity to learn concepts in as active a manner as possible.

CELL PHONES AND OTHER ELECTRONIC DEVICES: You may use a laptop or tablet to take notes during class. Please do not disturb others with their use. Please keep all electronics on vibrate or on silence. The use of any electronic device not authorized by the instructor during a test may result in the forfeiture of your grade for that test. All electronic devices should be turned off and stored out of sight during tests.

GRADING:

Assignments via MindTap (Concept Animations)	15%
3 Lecture Exams (~13.33% each)	40%
1 Final Comprehensive Exam	15%
In-class Activities, Quizzes, Homework Assignments	30%

There will be no make-ups for homework, in-class activities, or quizzes. Make-up exams will be given for tests ONLY under extenuating circumstances. Prior email notification is needed for a make-up exam. **NO LATE WORK ACCEPTED IN THIS COURSE.**

See Blackboard for the MindTap registration process.

GRADING SCALE: 100-90=A; 89-80=B; 79-70=C; 69-60=D; 59 and below=F

CLASS PREPARATION ASU EMAIL: Since class announcements will be routinely distributed via email and Blackboard, you will need to regularly check your ASU email account and our course Blackboard site (daily). All course correspondence will be through your ASU email account and Blackboard. ASU provides Internet and email services to you at any of the computer labs on campus. Call 942-2911 to set this up if necessary. Please print out the Lecture Powerpoints in Blackboard so that you can utilize them in class! I want to make your life easier.

KNOW THE ASU HONOR CODE: Angelo State University expects its students to maintain complete honesty and integrity in their academic pursuits. Students are responsible for understanding the Academic Honor Code, which is contained in both print and web versions of the Student Handbook.

STUDENTS WITH DISABILITIES:
1. "Angelo State University is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments Act of 2008 (ADAAA), and subsequent legislation."
2. The Office of Student Affairs is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability, and it is the student's responsibility to initiate such a request by contacting the Office of Student Affairs, University Center, Room 112 at (325) 942-2047 or (325) 942-2211(TDD/FAX) or by e-mail at studentservices@angelo.edu to begin the process. The Office of Student Affairs will establish the particular documentation requirements necessary for the various types of disabilities.
Reasonable accommodations will be made for students determined to be disabled or who have documented disabilities.

TITLE IX: Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

You are encouraged to report any incidents involving sexual misconduct to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Boone, J.D.

You may submit reports in the following manner:

Online: www.angelo.edu/incident-form
Face to Face: Mayer Administration Building, Room 210
Phone: 325-942-2022
E-Mail: michelle.boone@angelo.edu

Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit: www.angelo.edu/title-ix.

INCOMPLETE GRADE POLICY: It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 Grading Procedures for more information.

STUDENT ABSENCE FOR OBSERVANCE OF RELIGIOUS HOLY DAYS: A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day for more information.

ACADEMIC INTEGRITY: Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU. The College of Science and Engineering adheres to the Statement of Academic Integrity

PLAGIARISM: Plagiarism is a serious topic covered in ASU's Academic Integrity policy in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft. In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list. Papers are subject to be evaluated for originality via Turnitin. Resources to help you understand this policy better are available at the ASU Writing Center.

COPYRIGHT POLICY: Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

GENERAL POLICIES RELATED TO THIS COURSE: All students are required to follow the policies and procedures presented in these documents:

- Angelo State University Student Handbook
- Angelo State University Catalog

GEOLOGIC EXHIBITION ORGANIZATION (GEO):
GEO, the student organization of all interested in geology (not just majors/minors), meets almost every Wednesday @ 6:00PM. GEO is a student chapter of the American Association of

petroleum Geologists. Sigma Gamma Epsilon, the national honor society of the earth sciences is related to GEO.

YOU CAN MAJOR OR MINOR IN GEOLOGY @ ASU! See the BS in Geoscience requirements. A Geology Minor requires 18 hours of geology courses. Good and rewarding careers exist for geologists, geophysicists, hydrogeologists, secondary science teachers, and petroleum engineers.

INFORMATION ABOUT COVID-19
Please refer to ASU's COVID-19 (Coronavirus) Updates[i] web page for current information about campus guidelines and safety standards as they relate to the COVID-19 pandemic.

MODIFICATIONS TO THE SYLLABUS
This syllabus, including grade evaluation and course schedule, is subject to modification on potentially short notice based on developing circumstances.

