Atmospheric Science B.S.
Gen-ed competency proposal
Relevant course syllabi

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ATM 209 “Weather Workshop”
Fall 2012 – Class # 7306 – 12:35-1:55 PM, Wed., ES-333
Instructor: Ross Lazear
ES 322, 437-3601
rlazear@albany.edu

Office hours:
2:30-3:30 PM, Tuesdays and Thursdays
TA: Kyle Meier (kmeier@albany.edu): Office hours TBD

Class webpage: http://www.atmos.albany.edu/facstaff/ralazear/ATM209

Topics covered:
Weather plotting
METAR codes
Thermodynamic charts ("Skew-T")
Moisture variables
RAOB codes (Radiosonde observations)
ASOS (Automated observations)
Any interesting current weather...

Prerequisites:
You are required to be enrolled in, or have already taken ATM 210 or 210Z and its
prerequisites (MAT 112, PHY 140) in order to take this class.

Objectives and Grading:
This weather workshop is intended to complement your coursework in ATM 210, as well as
provide training for ATM 211 next semester. Most of the work will be done in class.
However, you will be expected to finish any workshop assignments not completed in class,
and “self-check” your work. Be sure to check the course website for updates.

Because there is no homework to be turned in each week, attendance is mandatory. 25% of
your grade (25 points) will be based on attendance:

Unexcused absence #1: -5 points
Unexcused absence #2: -15 points
Unexcused absence #3: -25 points

Absences are excused if you make sure to let me know of your legitimate, impending
absence anytime well before class.

The remaining 75% of your grade (75 points) is based on three quizzes (25 points each) on
the following dates:

Quiz #1: Wednesday, September 19
Quiz #2: Wednesday, October 31
Quiz #3: Wednesday, December 5
Thus, your total grade in this class will be out of 100 possible points. Unexcused absences will undoubtedly hurt your grade, so be sure to come to class!

**Materials needed:**
There is no textbook required for ATM 209, though there will be a number of important handouts that will not only assist you in this class, but in ATM 211, 311, and beyond. After a few weeks, you'll be required to purchase a laminated Skew-T (~$5) and wet-erase markers (~$6).

*** Most importantly, have fun, and be ready to learn. Bring questions and comments to class, and stop by my office hours (or make an appointment to meet with me) if you have additional questions about class, upcoming quizzes, or meteorology and our department in general! The best way to reach me is by e-mail, but feel free to stop by anytime.
Course:
Atm 210  Atmospheric Structure, Thermodynamics, and Circulation  Spring 2013
Class Number: 9585; Credits: 3

Schedule:
TuTh 10:15 a.m.–11:35 a.m., ES 232

Professor:
Daniel Keyser, ES 224, 442–4559, dkeyser@albany.edu
Office hours: MW Noon–1:00 p.m. and by appointment

Teaching Assistant:
Kyle Meier, ES 234, kmeier@albany.edu
Office hours: TuTh 1:00 p.m.–3:00 p.m. and by appointment

Text:

Prerequisites:
Mat 111 or 112 or 118; Phy 105 or 140 or 141

Grading:
A–E grading: In-class exams (25% each); Final exam (30%); Homework (20%)

Scope of Course:
This course is a technical survey of the atmosphere, designed for atmospheric and environmental science majors, that introduces and applies elementary principles and concepts from atmospheric dynamics and thermodynamics, radiative energy transfer, and cloud and precipitation physics to describe and understand the processes that govern weather and climate. Topics include: the Earth’s atmosphere; radiative heating; temperature; moisture and clouds; stability and precipitation; pressure and winds; atmospheric circulations; air masses, fronts, and cyclones; thunderstorms and tornadoes; hurricanes; and climate change.

The course will be conducted primarily through classroom lectures, supplemented by handouts and homework assignments. There will be two in-class exams during the semester and a comprehensive exam during the final-exam period.
ATM 211: Weather Analysis and Forecasting
Spring 2013

Instructor: Ross Lazear, ES-322 Phone: 437-3601
rlazear@albany.edu
Office hours:
2:45-3:45 PM, Tue., and Thur., and by appointment

TA:
Adrian Mitchell: amitchell@albany.edu
Office hours: 2:00-3:00, Mon., and Wed., ES-330

Class webpage: http://www.atmos.albany.edu/facstaff/ralazear/ATM211

Topics covered:
Atmospheric properties and measurements
Satellite and radar
Isobaric maps, levels of the atmosphere, and hand contour analyses
Forces, force balances (geostrophy/Ekman/gradient wind)
Forcing for ascent/precipitation, jets/jet circulation
Fronts
Cyclones (mid-latitude)
Models and MOS
Forecasting
Atmospheric Stability
Atmospheric flow patterns and properties

Objectives:
The goals of this course are to teach you the fundamental “synoptic-scale” processes of the atmosphere. The final part of the course will teach you how to forecast for various cities around the country in a fun, yet competitive environment. Your responsibilities will include taking several quizzes on geography and lecture material, mapping and Skew-T assignments, exams, as well as forecasting during the final few weeks of the course.

