ATMS 317: Intermediate Meteorology and Weather Forecasting (Fall 2015 - 3 credits)

Instructor: Dr. Heather Holmes
Class Meetings: MWF, 3:00-3:50pm, LP 110
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Office Hours: M & W 4-5pm, and at other times by appointment
Web Content: UNR Web Campus (https://wcl.unr.edu/), login with UNR netID

Required Materials

Optional Supplementary/Reference Texts
• Meteorology Today: An Introduction to Weather, Climate, and the Environment, by C. Donald Ahrens.
• Mid-Latitude Atmospheric Dynamics: A First Course, by Jonathan E. Martin.
• Weather Analysis & Forecasting Handbook, by Tim Vasquez.

Course Description
This course provides a firm foundation for understanding small scale and global winds and their connections with weather. Mathematical methods are introduced to describe physical flow phenomena (winds). The course begins with a general overview of global circulations and wind patterns to provide a conceptual understanding of how winds in the atmosphere are created. The focus then moves to mid latitude cyclones, how they are formed and how to interpret surface weather maps and vertical profiles of wind and temperature data to understand cyclone properties and movement. Thermodynamics of the atmosphere is also studied to understand the gaseous composition of the atmosphere and the transport of moisture, precipitation, and energy. Mathematical concepts are introduced to aid in the derivation of the fundamental fluid dynamics equations. The conservation of mass and the conservation of momentum (from Newton’s second law) are both derived for atmospheric flows. Scale analysis is used to simplify the equations and provide a conceptual understanding of forces dominating the winds during typical atmospheric conditions (e.g., Coriolis force, pressure gradient force, geostrophic approximation).

Prerequisite: ATMS 117 or ATMS 121 or GEOG 121; Physics 181; Math 285

Computer Skills: It is expected that at all students will have basic computer knowledge. We will use Microsoft Excel, MATLAB, R, etc. to graph data and analyze results.

Student Learning Outcomes
• Gain an understanding of atmospheric flows and thermodynamics in the atmosphere to establish a foundation for future courses
• Use surface weather maps and atmospheric sounding data to obtain information about atmospheric conditions
• Understand mathematical methods to describe physical phenomena in the atmosphere
• Derive the governing equations for mass and momentum in the atmosphere and simplify using scale analysis
• Learn how to use open access sources of atmospheric data from both observations and numerical models
• Enhance computational skills for accessing data, plotting graphs, and data analysis

Assessment and Grading
Homework (40%): Homework assignments will be due approximately every 1-2 weeks and will be a mix of short answer, numerical problems, critical thinking questions, and computational data analysis.

Final Project (20%): In place of a final exam a written final project will be due at the end of the final exam meeting time (see below). The written report will be done individually but working in groups on computer codes and data analysis is encouraged. Note: if any student directly copies computer codes or data analysis tools from another student both students will receive a zero on the final project!
Midterms Exams (40%): Two exams will be given each worth 20% for a total of 40% of the course grade. Unless otherwise stated exams will be closed notes and closed book. There will be numerical problems that require a calculator, so remember to bring one with you! The class meeting prior to the exam date will be reserved for an exam review, if there is specific material you would like reviewed please come to my office hours and let me know.

Final Exam Meeting Time: Wednesday 16 December 2015, 10:15am -12:15pm. Final projects are due by 12:15pm and can be submitted via email (hholmes@unr.edu), my mailbox in the Physics office (LP 225), or under my office door (LP 205).

Final letter grades are assigned as follows:
A = 93% or higher; A- = 90-92.9%; B+ = 87-89.9 %; B = 83-86.9 %; B- = 80-82.9 %; 
C+ = 77-79.9 %; C = 73-76.9 %; C- = 70-72.9 %; D+ = 67-69.9 %; D = 63-66.9 %; 
D- = 60-62.9 %; F = < 60 %.

Additional Information
Classroom Behavior: All students are expected to behave in a professional and respectful manner. This includes (but is not limited to) being respectful of your peers during classroom discussions, being a team player on group projects, showing up on time to class, no cell phones in class, no listening to music, and no typing on laptops during lecture. Any behavior that disrupts the class is not allowed.

Late Assignment Policy: Homework will be collected in class on the due date. Late homework will not be accepted. Students are expected to budget their time accordingly to ensure that homework assignments and projects are submitted on time. If a student anticipates a problem with the schedule a special arrangement with the instructor needs to be made prior to the due date.

Missed Exam Policy: It is your responsibility to be on time for tests, and to contact your instructors well before the test if you absolutely cannot attend. In most cases, it is possible to take a test before its scheduled date, but it is not possible to make it up afterwards. Students who arrive after the first person has completed the test will automatically receive a zero on that exam or quiz. Make-up examinations will be given only with a medical doctor’s note requesting permission in the case of illness, or a death certificate in the case of a family member death.

Disability Services: Any student with a disability needing academic adjustments or accommodations is requested to contact the instructor as well as the Disability Resource Center in Thompson Student Services 107 as soon as possible to allow for appropriate arrangements.

Academic Success Services: Your student fees cover use of -
• Math Center (784-443 or www.unr.edu/mathcenter/)
• Tutoring Center (784-6801 or www.unr.edu/tutoring/)
• University Writing Center (784-6030 or www.unr.edu/writing_center)
These centers support your classroom learning; it is your responsibility to take advantage of their services. Seeking help outside of class helps you develop as a responsible and successful student.

Recording: Surrerptitious or covert videotaping 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. In those cases, students should understand that their comments during class might be recorded.

Academic Honesty: All coursework must meet the UNR Standards for Academic Policy (http://www.unr.edu/student-conduct/policies/university-policies-and-guidelines/academic-standards/policy). Working in groups on the homework assignments is encouraged but each student must turn in their own work. Any homework that is directly copied form another student or copied from a solutions manual will not be given any credit.