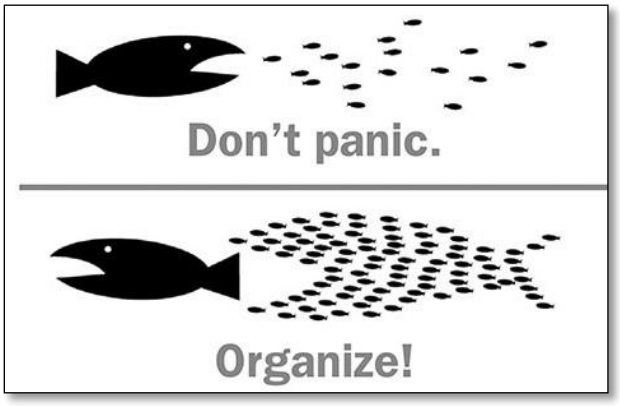
FINAL NOTE:
It is my goal to make this class both interesting and informative for you. With a reasonable amount of effort, it should be possible for everyone to meet the course objectives and earn a passing grade. With additional effort, aptitude, and investment of time, students may earn even higher course grades. If at any time you run into difficulties with the material, or need assistance or clarification, please do not hesitate to ask for help. I am here for you, and I will be glad to entertain any reasonable requests.

SCHEDULE: ***This is tentative.*** *All information is subject to change.*

TOPIC	TEXT CHAPTERS
Earth's Atmosphere	Ch 1
Energy	Ch 2
Temperature (*No Class on Labor Day 9/6*)	Ch 3
Exam #1 Humidity	Ch 4
Clouds	Ch 5
Stability	Ch 6
Precipitation	Ch 7
Exam #2 Air pressure & Winds	Ch 8
Local Wind	Ch 9
Global Wind	Ch 10
Airmasses and Fronts	Ch 11
Exam #3 (*No Class on Wed-Fri 11/24-11/25*) Mid-Latitude Cyclones	Ch 12
Climate Change	Ch 18
Global Climate	Ch 17
Thunderstorms, Tornadoes, Hurricanes	Ch 14, 15, 16
Comprehensive Final Exam: Monday Dec 6th 10:30am - 12:30am	--

Assigned homework:

- Dates will be announced at least a week in advance of the due date as we move through the semester. Be in class to hear them.



METEOROLOGY COURSE OUTLINE

Chapter 1: Intro to Meteorology/ Atmosphere

1. Meteorology
    a. Significance
    b. Wx vs climate
    c. History
2. Nature of Scientific Inquiry
    a. Models
    b. Hypothesis vs Theory
    c. Fundamental Laws
    d. Conservation of Mass
    e. 1st and 2nd Energy Laws
3. Earth's Atmosphere
    a. Composition
    b. Vertical Structure

Chapter 2: Energy

1. Definitions
    a. Temperature
    b. Sensible heat
        i. Heat transfer
            1. Conduction & Convection
    c. Latent heat
        i. Net Heat transfer
2. Radiant Energy
    a. EMS
    b. Laws
    c. Solar and Terrestrial Spectral Curves
3. Energy Budget

a. Greenhouse Effect
b. Albedo
c. Energy Balance

Chapter 3: Seasonal and Daily Temperature

1. Earth-Sun Relationships
    a. Rotation
    b. Revolution
        i. Historical
        ii. Characteristics
    c. Solar Declination
        i. Key Dates and Parallels
2. Surface Air Temperature
    a. Insolation
        i. Sun Angle: Temporal vs Spatial
        ii. Day Length
    b. Continentality
    c. Elevation
    d. Ocean currents
3. Temperature
    a. Lag
    b. Inversion

Chapter 4: Atmospheric Humidity

1. Hydrologic Cycle
    a. What does it look like?
2. Phases of Water
    a. Energy transformations
    b. Energy releases
3. Measures of Humidity
    a. Absolute
    b. Specific
    c. Mixing Ratio
    d. Vapor Pressure
    e. Relative
    f. Dew point

Chapter 5: Cloud Identification

1. Dew and Fog
    a. Dew
    b. Cloud condensation nuclei (CCN)
    c. Haze
    d. Fog Types
2. Cloud Identification
    a. High
    b. Middle
    c. Low
    d. Vertical

e. Unusual

Chapter 6: Stability and Cloud Development

1. Stability Definitions
2. Determining Stability
    a. Stable
    b. Unstable
    c. Conditionally unstable
    d. Causes of Instability
3. Cloud Development
    a. Causes
        i. E.g. Topography

Chapter 7: Precipitation

1. Precipitation Processes
    a. Growth
    b. Collision Coalescence
    c. Ice Crystal Bergeron
2. Precipitation Types
3. Cloud Seeding
4. Doppler Radar

Chapter 8: Air Pressure and Winds

1. Atmospheric Pressure
2. Horizontal Pressure Variation
3. Pressure Measurements
4. Surface and Upper-Level Charts
5. Forces that Influence the Wind
    a. Pressure Gradient Force
    b. Coriolis Force
    c. Friction
6. Flow Aloft
    a. Geostrophic Wind
    b. Gradient Wind
7. Surface Wind
8. Winds and Vertical Air motions

