**ATM 401/501: Synoptic Laboratory II**
**Spring 2019**

**Tu/Th: 4:15 – 5:35 pm in the Map Room (ES 333)**


**Instructor**: Lance F. Bosart, ES 227
Phone: 518-442-4564
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Office Hours: Tu/Th 1:30 – 3:00 pm
Other times by appointment
Map Room discussions anytime

**TA**: Marshall Pfahler, ES 234
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Office Hours: Mon/Wed 1:00 – 2:30 pm
Other times by appointment


**Course Objective:**

Provide a capstone class for graduating atmospheric science majors that applies the fundamental theoretical principles of synoptic-dynamic meteorology to the real atmosphere through a discussion of ensemble weather forecasting, atmospheric predictability, applications of QG principles and PV thinking to weather analysis and forecasting, atmospheric analyses on subsynoptic to subseasonal time scales, and a capstone real-time severe weather and quantitative precipitation forecasting exercise.

**Class Materials:**

Handouts.
Refereed literature.
Web-based information.

**Reference Materials:**

Doswell. C.A., Ed., *Severe Convective Storms, 2001 Meteor. Monogr.*, **27**, No. 49, American Meteorological Society, 570 pp.

Burt, C.C., 2005: Extreme Weather, Norton Press, 304 pp.

Kocin, P. and L. W. Uccellini, 2005: Northeast Snowstorms, Vol. I and II, American Meteorological Society, 818 and 296 pp., respectively.

Bluestein, H., 1992, 1993: Synoptic-Dynamic Meteorology in Midlatitudes. Volumes I and II. Oxford University Press, Oxford, UK, 431 pp (Vol I), and 594 pp (Vol II).

Holton, J.R., 2004: Introduction to Dynamic Meteorology, Academic Press, 535 pp.

Holton, J.R./G.J. Hakim, 2013: Introduction to Dynamic Meteorology, Academic Press, 532 pp.

Lackmann, G. M., 2011: Midlatitude Synoptic Meteorology: Dynamics, Analysis, and Forecasting. *Amer. Met. Soc.*, 345 pp.

Lackmann, G. M., Brian E. Mapes, and K. R. Tyle, 2017: Synoptic-Dynamic Meteorology Lab Manual: Visual Exercises to Complement Midlatitude Synoptic Meteorology. *Amer. Meteor. Soc.*

Martin, J. E., 2006: Mid-Latitude Atmospheric Dynamics. Wiley, 336 pp.
Markowski, P., and Y. Richardson, 2010: Mesoscale Meteorology in Midlatitudes. Wiley-Blackwell, Oxford, UK, 407 pp.

Schultz, D., 2009: Eloquent Science: A Practical Guide to Becoming a Better Writer, Speaker and Scientist. The University of Chicago Press, 448 pp.

Course webpage: http://www.atmos.albany.edu/daes/atmclasses/atm401/index.php

ECMWF Media Resources: https://www.ecmwf.int/en/about/media-centre/media-resources (choose Newsletters)

Real Atmosphere (best of all)

**Course Structure:**

1. Problem sets 10%
2. Two exams 40% (20% each)
3. Two projects 40% (20% each)
   a) format: standard AMS journals (see class home page for details)
   b) length: 2000 words **maximum**
   c) deadline: Th: 28 March 2019 (macroclimatology)
   Tu: 30 April 2019 (weather analysis and forecasting)
4. Class participation in weather discussions: 10%
5. Class project presentations: Day and time to be determined

**Forecasting:**

1. Temperature and precipitation.
2. Selected international cities that will rotate weekly.

**Course Outline:**

1. State-of-the-art of weather forecasting
2. Atmospheric predictability
3. Ensemble weather forecasting
4. Global macroclimatology
5. Application of QG principles and PV thinking to weather analysis and forecasting
6. Deep moist convection and severe weather forecasting
7. Real-time severe weather and quantitative precipitation forecasting (QPF) exercises