Grading:
*** 20% Quizzes
*** 15% Exam 1
*** 15% Exam 2
*** 25% Final
*** 25% Homework / maps / forecasting

Requirements:

Prerequisites:
ATM 210(Z)/209
(PHY 140)
A ATM 301 Surface Hydrology and Hydrometeorology
Fall 2012
3 credits
Lectures: MWF 12:35-1:30 pm
Room: ES 232
Website: http://www.atmos.albany.edu/daes/atmclasses/atm301/

Instructor
Justin Minder
ES 339B
(518) 437 3732
jminder@albany.edu
office hours: M 2-3pm & W 3-4pm, or by appointment

Teaching Assistant
Adrian Mitchell
ES 330
amitchell@albany.edu
office hours: Tu & Th 1-2pm

Required Text
Physical Hydrology (2nd Edition) - S.L. Dingman
Should be available at bookstore. Also, used online (from ~$50).

Prerequisite
A ATM 210 (Not open to students with credit in A ATM 408)

Description
From the catalog:
A survey of the water cycle and its interactions with the earth and atmosphere, including the processes of precipitation, evaporation, and stream flow. Water resources and policy issues incorporated where applicable.

By the end of this course you should be able to:
- Identify, describe, and quantify the stores and fluxes of water in the atmospheric and terrestrial branches of the hydrological cycle.
- Understand and describe the observational methods used to measure various components of the hydrologic cycle, as well as their respective limitations and uncertainties.
- Understand and describe the major conceptual, theoretical, numerical, and empirical methods used to model various components of the hydrologic cycle, as well as their respective limitations and uncertainties.
- Perform quantitative analysis of water budgets for various scenarios and systems.
- Perform quantitative analysis of surface energy budgets for various scenarios, and relate energy fluxes to water fluxes.
- Access and analyze freely available hydrometeorological datasets.
• Utilize and interpret the key statistical measures and tools used in hydrology.
• Demonstrate a sound understanding of the basic physics governing: evaporation, transpiration, condensation, soil water storage and transport, turbulent boundary layer fluxes, surface energy balance.
• Describe the major implications of climate change and land use on the hydrologic cycle.
• Describe how variability and extremes (e.g., floods & droughts) in the hydrologic cycle impact human and natural systems.

Grading
Grading will be on the A-E scale with the following weights:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation (mainly paper-discussions / labs)</td>
<td>5%</td>
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<tr>
<td>Homework &amp; projects (~weekly)</td>
<td>30%</td>
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<tr>
<td>In-term exams (2)</td>
<td>40%</td>
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<tr>
<td>Final (Thurs, Dec 20 8-10am)</td>
<td>25%</td>
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</tbody>
</table>

Outline
Overview
The Basics
• Units
• Properties of water
• The watershed
• Budget analysis
• Basic statistical tools
The global hydrological cycle
• Global stores and fluxes
• Spatial and seasonal distributions
• Large-scale balances
• Relationship to general circulation
Precipitation
• Water vapor in the atmosphere
• Condensation and mechanisms for lifting
• Basics of cloud and precipitation physics
• Direct measurements of rain and snow
• Methods of areal estimation
• Remote sensing of precipitation
• Representation in models
• Trends and variability
Soil water
• Soil properties and classification
• Soil water, porosity, and permeability
• Movement of water in soil
• Infiltration: regimes, controls, and modeling
• Redistribution

Surface energy budget
• Concept
• Relating energy and water fluxes
• Measuring relevant components
• Basics of the PBL
• Diurnal variations in different regions

Evaporation and transpiration
• Physics of evaporation
• Methods for quantifying free-water and bare-soil evaporation
• Physics and biology of transpiration
• Potential evapotranspiration
• Actual evapotranspiration
• Interception & interception loss
• Surface-atmosphere feedbacks
• Trends and variability

Snowpack
• Characteristics of snowpacks
• Measuring snow
• The snowmelt process
• Modeling snowpacks
• Trends and variability

Brief Overview of Groundwater

Streamflow
• Measurement methods
• Event-response: concept, hydrograph metrics, mechanisms
• Open channel flow
• Stream networks
• Rainfall-runoff modeling
• Trends and variability

Floods & Droughts

Advice & Expectations
• Assignments are due at the beginning of class on the due date. For any major conflicts (family emergencies, doctors appointments, etc.), discuss it with me in advance no less than 24 hours for homework or 1 week for exams. I will then make alternate arrangements with you. Otherwise, 30% will be deducted for each day of lateness on assignments, and zeros given for missed exams. The only exceptions are the following: a physician’s note, a note from the Dean’s office, or a legal summons. Official university policy on medical excuses: http://www.albany.edu/health_center/medical_excuse.shtml
• I will not generally be taking attendance. However, coming to class consistently will greatly improve your chances for success. **On days with paper discussions or lab/field exercises absences or lack of participation will count against your grade.**
• Your active participation in lectures is one of the primary ways you can enrich your education. **Come to class prepared to answer and ask questions.** This will make the class more worthwhile for everyone.

• If a concept or method is unclear to you be sure to **take advantage of office hours.** Start assignments and studying early so you have time to get help if needed. Concepts introduced early in the class will be the foundation for later subjects, so don't fall behind.

• **Homework assignments should show neat, detailed, organized work with a logical progression.** Answers must be clearly denoted and include proper units. Group collaboration on homework is acceptable, but you must write up your own assignments and check your work independently. **If you do not personally master the skills required on the homework, you are almost certain to do poorly on the exams.**

• Routine readings will be assigned, both from the text and supporting documents. You will generally find these most useful if you do them before class to familiarize yourself with the material and come up with questions to ask during lecture. On days with paper-discussions come to class prepared to actively discuss the paper.