Chapter 9: Wind: Small scale and local systems

1. Scales of Motion
2. Friction and Turbulence
    a. Eddies
    b. Force of Wind
3. Influences on
    a. Soil
    b. Snow
    c. Vegetation

    d. Water
4. Thermal circulations
    a. Sea and Land Breeze
5. Mountain and Valley Breezes
    a. Katabatic Winds
    b. Chinook Winds
    c. Santa Ana Winds
6. Desert Winds and Dust Storms
7. Seasonal Winds
    a. Monsoon
8. Measuring Wind
    a. Direction
    b. Speed
    c. Prevailing Wind
    d. Instruments

Chapter 10: Wind: Global System

1. Three cell model
    a. Pressure
    b. Winds
    c. Cells
    d. Belts
    e. Weather
2. The Real World
    a. Semi-permanent pressure
    b. Circulation/Precipitation
3. Jet Stream Formation
4. Oceanography
    a. Surface currents
    b. Ekman Transport
    c. Upwelling
    d. ENSO
    e. PDO/NO/AO

Chapter 11: Air masses and fronts

1. Airmasses
    a. Source Regions
    b. Classifications and Characteristics
        i. cP, cA
        ii. mP, mT
        iii. cT
2. Fronts
    a. Stationary
    b. Cold
    c. Warm
    d. Dryline

e. Occluded

Chapter 12: Middle-Latitude Cyclones

1. Mid-Latitude Cyclones
    a. Polar Front Theory
    b. Stages
    c. Formation location
2. Dynamic lows
    a. Vertical structure
    b. Convergence/divergence
3. Mid-Latitude Cyclone Formation
    a. Upper level waves
    b. Jetstream
    c. Intensity
    d. Conveyor belt model
    e. Vorticity

Chapter 13: Weather Forecasting

1. Wx Observations
    a. Surface/Upper Air
    b. Satellite
    c. Radar
2. Acquisition of Wx Information
3. Forecasting Tools
    a. AWIPS II
    b. Meteograms
    c. Soundings
    d. Thickness Charts
4. Numerical Weather Prediction
    a. Improvements
5. Grid Spacing
    a. Other Techniques
    b. Local signs
    c. Forecasting Vocabulary
    d. Time Range
        i. Accuracy and skill
    e. Rules of thumb
6. Practice
    a. A forecast for six cities
    b. A detailed walk-through

Chapter 14:Thunderstorms

1. Definition &Types
    a. Ordinary
    b. Multicellular
2. Features and Classes

    a. Gust Fronts
    b. Microbursts
    c. Squall Lines
    d. Bow echos & MCVs
    e. MCS
    f. MCC
    g. Supercellular
        i. Types
        ii. Anatomy
        iii. Influences
3. Thunderstorms
    a. Dryline
    b. Flooding
    c. Distribution
    d. Damage
4. Lightning
    a. Thunder
    b. Distance
    c. Theories
    d. Strokes
    e. Damage

Chapter 15: Tornadoes

1. Tornado
    a. Definitions
    b. Life Cycle
    c. Distribution
    d. Winds
2. Safety
    a. Seeking Shelter
    b. NWS
        i. Fujita Scale
3. Formation
    a. Supercell Tornadoes
    b. Tornadogenesis
    c. Nonsupercell tornadoes
4. Outbreaks
5. Observing Tornadoes
    a. Doppler
6. Chasing

Chapter 16: Hurricanes

1. Tropical Weather
2. Hurricane
    a. Anatomy

    b. Formation & Dissipation
        i. Developing Storm
        ii. Death
        iii. Stages
3. Investigation
    a. Movement
    b. Atlantic Hurricanes
    c. Eastern Pacific
4. Naming
5. Effects
6. Classifying
7. Historical
    a. US
    b. Global
8. Watches/Warnings
    a. Forecasting Techniques

Chapter 17: Global Climate

1. Climate definitions
2. Climate factors
    a. Temperature
    b. Precipitation
3. Climate Classification
    a. A to E

Chapter 18: Earth's changing climate

1. The Earth System
2. Causes of climate change (Long and Short term)
3. Anthropogenic changes
4. Anthropogenic climate change and effects
5. Conclusions

[1] https://blackboard.angelo.edu
[1] https://www.angelo.edu/catalogs/
[1] https://www.bls.gov/ooh/life-physical-and-social-science/print/geoscientists.htm
[1] https://www.aapg.org/students
[1] https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php
[1] https://www.angelo.edu/dept/writing_center/academic_honesty.php
[1] https://www.angelo.edu/services/disability-services/
[1] https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of
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