Mesoscale Dynamic Meteorology
Meteorology 407/507: http://www.meteor.iastate.edu/classes/mt407
Spring 2014

Class meetings (ROOM 2020 Agron): TR 9:30-10:50 am

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Office Hours: W 1-3 pm

Course Objectives
The primary objective of this course is to develop a comprehensive understanding of mesoscale meteorology and the dynamics governing it. In particular, the course will emphasize differences and interactions among mesoscale, synoptic and convective processes, and touch on requirements for observing, analyzing and forecasting mesoscale systems.

Texts: "Mesoscale Meteorology in Midlatitudes" by Markowski and Richardson (available in University bookstore, or at Amazon for roughly $72).
Supporting material can be found in the following texts which should be in the library, as well as various journal articles:

Course Topics (dates estimated)

- Definition of mesoscale (1/14)
- Differential heating-forced mesoscale circulations (1/14-1/30)
  TEAM ACTIVITY - PBL relationship to land surface characteristics
  TEAM ACTIVITY - PBL impacts on wind at turbine height for wind energy
- Terrain-forced mesoscale circulations (2/4-2/13)
  TEAM ACTIVITY - impacts of terrain on flow
- Fronts and Jets (2/18)
- Dry Lines, Gravity Waves, Bores (2/20-25)
  TEAM ACTIVITY - dry line behavior
- Convection (2/25-3/13)
  TEAM ACTIVITY - tornado behavior
- Mesoscale Convective Systems (3/13-4/1)
  TEAM ACTIVITY
- Mesoscale Observing Platforms (4/8)
- Mesoscale numerical modeling (4/10-4/24)
  TEAM ACTIVITY
- Main Semester Exam will likely be on Apr 3
- Final Exam for 407 will be on May 7, 9:45-11:45 am
Grading and Course Assignments:

407 students

25% Class assignments (homework exercises)
35% Mid-term examination (Apr 3)
20% Final examination
10% Team Activities
10% Question/Answer Assignment on 507 presentations

507 students

25% Class assignments (homework exercises, paper reviews)
25% Mid-term examination (Apr 3)
40% Semester Project (individual original research)
10% Team Activities

Students who are auditing the course will not receive a grade but must participate fully in the course, including all assignments except the semester project and exam(s).

507 Semester Project and 407 Q&A Assignment:

Each 507 student (except those auditing) must complete a semester project and present the results in written form due April 25 (Friday before Dead Week), and give a 20 minute oral presentation (15 minute talk plus 5 for questions) during the Dead Week classes. This project must involve original research conducted by the student individually.

Each 407 student will be required to undertake a question and answer assignment. Based on the titles and short descriptions of the 507 projects, which will be distributed to the 407 students by April 17, students will submit one question related to the material in each planned presentation, and these will be due electronically April 25. Students will also bring the same questions in written form to the presentations on Apr. 29 and May 1, and will be required to submit answers to their questions. These will be due at the end of both class periods (Apr. 29, May 1). The grade will be based on the depth and originality of the questions, and to a lesser extent on the actual answers.

Regarding the 507 projects, the following checkpoints will be established to assist in timely completion of the projects:

Project Topics: All students will email to me, or provide me on paper with the topic they plan to address by Tuesday, January 21.

Project Proposal: This is a concise statement of the nature and importance of the topic to be addressed, along with a statement of specific research techniques to be used. A brief review of previous literature in the topic must be included for all projects (include at least 3 sources). The entire size should be roughly one page. Due date: Thursday, February 13 (but feel free to discuss ideas with me well before that deadline).

Progress Report: A brief update on the progress of the project with a few preliminary results (aim for no more than 2 pages) is due Tuesday, March 11. It can be emailed to me.

Written project report: A clear and concise summary of the project, similar to a journal or conference paper, is due Friday, April 25. Please note that late or handwritten reports WILL NOT BE ACCEPTED!

Oral Presentation: During the final two class periods (April 29, May 1), we will hold a conference with a format similar to an American Meteorological Society conference. 507 students will have about 20 minutes to present their results, with 5 minutes of that time to respond to questions. 407 students will need to closely listen to the presentations in order to answer their questions, and are encouraged to use the 5 minute question time if they need more information.