• University "Standards of Academic Integrity" apply: http://www.albany.edu/undergraduate_bulletin/regulations.html
ATM 311
Severe and Hazardous Weather
Fall 2012 – Class # 1263 – Tue/Thur, 10:15-11:35 AM, Mon or Wed, 5-6 PM
Instructor: Ross Lazear, ES-322  Phone: 437-3601
rlazear@albany.edu

Office hours:
2:30-3:30 PM, Tue., and Thur., and by appointment

TA:
Larry Gloeckler, ES-330: lgloeckler@albany.edu
Office hours: 3:00-4:00 PM Mon. and Wed.

Class webpage: http://www.atmos.albany.edu/facstaff/ralazear/ATM311

Topics covered:
El Niño and the “Southern Oscillation”
Tropical cyclones
Thunderstorms (supercells, MCS, seabeam circulations)
Lightning and hail
Tornadoes
Severe weather indices
Blizzards
Ice storms
Lake effect snowstorms

Objectives:
The goals of this course are to teach you the fundamental processes associated with the various meteorological phenomena listed above, and furthering your forecasting expertise from what you learned in ATM 211. As a part of this course, you will be making your own short- and long-term forecasts for Albany, NY in our local forecasting competitions. Each week, your forecasts will be discussed in detail in a group setting during your lab section (Mon. or Wed., 5-6 PM in ES-333).

Grading:
*** 15% Quizzes: Announced quizzes covering recent lecture material and geography.
*** 15% Mid-term
*** 20% Final Exam
*** 10% Forecasting (details on a separate sheet)
*** 20% Homework and Projects
*** 20% Map Discussion: This will be broken up as 15% for your individual map discussion and forecast write-up (to be explained in discussion section), and 5% participation.

* Note: Attendance in your weekly discussion section is mandatory.

Requirements:
Severe and Hazardous Weather, 4 ed., Rauber et al.
ATM 316 Dynamic Meteorology I

Fall 2012
Class Number: 9915
Credits: 3

Tuesday and Thursday 8:45 – 10:05 am in ES232 (Holidays: 9/18, 11/22)
http://www.atmos.albany.edu/facstaff/tang/classes/atm316/

Professor:
Brian Tang
ES 324
518-442-4572
btang@albany.edu
Office hours: Monday and Wednesday 11 – noon and by appointment

Teaching Assistant:
Hannah Attard
ES 325
hannah.attard@gmail.com
Office hours: Monday and Wednesday 2-3 pm and by appointment

Prerequisites:
ATM 211, PHY 140/141, MAT 214, MAT 311 (corequisite)

Text:
An Introduction to Dynamic Meteorology by J.R. Holton (Ch. 1-3)

Course Requirements:
Homework assignments (6- 7) and presentations (2)*: 30%
Midterms (tentatively, Oct. 4 and Nov. 8): 30%
Final Exam (Dec. 19 3:30-5:30 pm): 40%

*Groups of two will give a 10 min. presentation at beginning of specified classes that synthesizes the material from the previous lecture. Each person will present twice during the semester. Grading of the presentations will be determined by peer assessment.

Late homework and off-time exams are only allowed for University-recognized reasons.

Grading:
A-E
Course Outline:

1. Mathematical tools
2. Forces in the atmosphere (Holton 1.1-1.5)
3. Vertical coordinates (Holton 1.6)
4. Frames of reference (Holton 2.1)
5. Horizontal momentum equations (Holton 2.2-2.3, 3.1.1)
6. Scale analysis, Rossby number (Holton 2.4)
7. Balanced flow (Holton 3.2)
8. Continuity equation (Holton 2.5, 3.1.2)
9. Thermodynamic equation (Holton 2.6-2.7, 3.1.3)
10. Trajectories and streamlines (Holton 3.3)
11. Thermal wind balance (Holton 3.4)
12. Inferring vertical motion (Holton 3.5)
13. Surface pressure tendency (Holton 3.6)
ATM 317: Dynamic Meteorology II
Spring 2013

Professor: Andrea Lang
ES 323
lang@albany.edu
518-442-4558
Office Hours: Mondays and Wednesdays 3:00 – 4:00 pm
Or by appointment

Teaching Assistant: Hannah Attard
ES 325
hattard@albany.edu
Office hours: Tuesdays and Thursdays 11:00 am – 12:00 pm
Or by appointment

Location: ES 232
Time: Monday, Wednesday & Friday
10:25-11:20 am

Course Number: 1255
Credits: 3
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, in-class handouts and topics of class lectures. 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.
**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
2. Circulation
3. Vorticity
4. Potential vorticity
5. Vorticity equation
6. Structure of extratropical circulations
7. Quasi-geostrophic approximations and the nature of ageostrophic wind
8. Quasi-geostrophic height tendency
9. Quasi-geostrophic omega equation
10. The $Q$-vector
11. Ageostrophic circulations
12. Idealized baroclinic disturbances
13. Introduction to fronts

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

**Grading:** A-E
- Homework (5-6): 25%
- In class assignments and presentations: 20%
- Quizzes (2): 20%
- Midterm (*Wed, March 13*): 15%
- Final (*Wed, May 15 2013 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 business day. If solutions have been discussed in class, you can no longer turn in your late 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 is responsible for creating this type of environment; I want to ask you to leave your distractions at the door.
A ATM/ENV 327: Meteorological and Environmental Measurement (3 Credits)
Spring 2013

Class #:
A ATM section (10039); A ENV section (10040)

Room:
ES B-13

Time:
T Th 1:15 – 2:35

Pre-reqs:
AMAT 113 or 119 and APHY 105 or 140 or 141 and A ATM 210

Instructor:
Vincent P. Idone, Associate Professor

Office:
ES 215

Hours:
M W Th 2:45 – 4:00; also, after class or by appointment.

