

P2.7 Online Weather Studies in a 2-year program in Applied Meteorology at West Virginia State University

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1. INTRODUCTION

West Virginia State University (WVSU) is a 4-year Historically Black College or University (HBCU) located in Institute, West Virginia. Its collocation with West Virginia State Community and Technical College (WVSCTC) allows the two higher learning centers the combined strength of both 4-year and 2-year academic programs. In the hopes of building a strong 4-year program in Meteorology in the near future, WVSCTC has implemented a 2-year Associate Degree program in Applied Meteorology. The foundation for this degree program is a Weather and Climate 3 hour lab-lecture course, which utilizes the American Meteorological Society (AMS) Online Weather Studies course book and lab study manual.

2. BACKGROUND

2.1 New Degree Program

The Applied Meteorology program introduces interested students to the field of meteorology through courses in elementary meteorology, weather systems, severe storms, and climatology. Student internships are available each semester for students to spend time and conduct research with the local National Weather Service

office. As the first and only meteorology program in the state of West Virginia, locally important weather phenomena such as flash floods, are discussed in great detail. Graduates from the 2-year program will be prepared for careers in broadcast meteorology or to continue their education in science and meteorology at a 4-year school. The goals of this introductory program are to raise awareness about an exciting scientific area and attract enough high quality students to support a bachelor degree program in meteorology at WVSU in the near future.

The associate degree program was conceived in an attempt to expose a wide diversity of students to the exciting science of meteorology while also determining how many students would be attracted to a technical science field at a non-traditional school. The curriculum is focused on introducing students to the diverse aspects of meteorology while giving them time to prepare for the rigors of an advanced science degree.

A total of six new courses were developed for the Applied Meteorology associate degree program. The preliminary introductory course, Weather and Climate, which is completely discussed in the following section, is the pre-requisite for each of the departmental courses. The course descriptions are the following:

- **Physical Climatology**: Introduction to the dynamics of the global climate system. Emphasizes the physical

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processes that force spatial variability in climate, and the feedback mechanisms associated with global teleconnections and climate change.

- **Severe Local Storms:** Survey of severe weather, including thunderstorms and tornadoes. Focuses on storm processes and the forecasting of severe local storm events.
- **Applied Meteorology Research:** Students research a meteorological topic of their interest and which the instructor approves. Students will prepare a written report on their findings and present those findings to the introductory Weather and Climate class.
- **Weather System Analysis:** Presentation and practice of synoptic- and meso-scale diagnostic analysis techniques, including a review of satellite and radar remote sensing systems and imagery interpretation. Introduction to numerical weather prediction.
- **Broadcast Meteorology:** Practice in preparing and presenting weathercasts for radio and television. Survey of the weather casting industry. The course focus is toward a hands-on approach to Broadcast Meteorology. Includes working in front of a green screen and developing a weather story.
- **Elementary Meteorology:** Introductory presentation of basic meteorological processes with a focus on applying theory to the analysis and forecasting of local weather.

A critical component of the Applied Meteorology program is to provide students the opportunity to gain exposure to the National Weather Service Forecast Office

(NWSFO) located in Charleston, WV. Therefore, each semester 2 students are selected to conduct an internship with the NWSFO and gain credit for the Applied Meteorology Research course. These students work on a range of topics which has included climatological statement for the synoptic forcings of severe weather events in West Virginia.

Currently, fourteen students are enrolled in the associate degree program. Fifty percent are female, and seven percent are African American. Eighty-six percent are enrolled in the technical Transfer program which prepares students for a bachelor degree program in meteorology.

2.2 Introductory Course

The foundation course for the program is an introductory Weather and Climate course. The course is a 3 hour lecture and combined laboratory course. It is taught 2 days a week for 4 hours a week. The current instructor has taught the course with a classical meteorology textbook as well as with the innovative AMS Online Weather Studies system (<http://www.ametsoc.org/amsedu/online/info/index.html>). This course is an introductory course in weather where students are able to study weather as it happens. The course was developed by a team of educators and meteorologists under the support of the AMS DataStreme project. It can be presented as a completely online distance learning course or in a traditional lecture/laboratory course. The Weather and Climate course at WVSU is a traditional course where students complete 1 online laboratory assignment independently each week.

The current setup of the course involves a weekly quiz covering 1 chapter of the book and study guide, two lectures completing a chapter in a week, and 1 online laboratory exercise. The study guide portion

of the lab is completed by the student prior to class, while the online portion is completed in small groups during the end of the second class period of each week. The following table, Table 1, contains the outline of the course activities throughout a standard week.

Table 1. Weekly Course Outline

	ACTIVITY	
Day1	1	Quiz
	2	Lecture
Day2	1	Lecture
	2	Online Lab

This course fulfills a general education science requirement for the 4-year university. Therefore, the course is a popular science course choice for many students, particularly the early education students. The Online Weather Studies curriculum has been well received by students, and their negative attitudes toward the difficulty of the coursework have diminished. The course average has increased by approximately 8% since the weekly quiz course format and the Online Weather Studies learning materials have been utilized. It is difficult to quantify the improvement in student's perception and feelings about the course. However, the students have overcome the difficulty of the course material through weekly quizzes and real-life applied laboratory exercises which reinforce theoretical course concepts.

