DEPARTMENT OF ATMOSPHERIC SCIENCES

Students in the Department of Atmospheric Sciences enjoy low student-to-teacher ratios and small classes. Undergraduates have opportunities for individual study and for participation in faculty research projects, including regional, national and international field programs.

Faculty

Bowman, Kenneth P, Professor
Atmospheric Sciences
PHD, Princeton University, 1984

Brooks, Sarah D, Professor
Atmospheric Sciences
PHD, University of Colorado, 2002

Collins, Donald R, Professor
Atmospheric Sciences
PHD, California Institute of Technology, 2000

Conlee, Don T, Instructional Professor
Atmospheric Sciences
PHD, Texas A&M University, 1994

Dessler, Andrew E, Professor
Atmospheric Sciences
PHD, Harvard University, 1994

Epifanio, Craig C, Associate Professor
Atmospheric Sciences
PHD, University of Washington, 1999

Korty, Robert L, Associate Professor
Atmospheric Sciences
PHD, Massachusetts Institute of Technology, 2005

Lemmon, Mark T, Associate Professor
Atmospheric Sciences
PHD, University of Arizona, 1994

Logan, Timothy S, Professor
Atmospheric Sciences
PHD, University of North Dakota, 2014

Nielsen-Gammon, John W, Professor
Atmospheric Sciences
PHD, Massachusetts Institute of Technology, 1990

North, Jerry R, Research Professor
Atmospheric Sciences
PHD, University of Wisconsin - Madison, 1966

Nowotarski, Christopher J, Assistant Professor
Atmospheric Sciences
PHD, The Pennsylvania State University, 2013

Orville, Richard E, Research Professor
Atmospheric Sciences
PHD, University of Arizona, 1966

Panetta, Richard L, Professor
Atmospheric Sciences
PHD, University of Wisconsin - Madison, 1978

Rapp, Anita D, Assistant Professor
Atmospheric Sciences
PHD, Colorado State University, 2008

Saravanam, Ramalingam, Professor
Atmospheric Sciences
PHD, Princeton University, 1990

Schade, Gunnar W, Associate Professor
Atmospheric Sciences
PHD, Johannes Gutenberg Universitat, Germany, 1997

Schumacher, Courtney, Professor
Atmospheric Sciences
PHD, University of Washington, 2003

Szunyogh, Istvan, Professor
Atmospheric Sciences
PHD, Hungarian Academy of Sciences, 1994

Xu, Yangyang, Associate Professor
Atmospheric Sciences
PHD, University of California, San Diego, 2014

Yang, Ping, Professor
Atmospheric Sciences
PHD, University of Utah, 1995

Zhang, Renyi, Professor
Atmospheric Sciences
PHD, Massachusetts Institute of Technology, 1994

Majors

• Bachelor of Science in Meteorology (http://catalog.tamu.edu/undergraduate/geosciences/atmospheric-sciences/meteorology-bs)

• Bachelor of Science in Meteorology and Master of Ocean Science and Technology, 5-Year Degree Program (http://catalog.tamu.edu/undergraduate/geosciences/atmospheric-sciences/bs-metr-most)

Minors

• Meteorology Minor (http://catalog.tamu.edu/undergraduate/geosciences/atmospheric-sciences/meteorology-minor)

Facilities

The Department of Atmospheric Sciences occupies the upper floors of the 15-story Oceanography and Meteorology Building. The Doppler weather radar on the roof of the building is a campus landmark and is used for both research and teaching. The department also operates a mobile Doppler radar for use in research projects. The department has four state-of-the-art chemistry labs, in which phenomena from ozone to aerosols are studied, as well as facilities for modeling the chemical environment. A continuous, comprehensive stream of meteorological data is received from ground stations, balloons, aircraft, radars, and satellites around the world. Two well-equipped computer labs are regularly upgraded to provide state-of-the-art educational equipment.
Courses

ATMO 201 Weather and Climate
Credits 3. 3 Lecture Hours.
Structure, energy, and motions of the atmosphere; climate; fronts and cyclones; atmospheric stability; clouds and precipitation; severe storms.

ATMO 202 Weather and Climate Laboratory
Credit 1. 2 Lab Hours.
Practical laboratory experiments and exercises, conducted in the meteorology and computer laboratories, concerning the fundamental physical processes underlying atmospheric phenomena, and the collection, display and interpretation of meteorological information. For non-majors only.

ATMO 203 Weather Forecasting Laboratory
Credit 1. 2 Lab Hours.
Short-range weather forecasting practice; numerical guidance; weather map analysis and discussions. 
Prerequisite: Concurrent enrollment in ATMO 201.

ATMO 251 Weather Observation and Analysis
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Standard and experimental weather observing techniques; subjective and objective analysis; application of conceptual models; simple kinematic and dynamic constraints.
Prerequisite: ATMO 203 or registration therein.

ATMO 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum.
Prerequisite: Freshman or sophomore classification.

ATMO 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of meteorology. May be repeated for credit.
Prerequisite: Approval of instructor.

ATMO 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in atmospheric sciences. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Freshman or sophomore classification.

ATMO 321 Computer Applications in the Atmospheric Sciences
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to technical computing methods in the atmosphere sciences; use of specialized software and data analysis systems for meteorological applications.

ATMO 324 Physical and Regional Climatology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Climate causes; global and surface energy balance; hydrologic cycle; general circulation; climate change; climate data analysis.
Prerequisites: ATMO 201 and ATMO 203; MATH 308 or registration therein or approval of instructor; ATMO 321 or equivalent; junior or senior classification.