Phone:
442-4577

E-mail:
vidone@albany.edu

Texts:
Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements, (2nd Ed.), John R. Taylor (Required)

Meteorological Measurement Systems, Fred V. Brock and Scott J. Richardson (Required)

Measuring the Natural Environment (2nd Ed.), Ian Strangeways (Not required but a potentially useful reference.)

Content:
Chapters 1 – 9 of Introduction to Error Analysis
Selected chapters of Measuring the Natural Environment
Also, appropriate ultra-basics of partial derivatives, simple differential equations, electronics, photography/photogrammetry, lightning, signal/image processing, air quality, water quality and noise pollution.

Objective:
To acquire a basic understanding of the techniques used to properly analyze and interpret measurements, and to become at least aware of a wide range of instruments employed in atmospheric and environmental measurement, along with the fundamental principles upon which they operate.

TA:
Mr. Nick Schiraldi

Office:
ES 330

E-mail:
nschiraldi@albany.edu
Grading:  Letter grade (A-E) format
Homework        (20%)
Mid-term exam   (25%)
Research Paper  (20%)
Final exam      (35%)  

Additional Notes:

This course necessarily covers a lot of ground, spanning many topics within and related to atmospheric and environmental science. Correspondingly, it is paramount to appreciate that this course is all about being quantitative (i.e., not merely qualitative) and understanding the underlying physical principles of various measurement techniques and instruments. There also will be some statistical concepts developed and used. It has been my experience to date that students in this course are often quite uncomfortable with calculus, and/or have minimal exposure to this very fundamental "tool" that is so important to all the physical sciences. Some of you may also have had minimal exposure to physics. It is critical that you realize that both are integral to practicing science.

The first part of the course will concentrate on the theory and application of error analysis. This is independent of the particular instrument used. It is admittedly fairly theoretical and mathematical, but very important. Hence, to give the class an occasional "break," I will intersperse a few lectures on other topics before we get to the second section of the course, which is specific to individual instruments.

Research Paper:

The research paper is due on or before the last class of the semester. The topic of your paper can be any analysis technique or instrument of your choosing. It should be at least 5-6 pages of text, excluding title page and references, and be written in double-spaced, 12-pt font (preferably Times New Roman). The overall paper format is the standard type. You may include pictures and/or figures embedded in the text or summarized as an appendix. It should have an abstract. You must submit it to me electronically, in either MSWord or PDF file format.

Some advice: your paper definitely should have some first-order references, and NOT exclusively rely on Internet references! It should focus on something that allows you to go into some depth. Whatever the topic is, the likelihood of a good grade increases significantly if your paper has an explicit and solid quantitative component that utilizes some of the material we develop in the course. WARNING: if you give me a mostly qualitative document, even if it is very pretty and slick, and if your quantitative aspects are akin to just citing percent uncertainty, you will receive a poor grade. And yes, there should be decent writing and grammar inherent to the paper as well. Think of this as scientific writing.

Finally, do yourself a BIG favor and pick a topic that really interests you! I keep it very open as to what topic you can select, just so that you can find the right topic.
Syllabus
AATM 335 Remote Sensing in Atmospheric Sciences
Spring 2013
Monday, Wednesday & Friday 12:25-1:45AM ES 232

Instructor: Liming Zhou, Ph.D.
Office: ES 312
Email: lzhou@albany.edu
Office hours: Wed and Fri 2:00-4:00pm

TA: Ron A Harris
Office: ES 330
Email: raharris@albany.edu
Office hours: Mon and Wen 1:30-3:00pm or by appointment via email

Prerequisites: AATM 210 or basic knowledge of calculus and physics

Course Description: This course will introduce you to remote sensing of the environment, with an emphasis on satellite remote sensing of land surface characteristics, but other passive and active systems will be also included. Topics include remote sensing principals and sensors, remote sensing data and methodology, digital data processing, and applications of remote sensed data in global change studies. The main theme will be how quantitative information from remotely sensed data of spatial and environmental relationships are acquired, processed and used. Examples cover a wide range of environmental applications of remote sensing. The course consists of lectures, homework, laboratory exercises, a midterm exam and a final project. The labs and project will provide students with hands-on experience on digital image processing and applications of remote sensed data to real issues.

Personal computers: Students are encouraged to bring their personal labtop computers and make use of the WiFi access point for class related labs and lecture notes.

Text Books (recommended but not required): The instructor will provide course related materials. No text books are required but students are recommended to read the following textbook.

