Atmospheric Sciences 347
Advanced Synoptic Meteorology and Weather Forecasting

Instructor: Professor Brian Colle, 135 Endeavour Hall, SoMAS
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TA: TBA
Office Hours: TBA
Class Hours: TBA

Required Text:

Other Useful References (not required):
“Mesoscale Meteorology in Midlatitudes”, Markowski and Richardson (2009)
There will also be online training at http://www.meted.ucar.edu/
and many handouts/powerpoints at: http://blizzard.msrc.sunysb.edu/~colle/ATM347

Learning Objectives:

- Apply dynamical and physical meteorology concepts to the forecast process
- Learn how to predict various atmospheric phenomenon using numerical and statistical models
- Learn how to diagnose vertical motion in model data using dynamical principles
- Understand the development and structure of midlatitude synoptic systems and convective systems
- Learn how to interpret radar data in order to understand evolving precipitating systems

Grading:
50% exams (25% -- 3 exams, 25% comprehensive final)
25% Forecasts and weather discussions.
25% Labs and homework
After 1 absence: 2% course grade deduction for each day absent without a reasonable excuse.
Extra credit: Attend Friday weather discussions in EN 139 or case study project.

Exams: Tentatively, three exams and a final should be expected.
National Forecast Contest:
Forecasts M-TH for a different city every other week on the wx challenge website (http://wxchallenge.com). See handouts for more information.
Also, each student must make two web forecasts for the SB campus during one other morning/afternoon in the week. Forecasts are entered on the atmsci computer.

Americans with Disabilities Act:
If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Academic Integrity:
Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person’s work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures.
For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

Critical Incident Management:
Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students’ ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.

Outline of lectures and labs:
Weeks 1-3 Numerical Weather Prediction and Forecasting (Lackmann Chapters 10 and 11)
Lab #1: Weather commands and weather discussion practice.
Lab #2: Formal weather discussion.
Lab #3: Completion of NWP COMET modules (more details in class).
2. Basic forecasting techniques (Lackmann Chapter 11). Overview of the forecast process. Approaches in forecasting primary meteorological parameters.
Lab #4: Forecasting practice.
Lab #5 Introduction to the WRF model.
Lab #6 Practice running the WRF model
Weeks 4-8 Applying Synoptic-Dynamic Meteorology to the Forecast Process (Lackmann Chapters 2, 4, 5, and 6):
   Lab #7: Vorticity and thermal advections review exercise.
4. Height tendency equation. Diagnosis of vertical motion using the $\nabla$-equation, Q-vector, and Sutcliffe/Trenberth approaches.
   Lab #8: height tendency, $\nabla$-equation, and Sutcliffe exercises
   Lab #9: Q-vector exercise
7. Introduction to potential vorticity (PV) -- Lackmann Chapter 4.
   Lab #10: Cyclogenesis exercise.
8. Non-classical cyclone development to the east of the Rockies.

Weeks 9-14 Mesoscale Meteorology:
9. Cold air damming (Lackmann Chapter 8)
11. Structure and evolution of convective systems from air mass to supercell thunderstorms.
12. Forecasting severe convective storms.
   Lab #11: COMET Storm convective matrix.
13. Use of Doppler radar imagery.
15. Tropical Storms