PHD-COURSE-2018

SPECIAL TOPICS IN METEOROLOGY

1. **Introduction to Meteorology**
2. **Lightning and Thunderstorms**
3. **The Atmospheric Environment**
4. **Climatology**
5. **General Meteorology**
6. **Radio and TV Weather**
7. **Computer and Data Analysis in Meteorology**
8. **Physical Meteorology**
9. **Atmospheric Dynamics**
10. **Weather Analysis and Forecasting I**
11. **Weather Analysis and Forecasting II**
12. **Micrometeorology**
13. **Mesoscale Meteorology**
14. **Atmospheric Radiative Transfer**
15. **Remote Sensing of the Atmosphere**
16. **Nanotechnology**
17. **Atmospheric pollutant**

1	Introduction to Meteorology	

This course focuses on introducing the student to the basic concepts of meteorology. Major topics include the structure of our atmosphere, heat balance, meteorological measurements, atmospheric stability, atmospheric motion, and wind circulations on both the global and local scales. Other areas covered may include an introduction to air masses, fronts, and precipitation processes. The analysis of U.S. government weather charts is also introduced.

	Tropical Weather Discussion	

Tropical Weather Discussion is an introductory course in current or recently-active tropical weather systems. This course mainly reviews the structure, behavior, history and potential forecasts of tropical cyclones in the Atlantic, Pacific, and Indian Ocean basins from a meteorological perspective with special emphasis on activity in the Atlantic basin. The course is taught during the Fall Semester because it overlaps with the most active period of the Atlantic Hurricane Season. Other tropical weather topics such as El Nino, La Nina, monsoon troughs, tropical upper-tropospheric troughs, Madden Julian Oscillation, and hurricane climatology are discussed during weeks of inactivity when no tropical cyclones may be occurring.

4	Climatology	

Analysis of global climate as aggregate weather. Component elements, factors controlling distribution, resulting area patterns, and climatic classification are studied.

	Severe Weather	

A study of the causes, structure, and impact of tornadoes, hurricanes, thunderstorms and severe weather systems.

5	General Meteorology	

An overall view of the field of meteorology for science majors and minors. This course uses a quantitative approach to study the composition of the atmosphere, atmospheric processes, global circulation, and storm development. Laboratory exercises pay particular attention to hands-on analysis of meteorological charts.

	Dynamic Meteorology I	

Dynamic meteorology is the study of atmospheric motions that control our weather and climate. Using fundamental laws of physics (fluid dynamics and thermodynamics), a set of mathematical equations that describe how the atmosphere behaves, is derived. These equations are too complex to solve analytically, but with certain assumptions they can be simplified to find approximate solutions. Even though approximate, these solutions still give useful information about the current state of the atmosphere and its evolution in to the future. Forecasting rules and techniques are based on the theories derived in dynamic meteorology. Thorough understanding of these theories is invaluable to becoming a skilled forecaster.

	Dynamic Meteorology II	

The circulation of the atmosphere and the structure of storms is quantitatively analyzed

using equations of atmospheric flow. The jet stream, atmospheric waves, mid-latitude cyclones, and the concept of vorticity are given considerable attention.		
9	Physical Meteorology	
A detailed investigation of adiabatic processes, thermodynamic diagrams, atmospheric stability, and precipitation processes. Additional topics include atmospheric composition and aerosols, radiation and electricity.		
	Meteorological Instrumentation	
Design, calibration, use and maintenance of existing and newly developed meteorological instruments and instrumentation systems. Analysis of data collected by instruments and instrument systems.		
	Radar Meteorology	
This course is designed to give the student a three-fold introduction to weather radar and its value in the workplace. Basic radar principles and assumptions applicable to all radars are presented: the Doppler function and limitations are covered in depth with final emphasis on properly utilizing weather radar in an operational setting.		
	Introduction to Television Weather	
This course gives the students the basic skills necessary for broadcasting weather information on TV. This course will focus on the basic principles and techniques of effective TV weather broadcasting.		
	Atmospheric Analysis	
Analysis of meteorological charts with an emphasis on meteorological reasoning and plausibility in the real atmosphere. Provides additional preparation for students prior to Synoptic Meteorology.		
	Satellite	
This course is an introduction to the weather satellite and its influence on meteorological observations and forecasting. Both radiative propagation theory and satellite interpretation of meteorological features will be covered extensively.		
	Weather Forecasting I	
A course specifically designed for students minoring in meteorology. Students are introduced to weather forecasting concepts and methods.		
	Weather Forecasting II	
A course specifically designed for students minoring in meteorology. Weather forecasting techniques are discussed with an emphasis on the use of meteorological models and severe weather forecasting.		