Image Processing Software: We will be using free image processing software, MultiSpec, created by Purdue University (https://engineering.purdue.edu/~biehl/MultiSpec/). Satellite images will be chosen for use in class.
**Grading:** Final grades will be given as A-E: 96-100 (A+), 90-95 (A-), 86-89 (B+), 80-85 (B-), 76-79 (C+), 70-75 (C-), 66-69 (D+), 60-65 (D-), and less than 60 (F).

**Grading Policy:** Homework: 20%; Labs: 30%; Midterm: 20%; Final project: 30%.

**Homework:** In order to help students understand the material covered in class, there will be five homework exercises following each major topic. Homework generally consists of 2-4 small questions. Students will be given one week to finish the homework.

**Labs:** Eight labs will be included to help students learn image processing techniques. An image processing software (see above) will be used for students to perform some essential tasks and answer some questions. Several satellite images will be provided by the instructor. Part of the lab results will be submitted and be graded.

**Midterm:** There will be an open-book exam on remote sensing fundamentals and basics taught in class (March 11).

**Final project:** A small project is required for each student to apply a subset of satellite data to a problem of the student’s choice throughout the latter half of the course. Students are expected to define their projects via discussion with the instructor, to develop the appropriate methodology and run the analysis using concepts and software tools learned in the course, and to present and discuss the results on the last week of class (May 1-6). The project should be proposed soon after the midterm exam and a final grade will be given based on the originality, quality, and presentation of the project.

Instructor will provide students with some potential project topics. More details will be given in class on April 24. You are particularly encouraged to develop your own ideas based on the class labs. You are always very welcome to discuss with me about your project. Students are asked to submit an initial project proposal (about 1 page) on April 26, including a title, student name, questions to be addressed, data and methods to be used, and expecting results. Each student will have a 15 minutes class presentation (40%) for the results and will submit the final project (60%), including major results and images (10-15 pages, single space, 12 font).

**Ethics and Conduct:** Plagiarism, cheating, and other types of academic dishonesty will be reported and a failing mark will be assigned. You can find more university-wide information at: [http://www.albany.edu/undergraduate_bulletin/regulations.html](http://www.albany.edu/undergraduate_bulletin/regulations.html).

**Course website:** Course related lectures and materials will be available through the instructor’s website: [http://www.atmos.albany.edu/facstaff/zhou/tmp_data/](http://www.atmos.albany.edu/facstaff/zhou/tmp_data/)
### Detailed Schedules (subject to change due to unpredictable events)

<table>
<thead>
<tr>
<th>Week #</th>
<th>Dates</th>
<th>Lecture Topics</th>
<th>Homework/Labs/Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 21</td>
<td>No Class</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jan 23</td>
<td>Course overview</td>
<td>First day of 8 Week 1</td>
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<tr>
<td></td>
<td>Jan 25</td>
<td>Remote sensing overview</td>
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<td></td>
<td>Jan 28</td>
<td>Remote sensing history</td>
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<td>2</td>
<td>Jan 30</td>
<td>Electromagnetic radiation</td>
<td>Homework #1</td>
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<tr>
<td></td>
<td>Feb 1</td>
<td>Radiation laws</td>
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<td>3</td>
<td>Feb 4</td>
<td>TOA irradiance</td>
<td>Homework #2</td>
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<td>Feb 6</td>
<td>Atmospheric scattering</td>
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<td>Feb 8</td>
<td>Atmospheric absorption</td>
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<td>Feb 11</td>
<td>Atmospheric radiative transfer</td>
<td>Homework #3</td>
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<td>Feb 13</td>
<td>Atmospheric radiative transfer</td>
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<td></td>
<td>Feb 15</td>
<td>Canopy radiative transfer</td>
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<td>RS imagery characteristics</td>
<td>Homework #4</td>
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<td></td>
<td>Feb 22</td>
<td>Spectral signature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feb 25</td>
<td>Passive thermal &amp; microwave</td>
<td>Homework #5</td>
</tr>
<tr>
<td></td>
<td>Feb 27</td>
<td>Passive thermal &amp; microwave</td>
<td></td>
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<tr>
<td>6</td>
<td>Mar 1</td>
<td>No Class</td>
<td>Easter</td>
</tr>
<tr>
<td></td>
<td>Mar 4</td>
<td>Active RS: LiDAR/RADAR</td>
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<tr>
<td></td>
<td>Mar 6</td>
<td>Active RS: LiDAR/RADAR</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Mar 8</td>
<td>Course review</td>
<td>Last day of 8 Week 1</td>
</tr>
<tr>
<td></td>
<td>Mar 11</td>
<td>Mid-term exam</td>
<td>Mid-term period</td>
</tr>
<tr>
<td>8/9</td>
<td>Mar 13</td>
<td>Image basics and display</td>
<td>First day of 8 Week 2</td>
</tr>
<tr>
<td></td>
<td>Mar 15-22</td>
<td>No Class</td>
<td>Spring break (enjoy)</td>
</tr>
<tr>
<td>10</td>
<td>Mar 25</td>
<td>Lab#1 &amp; 2</td>
<td>Lab#1&amp;2: RS data basics</td>
</tr>
<tr>
<td></td>
<td>Mar 27</td>
<td>Digital image processing</td>
<td></td>
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<tr>
<td></td>
<td>Mar 29</td>
<td>Lab#3</td>
<td>Lab#3: true color image</td>
</tr>
<tr>
<td>11</td>
<td>Apr 1</td>
<td>Change detection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apr 3</td>
<td>Lab#4</td>
<td>Lab#4: change detection</td>
</tr>
<tr>
<td></td>
<td>Apr 5</td>
<td>Image classification</td>
<td></td>
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<td></td>
<td>Apr 8</td>
<td>Lab#5</td>
<td>Lab#5: classification</td>
</tr>
<tr>
<td>12</td>
<td>Apr 10</td>
<td>MODIS instruments and data</td>
<td></td>
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<td></td>
<td>Apr 12</td>
<td>Lab#6</td>
<td>Lab#6: urbanization</td>
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<tr>
<td></td>
<td>Apr 15</td>
<td>MODIS data processing</td>
<td></td>
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<tr>
<td>13</td>
<td>Apr 17</td>
<td>Lab#7</td>
<td>Lab#7: phenology</td>
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<tr>
<td></td>
<td>Apr 19</td>
<td>MODIS data applications</td>
<td></td>
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<tr>
<td>14</td>
<td>Apr 22</td>
<td>Lab#8</td>
<td>Lab#8: oil spill</td>
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<tr>
<td></td>
<td>Apr 24</td>
<td>Project proposal</td>
<td></td>
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<tr>
<td></td>
<td>Apr 26</td>
<td>No Class – project preparation</td>
<td></td>
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<tr>
<td>15</td>
<td>Apr 29</td>
<td>No Class – project preparation</td>
<td></td>
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<tr>
<td></td>
<td>May 1</td>
<td>No Class – project preparation</td>
<td></td>
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<tr>
<td></td>
<td>May 3</td>
<td>Final project presentation</td>
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<td></td>
<td>May 6</td>
<td>Final project presentation</td>
<td></td>
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<tr>
<td>16/17</td>
<td>May 8</td>
<td>Final project presentation</td>
<td>Last day of 8 Week 2</td>
</tr>
<tr>
<td></td>
<td>May 10-17</td>
<td>No class – Final project due</td>
<td>Final exam period</td>
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Course:
Atm 350  Meteorological Datasets and Numerical Computation  Spring 2013
Class Number: 9756; Credits: 2

