UNIVERSITY AT ALBANY
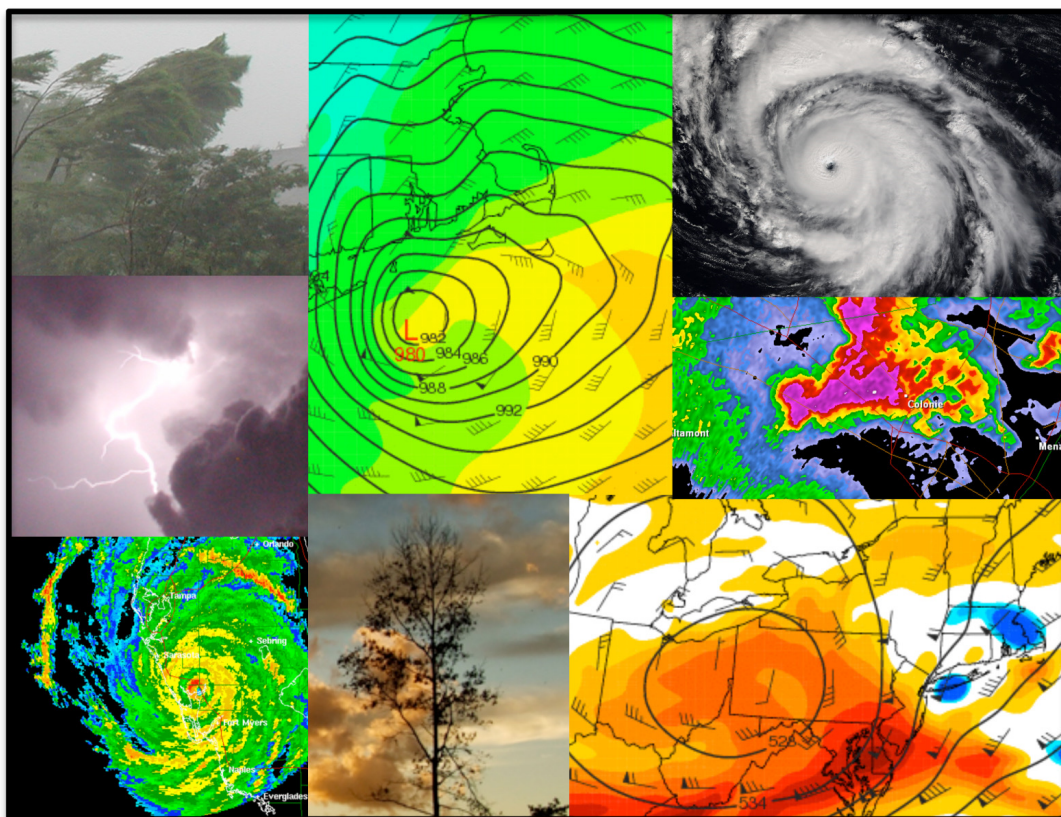State University of New York

ATMOSPHERIC SCIENCE

in the

Department of Atmospheric and Environmental Sciences

http://www.albany.edu/atmos/

Bachelor of Science Degree in Atmospheric Science

The Atmospheric Science program at the University at Albany is nationally and internationally renowned. The combination of the **Department of Atmospheric and Environmental Sciences (DAES)** and the **Atmospheric Science Research Center (ASRC)** gives the University the largest program of education and research in New York State, and one of the largest in the nation. Faculty are not only active and prominent researchers but also several have received national teaching awards. Additionally, the **National Weather Service's regional office** is located nearby. This gives students in the department a unique opportunity to work closely with researchers and forecasters in multiple fields of study within the atmospheric sciences.

Faculty research covers a broad range of interest in the atmospheric and environmental sciences. Topics of research and study include:

- Synoptic-dynamic meteorology
- Weather systems and predictability
- Climate and climate change
- Meteorological instrumentation
- Mesoscale meteorology
- Hurricanes and tropical meteorology
- Cloud and precipitation physics
- Numerical weather prediction

Research and Teaching Facilities

Maproom *(right)*: DAES runs a fully equipped electronic map room with satellite, radar, lightning, and model data. The room is used for teaching and frequent weather discussions. The room also houses Linux workstations on which students can study or hone their forecasting skills in one of our many forecast contests.