Several of the activities that are a part of the laboratory exercises provide an opportunity for the students to engage in hands-on and minds-on learning. These activities are particularly noteworthy as they reinforce the conceptual theory in class with hands-on activities. These activities include the following:

- Air pressure and Wind Lab where students model the air flow around a

surface low and high with the rotation of their hands.

- Air Pressure in the Vertical Lab where students are able to compare the pressure change in the vertical with red and blue blocks of different volumes and densities.
- Clouds, Temperature and Air Pressure Lab where students make a cloud in a 2-liter bottle.
- Surface Weather Maps and Forces Lab where the coriolis force is demonstrated through rotating notecards.

Each of these activities are valuable for demonstrating difficult conceptual theory with real hands-on activities.

2.3 Facilities

2.3.1 Facilities

The Applied Meteorology program is located in Hamblin Hall on the West Virginia State University Campus. A picture of Hamblin Hall is shown in Figure 1. Over the past two years, the department has modified an existing physics lab into a computer lab used by the students in the Applied Meteorology program and those in the Weather and Climate class. This computer lab allows students to have access to the Internet for performing the online section of the Online Weather Studies course work. In addition, the computers have several weather programs which are used by the Applied Meteorology students for accessing and studying current radar, satellite, surface and upper-air weather observations. The lab contains 12 Windows NT/XP based computers with flat panel monitors.



Figure 1: Hamblin Hall on the West Virginia State University Campus.

The computer lab also has wireless networking to grant the students who have laptops with wireless capabilities to access the Internet for coursework and real-time weather data. The computer lab is shown in Figure 2. The wireless networking system covers both the computer lab and the meteorology classroom to reduce the cables and clutter when the instructor wishes to access current weather information on the Internet.



Figure 2: Students in the Applied Meteorology Lab.

The meteorology classroom has a projector system installed in the ceiling, permitting the instructor to connect the department laptop to the system and display PowerPoint lectures on the screen at the front of the classroom.

As a part of the Broadcast Meteorology option of the Associate Degree program, the Applied Meteorology program has developed a Broadcast Meteorology studio. This studio will be used by the Broadcast Meteorology Class and allow the students to create performance tapes to be given to perspective employers.

2.3.2 Davis Instruments Weather Station

The Applied Meteorology program has purchased and installed a Davis Instruments Vantage Pro weather station on the south side of the West Virginia State University campus. The Applied Meteorology program is working together with the Biology Department and WVSU Bioplex Field on campus to keep the weather station in operating condition. The weather station provides numerous weather and land conditions including, air/soil temperature and moisture, wind speed and direction, barometric pressure, precipitation types and amounts, and solar radiation. All of this information is wirelessly transmitted to a computer operating within the WVSU Bioplex Field. This computer runs the WeatherLink program provided with the weather station, which processes the information and automatically generates National Climatic Data Center (NCDC) formatted current and climatological weather information.

2.3.3 Website

The computer in the WVSU Bioplex Field also updates the data to the Internet. The Applied Meteorology program has developed a website to incorporate this weather data, provide links to other local weather information, and publicize the Applied Meteorology program. The website is setup to automatically retrieve the current weather information every five minutes. This allows the meteorology students and the general public who are both on and off-

campus to have direct access to the most up-to-date weather conditions at the West Virginia State University.

In addition to the current weather information, the website displays a current view of the campus via a webcam. This webcam is located on the 8th floor of Wallace Hall and provides a view of both the central part of the campus and of the weather to the south. The website is shown in Figure 3.

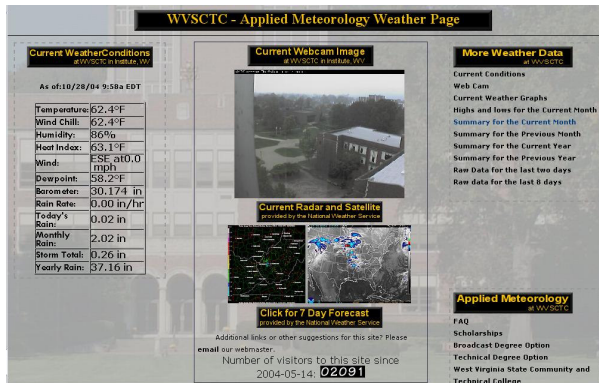


Figure 3: Image of the Applied Meteorology Website.

3. CONCLUSIONS

Overall, the course and the new program are considered to be a success. The Weather and Climate course is extremely popular by a wide variety of students. The current course load is 20 students, and the available sections fill quickly during registration. The new meteorology program began in August 2003, and currently has 12 students enrolled. The program personnel are optimistic that more quality students will be attracted to a small innovative program that has a close connection with the local National Weather Forecast Office.