Schedule:
T, Th 1:15 p.m.–2:35 p.m., ES 333 (Maproom)

Instructors:
Kevin Tyle, ES 235, 442–4578, kstyle@albany.edu
Office hours: MoWe 2:00 p.m.–3:00 p.m. and by appointment
Ross Lazear, ES 322, 437–3601, rlazear@albany.edu
Office hours: MoWe 2:00 p.m.–3:00 p.m. and by appointment

Prerequisites:
ATM 211, ATM 311

Grading:
One 80-minute exam (1/6 of final grade); Case Study Presentation (1/6 of final grade);
Labs (2/3 of final grade)

Scope of Course:
This course provides an overview to the main types of meteorological datasets used by
operational forecasters, researchers, and numerical weather prediction modelers. Students
will master a variety of software applications used to display and manipulate these datasets.
The course will primarily focus on software developed for UNIX operating systems; there-
fore, students will learn the basics of the UNIX command shell environment, via an in-
troduction to common UNIX commands, as well as simple shell scripting. Real-time and
historical weather datasets will provide the context for the exploration of both the software
applications and the UNIX environment.

The course will be conducted with classroom lectures (Tuesdays) and computer labs
(Thursdays). Six or seven lab assignments will be assigned, to be started on the Thursday
lab periods and will be due by the time of the following week’s Tuesday lecture. There will
be one exam during the semester. This exam accounts for one-sixth of the student’s final
grade. During the final exam period, each student will make a 5-10 minute oral presenta-
tion of a meteorological case study using the techniques learned in class; this presentation
will also account for 1/6 of the student’s final grade. The balance of the final course grade
(two-thirds) will be determined from homework performance.

Each student’s lowest-marked homework assignment will be dropped and not factored into
the final grade. However, neither the exam nor the presentation grades can be dropped.

Lab assignments will be available via the course website at the beginning of the Thursday
lab in which they are assigned, and will be due the following Tuesday at 1:15 PM, unless
otherwise directed. For the first 24 hours that the assignment is turned in late, two points will be deducted from the maximum total of ten. Each successive day (including weekends) that the assignment is tardy will entail an additional one point loss. Since assignments will typically be "turned in" electronically, each file will automatically have a timestamp, to avoid any questions of the time the student completed the homework. The instructor reserves the right to make exceptions to the tardiness policy if the situation warrants. Students are encouraged to log into one of the maproom computers, or their own personal computer, during class in order to interactively follow along with the presented material.

It is expected though that during class time, computer use will be restricted to ATM350-related material, not private web surfing, social networking, etc.

CELLPHONE use is NOT ALLOWED during classtime, nor are students allowed to leave the room to take/make personal phone calls. This will ensure a focused, non-distracting classroom environment.
ATM 400: Synoptic Meteorology I
Fall 2012

Instructor: Prof. Kristen Corbosiero, ES 321, 442-5852, kcorbosiero@albany.edu

Class hours: Tuesday and Thursday 4:15 – 5:35 PM in ES 232 and ES 333

Office hours: Monday 2 – 3 PM; Tuesday and Thursday 11 AM – Noon, and by appointment

Class website: http://www.atmos.albany.edu/daes/atmclasses/atm400

Prerequisite/Corequisite: ATM 311 and ATM 350/ATM 316

Course objectives: The primary goal of this course is the investigation of midlatitude weather phenomena through the application of the fundamental principles of dynamic meteorology. This investigation will culminate in the introduction of quasi-geostrophic (QG) theory and its applicability to the analysis and forecasting of midlatitude weather systems. In addition, key components of the course will be map discussions, participation in the Albany weather and 3-5 day extended forecast contests, and the completion of an original research case study.

