ATM 317: Dynamic Meteorology II

Spring 2017

| Professor: | Andrea Lang ES 323 alang@albany 518-442-4558 Office Hours: | v.edu Tuesday and Thursday, 10:30 — 11:30 am Or by appointment |
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| Teaching Assistant: | Jennifer Gahta ES 337 jgahtan@alba Office Hours: | an ny.edu Tuesday and Thursday, 3:30-4:30 pm Or by appointment |

| Location: | ES 232 | Course Number: 1196 |
|-----------|----------------------------|-----------------------|
| Time: | Monday, Wednesday & Friday | Credits: 3 |
| | 10:25-11:20 am | Prerequisite: ATM 316 |

Web: http://www.atmos.albany.edu/facstaff/andrea/courses/atm317.html The course page will be updated with suggested readings, copies of homework assignments, and in-class handouts. Please bookmark this page for the semester.

Accessibility:

If you have a documented disability and may require some accommodation or modification in procedures, class activity, instruction, etc., please see me early in the semester. If you need forms or information, please visit the Disability Resource Center;

http://www.albany.edu/disability/index.shtml

Academic Integrity:

It is every student's responsibility to become familiar with the standards of academic integrity at the University. Claims of ignorance, of unintentional error, or of academic or personal pressures are not sufficient reasons for violations of academic integrity. Please see the current Undergraduate Bulletin or University Libraries for more information on academic integrity. http://www.albany.edu/undergraduate_bulletin/regulations.html

Please turn off your cell phone before you get to class. All electronic devices, including cell phones, must be put away before class begins and in no way will they be tolerated during exams. You will be asked to leave the classroom for distracting use of electronic devices.

Course Description:

An application of the governing equations to describe and understand synoptic to planetary scale phenomena, including vertical motion, jet streaks, and the frontal cyclone; introduction to the concepts of vorticity and potential vorticity.

Course Topics (*Tentative*):

- 1. Review (Kinematic properties of flows, balanced flows, thermal wind)
- 2. Circulation
- 3. Vorticity
- 4. Potential vorticity
- 5. Vorticity equation
- 6. Structure of extratropical circulations
- 7. Quasi-geostrophic approximations and the ageostrophic wind
- 8. Quasi-geostrophic omega equation
- 9. Ageostrophic circulations
- 10. The **Q**-vector
- 11. Quasi-geostrophic height tendency*

Texts:

Mid-latitude Atmospheric Dynamics by J. E. Martin (Required) *An Introduction to Dynamic Meteorology* by J. R. Holton (Recommended)

Grading: A-E

Homework (5-6): 35% In class assignments and presentations: 10% Quizzes (2): 20% Midterm (*Wed, March 22*): 15% Final (*Tue, May 16 2017 at 3:30 pm*): 20%

I know you have a life outside of class, therefore I give everyone one freebee late day to be used on one assignment. Once you have used your late day, a late assignment will incur a 10% deduction per day. If solutions have been discussed in class, you can no longer turn in your late assignment and you will receive a zero on that assignment.

I will come to class prepared to lecture but I encourage you to start a conversation and ask questions in class if you do not understand something. If you have a question, chances are someone else has the same question, go ahead and speak up. The classroom should be an open and inviting environment so that everyone feels free to participate and discuss the material. Everyone in the classroom is responsible for creating this type of environment; I ask you to leave your distractions at the door and participate as a community of learners.

Tentative Schedule

| ATM 317: Spring 2017 | | | | | | | | | | |
|----------------------|-------------------------------------|------------------------------------|----------------------------------|-------|-------------------------------------|---------------------------------------|--------------------------------------|--|--|--|
| | М | W | F | | М | W | F | | | |
| January | 23 | 25 | 27 | March | 20 | 22 | 24 | | | |
| | No Class AMS Mtg | No Class AMS Mtg | No Class AMS Mtg | | Sutcliffe Form | Midterm | Review: History and Kinematics | | | |
| | 30 | 1 | 3 | | 27 | 29 | 31 | | | |
| | Review & Kinematic properties | Review & Eq. of Motion | Force Balances | | Sutcliffe Development Theorem | Applying Sutcliffe Dev. Theorem | Revisit QG assumptions | | | |
| February | 6 | 8 | 10 | April | 3 | 5 | 7 | | | |
| | Thickness and Thermal Wind | Interpreting Thermal Wind | What is Circulation? | _ | QG Omega Equation | QG Omega Equation | Trenberth form | | | |
| | 13 | 15 | 17 | | 10 | 12 | 14 | | | |
| | Kelvin's Circulation Theorem | Bjerknes Circulation Theorem | Circulation vs Vorticity | | Deformation terms | Holiday | Geostrophic Paradox | | | |
| | 20 | 22 | 24 | | 17 | 19 | 21 | | | |
| | Quiz 1 | Vorticity in Natural Coords | Vorticity Equation | | Holiday | Quiz 2 | Vector form of forcing | | | |
| | 27 | 1 | 3 | | 24 | 26 | 28 | | | |
| | The Vorticity Eq Terms | Potential Vorticity | PV Conservation Using PV | - | Natural Coordinate form of Q | Q vector form of QG Omega Eq | Applications of the Q- vector | | | |
| March | 6 | 8 | 10 | May | 1 | 3 | 5 | | | |
| | Hydrodynamic Instability | Eddy Kinetic Energy | Diagnosing Vertical Motion | | Q-vector and Cyclogenesis | Q-vector and Frontogenesis | Intro to QG height tend. Eq | | | |
| | 13 | 15 | 17 | | 8 | 10 | 12 | | | |
| | Spring Break | | | | Last week exercise | Last week exercise | | | | |
| | | | | | 15 | Tuesday: May 16 | | | | |
| | | | | | | Final Exam 3:30 – 5:30 pm | | | | |