Continue and Field-Based Applied Meteorology for Majors Paul Ruscher Department of Earth, Ocean and Atmospheric Science Florida State University Tallahassee



Image Acknowledgements:

← *The Leviathan*, from friedpost.com

Crater Lake, Wizard Is. → National Park Service



21st Education Symposium • AMS 92nd • New Orleans, LA • 24 January 2012

With thanks to:









Some History





- Science Electives include traditional 3 credit classes, and 1 credit "mini-classes" that ran 5 weeks each
- They could be taken simultaneously or in sequence; e.g.,
- Geology of our National Parks
- Marine Myths, Mermaids, and Monsters

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- Weather at its Worst
- I was a <u>history</u> major these courses had an impact on me



Meteorology Curriculum in Liberal Arts State University – Florida Style



Image from R. L. Tilden and sourced on Google Earth

Constraints:

- > 36 hours liberal studies
- 12 hours foreign language
 - By SUS articulation agreements, Unique BS must accept all AA transfers and allow graduation in two years

Realities:

- > 1st MET course has the following prerequisites:
 - Calc I, Physics A, Chemistry
- Must fit entire curriculum in two years!



FSU Meteorology BS Degree

Required

- General Chemistry*
- Calculus I, II, III*
- Ordinary Differential Equations*
- Statistics for Scientists & Engineers
- General Meteorology
- Physical Climatology
- Weather Analysis and Forecasting
- Meteorological Computations
- Intro to Atmospheric Dynamics

*may be taken at other schools

- Physical Meteorology I & II
 - Thermo, cloud physics, radiation, remote sensing
- Dynamic Meteorology I & II
 - Holton (8-10 chapters)
- Synoptic Meteorology I & II
 - Analysis of synoptic, meso-α scale phenomena, primarily of midlatitudes

Electives

- Current Weather Discussion
- Weathercasting
- Instruments and Observations
- Operational Meteorology (NWS)



What Our Students are *Were Not* (Necessarily) Seeing (Recently)





- Tropical and Subtropical Meteorology*
- Mesoscale Meteorology*
- Air Pollution
- Boundary Layer Meteorology*
- Instrumentation
- Technical Writing
- Space Weather / Aeronomy*
- Climate Change*
- Numerical Weather Prediction*
- Coastal Meteorology*
- Air-Sea Interaction*
- Lightning*

* areas of interest in Florida, or areas of research specialization at FSU



Learning to Teach (Again)



REALM Project: Really Exploring and Learning Meteorology







- Lessons from K-12 Teachers
- Lessons from Online Learners
- Lessons from AMS Educational Symposium Presenters and Discussions
- FSU's Learning Systems Institute
 - Shared Mental Models Team vs. Individual Knowledge







Solutions

- First is there a problem? (at FSU)
- Yes! Compare notes with colleagues at other institutions and also new AMS guidelines!
- Are there solutions! YES!





MetEd CONET



What does MetEd Offer?

- 317 Modules in 18 Different Areas
- Quizzes!
- Automatic Scoring with Score Reports
- Transcripts
- Students may get NOAA credit for completed modules



What Could FSU Offer?

- Tropical Meteorology
- Mesoscale Meteorology
- Air Pollution
- Boundary Layer Meteorology
- Satellite Meteorology
- Coastal Meteorology
- Teaching Meteorology
- Hydrometeorology



What Does the Class Look Like?

- 1 class meeting 1st week of classes (orientation)
- 1 class meeting last week of classes (week 15 summary and evaluation)
- 1 field trip
- Online Blackboard discussions (sometimes)
- 12-21 modules (20-30 hours)
- 1 credit (4000-level)
- Each module list selected by instructor (so far, just me!), but each class has unique prerequisites based upon our present curriculum



Sample Class

MetEd

Intro to Coastal Meteorology

• Nature of Waves

- Wave Types, Life Cycles, Swell, Shallow
- Tides and Currents
 - Introduction Currents & Tides; ENSO
- Ocean Models
 - Introduction to Ocean Models, Marine Wave Model
 - Wave Watch III, Wave Ensembles
- Observations and Forecasting along the Coast
 - Marine Customers
 - Rip Currents, Scatterometry
 - Marine BL, Sea Breezes, Landfalling Fronts
 - Gap Winds, Coastal Jets, Fog

Structure / Assessment

- ~30 hours of estimated completion time per 1 credit class
- 90% of grade based on module quizzes
 - □ 10 90% or higher on the 1st attempt

- 9 90% or higher on the 2nd or 3rd try
- 8 90% or higher on the 4th or 5th try or
 80% or higher on 1st attempt
 - 7 80% or higher on the 2nd 5th try
 - 6 passing score (MetEd definition) achieved on 1st through 10th attempt
 - 3 non-passing score as highest of 10 attempts
- 10% based on participation (field trip to FSU Marine Lab, discussions)



MetEd

Other Classes



Basic Hydrologic Sciences Distance Learning Course



Introduction to Air Pollution Meteorology

- IT MetEd Modules
- Basics of Atmospheric Dispersion
- Dust and Aerosols
- Modeling Applications
- Fire Weather Applications
- Emergency Management Response
- Public Health and Climate Change Applications
- Field Trip to EPA/DEP AirNow Monitoring Site
- Introduction to Hydrometeorology
 - a 21 MetEd Modules
 - 14 from Basic MetEd Course
 - Field Trip to Stream Gauge (NWS/USGS/WMD)



Other Classes

MetEd





Introduction to Climate Change

- I 13 MetEd Modules
 - > From Arctic to the Tropics
 - > Coastal Regions
 - > Drought, Statistics
- FSU/NSF Antarctic Core Facility Field Trip
- Introduction to Aviation Weather
 - □ ~18 MetEd Modules
 - Poorly subscribed
 - Field Trip to Airport FAA weather station (ASOS)
- Introduction to Boundary Layer Meteorology
 - □ ~16 MetEd Modules



Other Classes

FloridaDisaster Responders Public | Business | EM Community | Organization | News Media | Kids State Emergency Operations Center Events Introduction to Tropical EOC Home n **Meteorology** Severe Weather Drought 1 2 1 Revamped to take advantage of the 2nd edition of the new text Wildfires by Laing and Evans! Terrorism Working through all online



- Introduction to Mesoscale
 - First time offered Spring 2012
 - **18 MetEd Modules**
 - Field Trip to FSU Mesonet Site

MetEd

- chapters (1st time through in this style Spring 2012)
- Field trip to Florida EOC (aka, the house that Andrew built)
- Meteorology



Summary

Impacts & Findings

- Courses began 2008-2009
- 2-3 offerings per semester, including summers
- 4-10 students per section; 122 total over 3 years
- Student satisfaction is very high (based upon standard FSU course evaluations)
- It is a hard sell to get seniors to take "extra" classes
- Transfer students often cannot take electives unless they are in the 5 year plan (many are)

Future Goals

- New Course **Space Weather**
- Revamp Aviation Wx
- More Faculty Involvement
- Offer online for non-FSU degreeseeking students?
- Structure other courses around "Level 1" modules to allow for participation among lower-level students?
- Assess the assessment system is it honest?
- Carry out systematic evaluation of effects/likes/dislikes

http://yankee.met.fsu.edu/~paul/Mini/