Topics:
- Geostrophic wind
- Thermodynamic energy equation and stability
- Thermal wind balance
- Jet streak circulations
- Atmospheric soundings
- Vorticity equation
- Quasi-geostrophic (QG) theory
  ~ QG vorticity and thermodynamic equations
  ~ QG height tendency (\( \chi \)) equation
  ~ QG omega (\( \omega \)) equation
  ~ Sutcliffe-Trenberth \( \omega \) equation
- Thermal vorticity

Recommended texts:
**Grading:** Midterm exam (15%); Final exam (20%); Quizzes (10%); Research case study (20%); Map discussions (15%); Homework and lab assignments (15%); Forecasting and class participation (5%)

**Exams (in class):** Midterm – Tuesday, October 16th; Final – Tuesday, December 11th

**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 with a note from the Dean's office. Homework assignments that are turned in late will be subject to a 10% deduction in grade per day late.

**Academic integrity:** Cheating and plagiarism is 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](http://www.albany.edu/undergraduate_bulletin/regulations.html)
ATM 401/501: Synoptic Laboratory II
Spring 2013
Tu/Th: 4:15 – 5:35 pm in ES 232

Instructor: Lance F. Bosart, ES 227
Phone: 518-442-4564
Fax: 518-442-5825
Email: bosart@atmos.albany.edu
Office Hours: Tu/Th 1:30 – 3:00 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, an application of QG principles and PV thinking to weather and forecasting, a multiscale analysis of the atmosphere from the large scale to the mesoscale, and a real-time severe weather and quantitative precipitation forecasting exercise.

Class Materials:
Handouts.
Refereed literature.
Online-based information.

Reference Materials:


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

Real Atmosphere (best of all)

**Course Structure:**
1. Problem sets 10%
2. Topical exams 40%
3. Two projects 40% (20% each)
   a) format: standard AMS journals
   b) length: 2000 words **maximum**
   c) deadline: Tu: 2 April 2013 (macroclimatology)
      Th: 2 May 2013 (weather analysis and forecasting)
4. Class participation in weather discussions and the forecast game: 10%
5. Project Presentations: Time to be determined

**Forecasting:**
1. Forecast both ALB/EXT games.
2. Forecast on class days, and often enough on other days to make the ALB/EXT rankings (Lazear rules on forecast numbers apply).

**Course Outline:**
1. State-of-the-art of weather forecasting
2. Ensemble weather forecasting and numerical weather prediction applications
3. Application of QG principles and PV thinking to weather analysis and forecasting
4. Global macroclimatology and the weather-climate interface
5. Deep moist convection and mesoscale meteorology
6. Real-time severe weather and quantitative precipitation forecasting (QPF) exercises
ATM 418: Dynamic Meteorology III
Fall Semester 2011 (3 credits), Class Number ??????
Lecture: Tuesday & Thursday 8:45-10:05 in ES 232
http://www.atmos.albany.edu/daes/atmclasses/…

Instructor:
Professor Ryan Torn
Office: ES 229
Phone: 442.4560
Fax: 442.5825
torn@atmos.albany.edu
Office hours: Monday and Wednesday 11:00-12:00, and by appointment

Course Objective:
This course uses the governing equations of the atmosphere to understand mesoscale phenomena, including convection, flow over topography and boundary layer. In addition, students will learn how the governing equations are used to produce numerical weather model forecasts.

Prerequisites:
ATM 317, 320

Text:
An Introduction to Dynamic Meteorology by J. R. Holton

Supplementary reading:
Mid-Latitude Atmospheric Dynamics: A First Course, by J. E. Martin
Cloud Dynamics, by R. A. Houze

Course Requirements:
7 Homework assignments and Summary: 30%
2 In-class exams: 20% each
Final exam: 30%
Grading: A-E
Each student will be assigned a group that will be responsible for giving a summary of the previous lecture on a regular basis. At the end of the course, each group is assigned a grade based on the quality of the summary, with adjustments based on peer assessment. Late Homework and off-time exams are only allowed for University-recognized reasons.

Course Outline:
1. Topographic flow (2 weeks; course notes)
   • flow around topography
   • downslope winds
   • topographic kelvin waves
2. Dynamics of Convection (4 Weeks; course notes)
   - buoyancy and entrainment
   - squall lines and RKW theory
   - supercell dynamics
   - sea breezes and dry lines

3. Boundary Layer (3 Weeks)
   - mean and perturbation form of equations (Holton 5.1)
   - turbulent kinetic energy (Holton 5.2)
   - introduction to K methods (Holton 5.3)
   - Ekman solution and spin-down (Holton 5.3)

4. Numerical Weather Prediction (3 weeks; course notes)
   - finite differencing
   - time stepping algorithms
   - spectral techniques
   - microphysics, cumulus, boundary layer parameterizations
   - data assimilation and ensemble forecasting
A ATM 425 Physical Meteorology (4 credits)
Spring 2012

Class #: 1266 (lecture section)
Room: ES 325
Times: Lecture, T, Th 11:45 – 1:05; Discussion section, T 1:15 – 2:35
Pre-reqs: A Atm 315 and A Phy 240 or 241
Co-req: A Atm 320

Instructor: Vincent P. Idone, Associate Professor
Office: ES 215
Hours: M, W, F 11:00-1:00; also, after class or by appointment.
Phone: 442-4577
E-mail: vidone@albany.edu

Text: *Atmospheric Science: An Introductory Survey (2nd Edition)*
J. M. Wallace and P. V. Hobbs
(Some material covered will be notes only - no text!)