Whiteface Mtn. Observatory *(below)*: ASRC operates an observation center atop Whiteface Mountain in the Adirondacks, meausring chemical species, cloud properties, acid precipitation, and aerosol content.
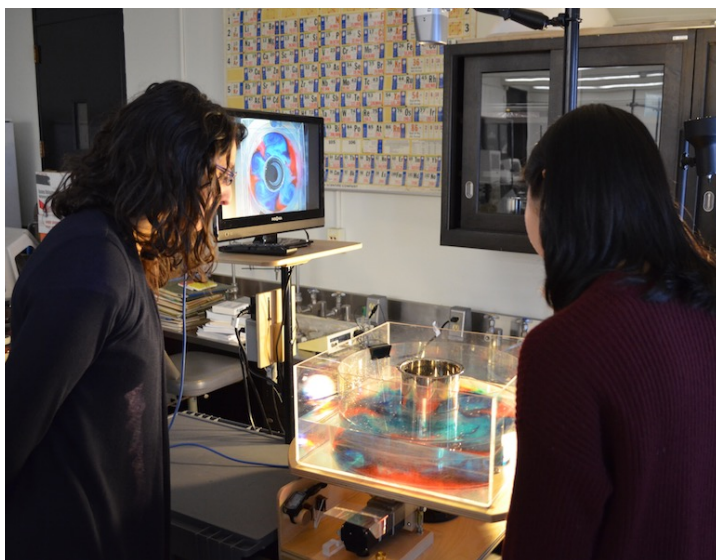
Atmospheric Science Curriculum

Students planning to study atmospheric science should have a good academic preparation in physics and mathematics. Below is a sample four-year plan for an atmospheric science major, with **required classes listed in bold (including twelve elective credits)**:

Semester 1			*Semester 2*	
MAT 112: Calculus I	**4**		**MAT 113: Calculus II**	**4**
PHY 140, 145: Physics I (w/ lab)	**4**		**PHY 150: Physics II**	**3**
CHM 120: Chemistry I	**4**		Elective/Gen-ed	*
Elective/University Gen. Ed. Requirement	*		Elective/Gen-ed	*

Semester 3			*Semester 4*	
MAT 214: Calculus III	**4**		**MAT 311: Differential Equations**	**3**
ATM 209: Weather Workshop	**1**		**ATM 211: Weather Analysis and Forecasting**	**4**
ATM 210/Z: Atmospheric Structure, Thermodynamics, and Circulation	**3**		**ATM 315: Env. Stats/Comp.**	**4**
Elective/Gen-ed	*		Elective/Gen-ed	*
			Elective/Gen-ed	*

Semester 5			*Semester 6*	
ATM 316: Dynamic Meteorology I	**3**		**ATM 317: Dynamic Meteorology II**	**3**
ATM 320: Atmos. Thermodynamics	3		**ATM 321Y: Physical Meteorology**	**3**
ATM Elective	*		**ATM 350: Meteorological Data Analysis and Computing**	**2**
Elective/Gen-ed / Minor	*		**ATM Elective**	*
Elective/Minor	*		Elective/Minor	*

Semester 7			*Semester 8*	
ATM Elective	**3**		**ATM 419: Numerical Weather Pred.**	**3**
ATM Elective/Gen-ed/Internship	*		**ATM Elective**/Gen-ed/Internship	*
Elective/Minor/Research	*		Elective/Minor/Research	*
Elective/Minor	*		Elective/Minor	*
Elective/Minor	*		Elective/Minor	*

In Dynamic Meteorology, students use a rotating fluids tank in order to demonstrate fundamental atmospheric processes.

Additional (Elective) Courses include

ATM 100: The Atmosphere
ATM 103: Introduction to Climate Change
ATM 107: The Oceans
ATM 110: Weather and Climate Issues for the 21st Century
ATM 200: Natural Disasters
ATM 301: Surface Hydrology and Hydrometeorology
ATM 304: Air Quality
ATM 305: Global Physical Climatology
ATM 306: Climate Variability and Change
ATM 307: Atmospheric Chemistry
ATM 311: Severe and Hazardous Weather
ATM 327: Meteorological and Environmental Measurement
ATM 335: Meteorological Remote Sensing
ATM 400: Synoptic Meteorology I
ATM 404: Oceans and Climate
ATM 405: Water and Climate Change
ATM 408: Hydrometeorology
ATM 413: Weather, Climate Change, and Societal Impacts
ATM 414: Air Pollution Meteorology
ATM 415: Climate Laboratory
ATM 421: Tropical Meteorology
ATM 440: Seasonal and Subseasonal Forecasting

Internship and Research Opportunities

Internships:

DAES allows multiple internship opportunities, all of which provide students with a valuable learning experience and credit towards the major. Some examples are:

### National Weather Service (NWS)

The NWS Forecast Office in Albany, a 10-minute walk from DAES, provides an internship that allows students to work with forecasters, launch weather balloons, assist with the forecast process, conduct storm damage surveys, pursue research projects, visit observation sites, etc.

