Syllabus: ATMS 317 Intermediate Meteorology and Weather Forecasting

Course Administration: http://www.patarnott.com/atms317 and webcampus.

Time and Place: Tues/Thurs 10:30-11:45 am, LP104

Office Hours: Wednesday 1 pm – 3 pm, LP 213 and by appointment.

Main Textbook: Mid-Latitude Atmospheric Dynamics: A First Course. By Jonathan E. Martin.

This course will be taught by Pat Arnott.

Prerequisites:
ATMS 117 or ATMS 121 or GEOG 121; Physics 181; Math 285.
Recommended prerequisite ATMS 411.

Topics:

- Overview of atmospheric thermodynamics, structure, and balloon sonde measurements.
- Air Pressure and Winds.
- Wind: Small Scale and Local Systems.
- Wind: Global Systems.
- Air Masses and Fronts.
- Middle-Latitude Cyclones.
- Weather Forecasting. Anatomy of Weather Models and Limitations.
- Mountain Meteorology.
- Boundary Layer Meteorology

Learning Outcomes:
1. Demonstrate understanding of atmospheric flows and thermodynamics in the atmosphere to establish a foundation for future courses.

2. Use surface weather maps and atmospheric sounding data to obtain information about atmospheric conditions.

3. Demonstrate understanding of mathematical methods to describe physical phenomena in the atmosphere.

4. Derive the governing equations for mass and momentum in the atmosphere and simplify using scale analysis.

5. Use open access sources of atmospheric data from both observations and numerical models.

Planned Schedule of Topics:

Week 1. Review of fronts, global circulation, and air masses. Meteorological data for weather observations. Assignment 1 given for students to present weather briefing each day at the beginning of class. Begin mathematics of fluid dynamics.
Week 2. Mathematics of fluid dynamics continued. Visual flow associated with a flow purely of divergence and vorticity. Assignment 2 given on mathematics of fluids. Lagrangian and Eularian points of view and HYSPLIT back trajectory example. Scalar and vector potentials for representing fluid velocity vectors.
Week 3. Continue with Mathematics of fluid motion and discuss homework 2.
Week 4. Temperature advection, general properties of fluids, and the hysplit model.
Week 5. Coriolis force and homework assignment 3.
Week 6. Applications of the equations of motion. Example problems of flor, accelerations, and force balances.
Week 7. **Midterm Exam1** Ageostophic flow near a jet streak, continuity equation, Dines compensation.
Week 8. Energy equation, potential temperature and gravity waves.
Week 9. Divergence of the geostrophic wind.
Week 10. Discussion of the ridge-trough pattern and relation to surface pressure.
Week 11. Equations of motion in pressure coordinates. Thermal wind.
Week 12. **Midterm Exam 2**Thermal wind relationships. Vertical velocity.
Week 13. Natural coordinates. Gradient wind, Cyclostrophic, geostrophic, and gradient approximations.
Week 14. Vorticity, potential vorticity
Week 15. Numerical Weather Prediction from Stull's book chapter 20
Final Exam

Optional Introductory Textbook as a Reference: Meteorology Today: An Introduction to Weather, Climate, and the Environment.

Optional Midlevel Textbook as a Reference: Applied Atmospheric Dynamics, First Edition. Authors are Lynch and Cassano. ISBN-10: 0470861738. ISBN-13: 978-0470861738.

Optional *Free* Comprehensive Textbook Using Algebra:
Stull, R., 2017: "Practical Meteorology: An Algebra-based Survey of Atmospheric Science" -version 1.02b. Univ. of British Columbia. 940 pages. isbn 978-0-88865-283-6 .
https://www.eoas.ubc.ca/books/Practical_Meteorology/

Brief Description:
This course provides a firm foundation for understanding small scale to global winds and their connections with weather. Local circulations have direct impacts on atmospheric boundary layer development and turbulent exchange of heat and mass between the atmosphere and the surface.

GRADING:
40% on homework. 20% on exam 1. 20% on exam 2. 20% on comprehensive final exam.

GRADING SCALE:
92% >= Score <= 100% = A
90% >= Score < 92% = A-
88% >= Score < 90% = B+
82% >= Score < 88% = B
80% >= Score < 82% = B-
78% >= Score < 80% = C+
72% >= Score < 78% = C
70% >= Score < 72% = C-
68% >= Score < 70% = D+
62% >= Score < 68% = D
60% >= Score < 62% = D-
0% >= Score < 60% = F

POLICY ON LATE HOMEWORK: 0% possible. Contact instructor for circumstances.