Content: Chapter 5.4-5.6 – Tropospheric Aerosols
Chapter 4 - Radiative Transfer
Chapter 6 - Cloud Microphysics
Atmospheric Optical Phenomena
Meteorological Radar Applications
Atmospheric Electricity/Lightning

Discussion Section (class # 1267):
Homework Review
Special Topics
Two Presentations: one practice, one formal research presentation

TA: Matthew Potter
Office: ES 234 (Hours TBD)
E-mail: mpotter2@albany.edu

Grading: Letter grade (A-E) format
Homework (20%)
Mid-term Exam (25%)
Final Exam (30%)
Research Presentation (15%, your presentation)
Critiques of Classmates (5%)
2nd Assessment Quiz (5%)
General: Attendance will not be taken, but miss lectures at your own risk! During exams, you should always have a calculator available. Homework assignments should be submitted on time and be neatly written up, with no "magically" appearing answers and an appropriate amount of intermediate steps indicated, particularly for derivations. If you don’t understand something in class, you’re probably not the only one; be brave and ask a question! We will all work hard, but there is no reason why we can’t have a little fun too.

Course Overview and Objectives

This course will provide an introduction to several recognized subdisciplines within the larger subject area of Physical Meteorology. This course also satisfies the Oral Discourse requirement of the General Education program, this being specific to the Research Presentation described below.

The field of physical meteorology necessarily entails aspects of theory, observation and measurement. As such, we will strive to address these within any particular subject area. You should not view these topics in isolation, but rather, with a broader perspective that might allow for unappreciated couplings or linkages. For example, if the atmospheric aerosol seems to you as nothing more than counting particles in the air, you are missing the essential critical notion that these particles determine the extent and amount of clouds in our atmosphere, which in turn, affect the short and long term radiation balance of the Earth, which, of course, also affects our climate. Physically, many processes are interrelated - and oftentimes, not readily revealed as such. This is why research is key to increasing our understanding of these interconnections and their significance. At your level of knowledge, you should be attempting to identify and possibly test some of these connections. This involves critical thinking, which is an essential aspect of becoming a practicing scientist. (Factual knowledge alone, though requisite, does not a scientist make!)

The Research Presentation

Each student will make two presentations to the class and me. The purpose of this component of the course is twofold: to get you to investigate something using sources outside the text and class notes, and to help you improve your ability to communicate what you have discovered in a conference/meeting format. Your first presentation will be a practice run in which I will assign you a topic that you should already be familiar with. Your objective is to give a brief and lucid recounting of the topic to the class. This exercise also will help the class as a form of "review" while it helps you to appreciate first-hand what it takes to effectively communicate an idea, thereby identifying areas you may need to work on. I will assign you a grade and give you individual feedback on the results of your initial presentation. Your practice grade will not contribute to your course grade; the purpose is to get you oriented towards using proper presentation techniques. Toward the end of the semester, you will make your formal research presentation, and this will contribute 20% toward your final grade in the course. In addition, for both the practice run and the formal presentation, you will need to send me a critique of each of you classmates’ presentation. If you do so to an adequate degree, I will give you the full 5%; if
you fail to provide sufficient critiques, you will lose this fraction toward your grade. Don’t worry, I will keep your criticisms private and only communicate a sanitized summary to each of you. I urge you to take the practice exercise seriously to help optimize your future research presentation grade!

Here are some specifics on the **formal research presentation**. You will have exactly 12 minutes to present a research topic that, again, I will assign you. You will be graded on the quality of the **content** of your research, as well as your **presentation** ability. (By research, here, I don’t mean you have to discover something for the first time; rather, the idea is to investigate a topic as you would for a term paper, only now you don’t write or submit a paper - you **present** it.) Requisite hardware such as overhead/computer projectors, as necessary for your presentation will be provided. It’s best to use a thumb drive to load your talk if you are using PowerPoint, as most do. Presentation time limits will be **strictly** enforced! You cannot ramble on. Finally, you will be expected to answer several questions on your presentation after its conclusion. Typically, we will use the last few lab/discussion sessions of the semester for these presentations. The presentations may be videotaped to provide a useful record for assessment of the presentation.

If this frightens you a bit, that’s normal. Relax. You will likely need to develop these skills anyway in almost **any** future occupation, especially one utilizing your degree in Atmospheric Science. Accept it and realize that this is for your **benefit**. Trust me on this - it really is!

Finally, this course is being used for assessment. As such, you will take a quiz today, which does not count toward your grade. You will get a second quiz at the end of the course, which will count 5% toward your grade.