	Meteorological Phenomenology	

This class is an introduction to reading meteorological journal and professional writings and to writing some of the standard scientific forms common in both operational and research meteorology: summaries, conference abstracts, and scientific journal articles. The students will engage in brief examination of some of the fundamental phenomena in the atmosphere through selected journal articles and write about these topics in an appropriate manner as inquisitive meteorologists.

	Computer Applications in Meteorology	

Students will be introduced to computer applications that are commonly used in meteorology. Simple programming skills will be developed using FORTRAN (including UNIX) programming and data visualization through IDL (Interactive Data Language).

	Air Pollution Meteorology	

Air Pollution Meteorology is a survey course in air pollution topics taught primarily from an atmospheric perspective. This course covers topics on air pollution history, methods of measuring air quality, sources of air pollution, basic atmospheric pollution dispersion concepts, basic principles of air pollution modeling and prediction, and an overview of the impacts of polluted air on human health and the environment.

	Tropical Meteorology	

This course will focus on the structure and behavior of tropical cyclones. Students will be introduced to the physics and dynamics of tropical cyclones and the equations that describe them. In addition, students will be exposed to a research environment where they will utilize scientific journals and participate in a simulated scientific conference.

	Synoptic Meteorology I	

Principles of dynamic meteorology are applied to current surface and upper air analyses of frontal cyclones. An emphasis is placed on forecasting techniques, daily weather discussions, continuity and analysis.

	Synoptic Meteorology II	

Through the use of surface and upper air analysis, satellite and radar imagery, and the principles of atmospheric dynamics, convective weather systems are studied and forecast. Principles of numerical forecast models and their interpretation are stressed. Special attention will be placed on predicting and monitoring severe weather events, using computer model forecasts, and daily weather discussions.

	Applied Climatology	

Training in the application of climatology to solve real world problems. In addition to an examination of present day climate patterns, their causes, and mechanisms, the course focuses on the El Nino, recent and past climates, the natural and human impact on the earth's energy balance,

global warming, ozone hole and chaos theory.

	Mesonet Internship	

Students will learn various aspects of mesonet (mesoscale weather station network) operation and maintenance. Students will take part in routine weather station site visits, emergency site visits when a sensor malfunctions, and quality control of incoming data. Once a year every weather station receives a complete retrofit where all sensors are replaced with freshly calibrated sensors. If such a retrofit occurs during the semester of a student's internship, the student will be given the opportunity to take part in this process as well. A large component of this course will consist of field work. Depending on student schedules and mesonet behavior, time will also be spent in the lab performing manual data quality control using the USA Mesonet website.

	Internship in Meteorology	

On-the-job learning through occupational, professional, or research work with an approved firm, agency, or meteorology faculty member. Open only to meteorology majors.

	Broadcast Meteorology Practicum I	

This course focuses on introducing the student to the ever evolving technology in broadcast meteorology. Emphasis is placed on the application of meteorological data through the use of professional television weather graphics systems in order to develop a "weather story." Particular attention is given to the use of chroma key mechanics/techniques for public viewing.

	Broadcast Meteorology Practicum II	

This course focuses on communicating accurate forecasts and other important weather info to the public. Attention is given to fine-tuning the on-air weather presentation style, as well as developing a professional resume tape of weather shows in order to gain employment as a broadcast meteorologist. Special attention is given to severe weather cut-ins and accurately conveying severe weather threats to the public.

	Topics in Air Pollution	

Topics in Air Pollution Meteorology are a graduate course on advanced air pollution topics taught primarily from an atmospheric perspective. This course provides an overview of "dry" meteorological processes, such as temperature, pressure, wind, and general circulation combined with topics on air pollution history, methods of measuring air quality, sources of air pollution, atmospheric pollution dispersion concepts, principles of air pollution modeling and prediction, and the impacts of polluted air on human health and the environment.

	Graduate Directed Studies in Meteorology	

Graduate level independent study in Meteorology under the direction of a member of Meteorology's Graduate Faculty. Student must have an approved topic and must be accepted by a Graduate Faculty mentor before registering for this class.