ONLINE CONTENT: Grades are posted on webcampus.

Final Exam:
Tuesday May 16th 9:50 – 11:50 am.

GUIDE TO DOING WELL IN THIS CLASS:

(My observations of students that get the most out of their course work during this brief time in life when you get to be a student)

1. Attend class, every class. Ask questions in class. I benefit greatly from questions students ask in class as it helps me refine my understanding of the subject matter, and it helps me convey topics more effectively. Other students benefit as well. I am very open to questions in class and find that when we have a discussion rather than a monologue, we all get a lot more out of our time together, and we can make interesting discoveries as we go along.

2. Do the homework every time, on time.

3. Work with others on the homework so that you learn to work in a group, and you gain the insights of others as they gain from you.

4. Be sure you thoroughly understand the homework and course material.

5. Read the textbook and assigned supplemental material.

6. Arrange your daily schedule so that you have time for sleep at night and can digest the course material daily. Work on each course a little each day.

7. Get started early on everything. It helps cement your knowledge.

8. Eat well and get some exercise. Some diversions help refresh your enthusiasm and skill.

9. Attend office hours to ask questions and refine your understanding of the subject matter.

10. Seek connections with the subjects of this course and others you are taking or will take later.

11. Pay close attention to subjects that are of great interest to you, and you may be able to link future employment and/or your thesis to the concepts of this course.

University Policies

Statement on Academic Dishonesty

The University Academic Standards Policy defines academic dishonesty, and mandates specific sanctions for violations. See the University Academic Standards policy: UAM 6,502.

Statement on Student Compliance with University Policies

In accordance with section 6,502 of the University Administrative Manual, a student may receive academic and disciplinary sanctions for failure to comply with policy, including this syllabus, for failure to comply with the directions of a University Official, for disruptive behavior in the classroom, or any other prohibited action. “Disruptive behavior" is defined in part as behavior, including but not limited to failure to follow course, laboratory or safety rules, or endangering the health of others. A student may be dropped from class at any time for misconduct or disruptive behavior in the classroom upon recommendation of the instructor and with approval of the college dean. A student may also receive disciplinary sanctions through the Office of Student Conduct for misconduct or disruptive behavior, including endangering the health of others, in the classroom. The student shall not receive a refund for course fees or tuition.

Statement of Disability Services

For Traditional and Seated Classrooms:

Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Pennington Achievement Center Suite 230) as soon as possible to arrange for appropriate accommodations.

For Online Courses:

If you are a student who would normally seek accommodations in a traditional classroom, please contact me as soon as possible. You may also contact the Disability Resource Center for services for online courses by emailing drc@unr.edu or calling 775-784-6000. Academic accommodations for online courses may be different than those for seated classrooms; it is important that you contact us as soon as possible to discuss services. The University of Nevada, Reno supports equal access for students with disabilities. For more information, visit the Disability Resource Center.

This course may leverage 3rd party web/multimedia content, if you experience any issues accessing this content, please notify your instructor.

Statement on Audio and Video Recording

Student-created Recordings

Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped, or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

Instructor-created Recordings

Class sessions may be audio-visually recorded for students in the class to review and for enrolled students who are unable to attend live to view. Students who participate with their camera on or who use a profile image are consenting to have their video or image recorded. If you do not consent to have your profile or video image recorded, keep your camera off and do not use a profile image. Students who un-mute during class and participate orally are consenting to have their voices recorded. If you do not consent to have your voice recorded during class, keep your mute button activated and only communicate by using the "chat" feature, which allows you to type questions and comments live.

Statement on Maintaining a Safe Learning and Work Environment

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University's Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the Equal Opportunity and Title IX page.

Statement on Campus Closures or Delays

In the event of class cancelations or delays caused by inclement weather conditions, fire/smoke conditions, or other unforeseen emergencies, the safety and well-being of students are the University's top priority. Official notifications will be disseminated through the University website and other official channels with details related to any campus delays or closures.

In the event of a campus closure, you will be informed as to whether the class will be offered remotely or if it will be canceled. If the class is cancelled, you will receive information on how to address any missed course content. We will most likely use Zoom if campus is closed.

Students facing significant impacts due to these events are encouraged to communicate with their instructor for potential accommodations.

Additional Information

- Your student fees cover usage of the University Math Center (https://www.unr.edu/university-math-center), (775) 784-4433; University Tutoring Center (https://www.unr.edu/tutoring-center), (775) 784-6801; and University Writing & Speaking Center (https://www.unr.edu/writing-speaking-center), (775) 784-6030. These centers support your classroom learning.