ATMO 326 Environmental Atmospheric Science
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Basic concepts of meteorology as needed in environmental sciences; patterns of meteorological and climatic elements and their relevance in terrestrial ecology and urban sciences; solar and wind energy physics; practical experience in use of instruments to measure micro-climates as they relate to meteorological conditions and analysis of data.
Prerequisites: ATMO 201 or GEOG 203, or approval of instructor.

ATMO 335 Atmospheric Thermodynamics
Credits 3. 3 Lecture Hours.
Application of thermodynamics to Earth's atmosphere; phase changes of water; stability concepts; introduction to physical chemistry.
Prerequisites: CHEM 102; MATH 251; PHYS 218.

ATMO 336 Atmospheric Dynamics
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Kinematic concepts and relationships; equations of motion; geostrophic and accelerated motions; the vorticity equation and Rossby waves.
Prerequisites: ATMO 335 or registration therein; MATH 308 or registration therein; junior or senior classification.

ATMO 352 Severe Weather and Mesoscale Forecasting
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Principles of radar theory, hardware, operations and analysis using real-time radar and computer-based case studies; conventional, Doppler and polarimetric weather radar; precipitation estimation, hydrometeor identification and air motion analysis; observations and analyses of thunderstorms, mesocyclones, tornadoes and gust fronts.
Prerequisites: ATMO 352; PHYS 208.

ATMO 363 Introduction to Atmospheric Chemistry and Air Pollution
Credits 3. 3 Lecture Hours.
Descriptive introduction of the composition and chemistry of natural and pollutant compounds in the atmosphere; transport, cycling and reactivity of atmospheric material; atmospheric measurements, data processing, air quality and human health issues; air pollution trends and climate change.
Prerequisites: CHEM 101 and CHEM 102 or approval of instructor.

ATMO 435 Synoptic-Dynamic Meteorology
Credits 3. 3 Lecture Hours.
Dynamics and diagnosis of synoptic-scale systems; perturbation theory and baroclinic instability; wave energetics, frontogenises.
Prerequisites: ATMO 336 or equivalent; MATH 308.

ATMO 441 Satellite Meteorology and Remote Sensing
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to satellite orbit dynamics, atmospheric radiative transfer, atmospheric remote sensing methods, and analysis and application of remotelysensed meteorological data.
Prerequisites: ATMO 324, MATH 308; junior or senior classification.

ATMO 443 Radar Meteorology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Principles of radar theory, hardware, operations and analysis using real-time radar and computer-based case studies; conventional, Doppler and polarimetric weather radar; precipitation estimation, hydrometeor identification and air motion analysis; observations and analyses of thunderstorms, mesocyclones, tornadoes and gust fronts.
Prerequisites: ATMO 352; PHYS 208.

ATMO 446 Physical Meteorology
Credits 3. 3 Lecture Hours.
Physics and meteorology of clouds and precipitation; atmospheric electricity; radiative transfer.
Prerequisite: ATMO 335.
ATMO 455 Numerical Weather Prediction  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Basic principles of computer models of the atmosphere; parameterizations; use and critical evaluation of models and model output.  
**Prerequisites:** MATH 308; ATMO 336 or registration therein.  

ATMO 456 Practical Weather Forecasting  
Credits 3. 1 Lecture Hour. 4 Lab Hours.  
Advanced weather forecasting techniques with application to a variety of forecasting problems, both public and private sector.  
**Prerequisites:** ATMO 435 or registration therein; junior or senior classification.  

ATMO 459 Tropical Meteorology  
Credits 3. 3 Lecture Hours.  
Tropical climatology; structure, evolution, and motion of tropical cyclones; tropical cyclone hazards; large-scale tropical phenomena.  
**Prerequisites:** ATMO 336; ATMO 352 or registration therein.  

ATMO 461 Broadcast Meteorology  
Credit 1. 2 Lab Hours.  
Instruction in the practice of broadcast meteorology; practice in and preparation of weather forecast products and demonstration videotapes. May be taken twice for credit with faculty advisor approval.  
**Prerequisites:** ATMO 335 or registration therein; MATH 308 or registration therein; junior or senior classification.  

ATMO 463 Air Quality  
Credits 3. 3 Lecture Hours.  
Atmospheric pollution sources, transport, sinks, and effects; monitoring of air pollutant emissions and of ambient concentrations; use of models to simulate air pollution; regulation of emissions and ambient concentrations; greenhouse gas emissions regulations.  
**Prerequisite:** CHEM 101 or CHEM 107 or approval of instructor; junior or senior classification.  

ATMO 464 Laboratory Methods in Atmospheric Sciences  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
Instruction in chemical techniques used to monitor the atmosphere and other earth systems; sampling strategies; survey of current literature focusing on development of new techniques.  
**Prerequisites:** CHEM 101 and one semester of calculus (MATH 171 or equivalent).  

ATMO 484 Internship  
Credits 0 to 3. 0 to 3 Other Hours.  
Supervised internship at National Weather Service or in broadcast meteorology or elsewhere with faculty advisor approval; must complete a report and have a letter from supervisor for credit. May be taken three times for credit. Must be taken on a satisfactory/unsatisfactory basis.  
**Prerequisites:** ATMO 251; approval of faculty advisor.  

ATMO 485 Directed Studies  
Credits 1 to 23. 1 to 23 Other Hours.  
Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum.  
**Prerequisite:** Junior or senior classification.  

ATMO 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of meteorology. May be repeated for credit.  

ATMO 491 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in atmospheric sciences. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
**Prerequisites:** Junior or senior classification and approval of instructor.