ATM 400: Synoptic Meteorology I
Fall 2025

Instructor: Prof. Kristen Corbosiero, ETEC 413 & 496C, 442-5852, ***kcorbosiero@albany.edu***

Class hours: Tuesday & Thursday 1:30–2:50 PM in ETEC 450, and Wednesday 4:30–5:25 PM in ETEC 480

Office hours: Tuesday 11 AM–12 PM, Wednesday 10–11 AM, & Thursday 11:30 AM–12:30 PM
https://albany.zoom.us/j/98825014639?pwd=a2lHUktsM2lOWVZNMENkY0J4aXJsdz09
Meeting ID: 988 2501 4639
Passcode: QGomega

TA: Matt Lynne, Collaboratorium, ***mlynne@albany.edu***, Monday 2:30–3:30 PM & Wednesday 11:30 AM–12:30 PM

Class web site: ***http://www.atmos.albany.edu/daes/atmclasses/atm400***

Prerequisites: ATM 311, 317, and 350

Course objectives: The primary goal of this course is to bridge the gap between theory and observation in the study of midlatitude weather phenomena. We will achieve this goal through the application of fundamental principles of dynamic meteorology, including quasigeostrophic theory and potential vorticity, to analyze real-time examples and classic case studies. In addition, key components of the course will be map discussions and the completion of an original research project.

Learning outcomes: At the end of the semester, students will be able to articulate the connections between theory and observation for midlatitude, synoptic-scale weather systems. They will be able to apply quasigeostrophic theory to cyclones and anticyclones to understand and interpret their movement, intensity, and intensification. Finally, students will be to successfully lead real-time weather map discussions and conduct research-based, case study analyses of past weather events.

Topics:
- Review of governing equations and balances
- Jet streak circulations & ageostrophic flow
- Quasi-geostrophic (QG) theory
  - ~ QG height tendency (χ) & omega (ω) equations
  - ~ Sutcliffe–Trenberth ω equation
- Thermal vorticity
- Q vectors
- Fronts and frontogenesis
- Potential vorticity (PV) thinking
  - ~ Isentropic analysis
  - ~ Dynamic tropopause
- Mesoscale snowbands

Recommended texts:

Bluestein, H. B., 1992: Principles of Kinematics and Dynamics, Vol. I, Synoptic-Dynamic Meteorology in Midlatitudes. Oxford University Press, 431 pp.

Lackmann, G., 2011: Midlatitude Synoptic Meteorology: Dynamics, Analysis and Forecasting. American Meteorology Society, 345 pp.

Martin, J. E., 2006: Mid-latitude Atmospheric Dynamics: A First Course. Wiley Press, 324 pp.

Grading: Quizzes (20%); Research project (20%); Homework and lab assignments (20%); Exam (20%); Map discussions (15%); Class participation (5%) [*Please see the* ***tentative*** *schedule on the class website for further information*]

Class format and attendance:

This is a fast-paced, rigorous class; unexcused absences are not acceptable and class attendance/participation is expected. Make-up exams and quizzes will not be given except for an illness documented by a physician, official college-sponsored activities with appropriate documentation, or a death in the immediate family. Homework assignments that are turned in late will be subject to a 10% deduction in grade per day late.

This being said, I want you to enjoy taking and learning in this class (because I love teaching it!), so we're going to practice and extend as much patience, flexibility, and compassion as possible. Please let me know as soon as possible if you start to experience difficulties related to school, work, family, etc., and I will work with you to find solutions. For example, if you feel sick or need to miss class, please let me know. I have recorded lectures, which can be shared, and/or class can be streamed.

Absence due to religious observance: Any student who is unable, because of her or his religious beliefs, to attend classes on a particular day or days shall, because of such absence, be excused from any examination, study, and/or work requirements. Please notify me in a timely manner of any upcoming absences and see NY State Education Law Section 224-A for further details: ***https://www.nysenate.gov/legislation/laws/EDN/224-A***.

Academic integrity: Cheating and plagiarism are unacceptable and will result in a zero for this class and can potentially result in suspension from the University. It is every student's responsibility to become familiar with the university's standards of academic integrity. The following university website provides additional information:
http://www.albany.edu/undergraduate_bulletin/regulations.html.

AI policy: This course is design to help you develop the keys skills of: 1) connecting and applying theory to real-world events; 2) problem solving ; 3) coding and plotting of weather data; and, 4) scientific writing and presentation. While generative AI *may* be able assist you with the homework and lab assignments formulated to help you hone these skills, especially #3, it is sometimes spectacularly wrong and will not be available to you on exams and quizzes; thus, leaning heavily on AI will not allow you to develop these workforce-necessary skills, to learn important concepts, or to be successful in this class.

Your thinking, answers, and writing should, primarily, be done by you. If you do use AI to help get started on a question, to suggest a case for your class project, or with coding, you must disclose its use and provide proper citation (e.g., tool employed, prompt used, etc.). Failure to do so will constitute a violation of academic integrity. AI is a supplementary tool for learning and critical thinking, not a replacement for it.