National Weather Service internship

New York State Mesonet

The NYS Mesonet, started in 2015, is a dense network of 126 weather stations across the state. With its control center on campus, students can intern in this project and support field technicians, monitor network communications, assure data quality, and work on related research utilizing Mesonet data.

New York State Mesonet internship

Broadcast Meteorology

Students can intern with a local TV meteorologist. Duties include working behind the scenes on weather graphics, and practicing on-air time leading to a demo tape.
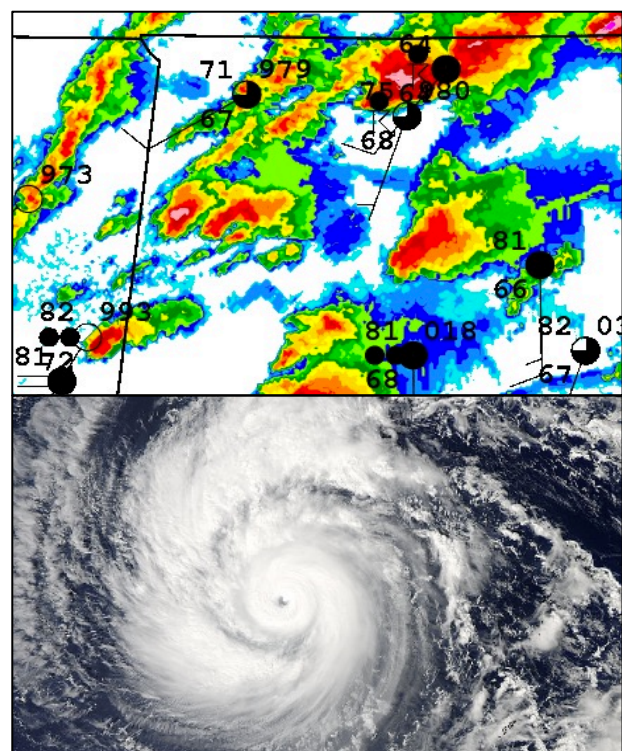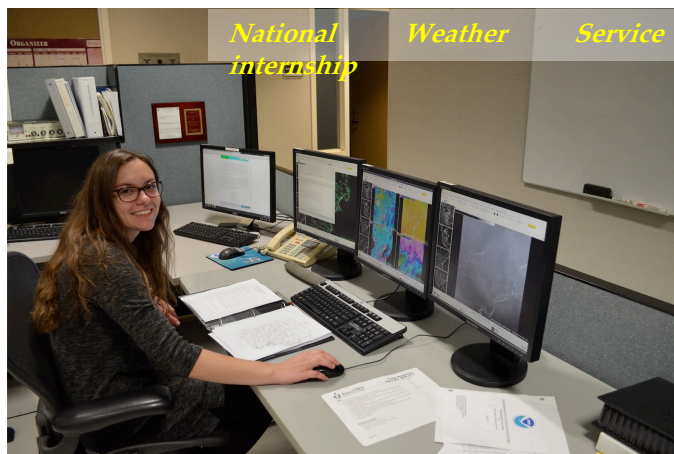
Research:

Many students work on a research project with a faculty member during their junior or senior year. Research ideas may come directly from faculty, but students often come up with their own ideas that fit with a specific faculty member's research interests.

Some recent undergraduate research projects are:

- Large-scale precursors to major lake-effect snow events
- The effect of the Appalachians on mid-summer squall lines
- Using the convective available potential energy tendency equation in the analysis of a major severe weather outbreak
- Case study of an unusually strong late summer Arctic cyclone
- Processes that lead to an abundance of eastern U.S. heat waves in late August and early September
- Lightning in complex terrain for varying weather patterns
- Analysis of tornado track length and downdraft strength
- Case study of the major tornado outbreak of 27 April 2011
- Warm-season Mohawk–Hudson convergence thunderstorms

Students launching a weather balloon in ATM 327

Honors Program:

Students with a cumulative GPA of at least 3.25, and 3.5 in the major, are eligible to apply for a B.S. with honors in atmospheric science. Students must complete 82 credits including two semesters of Undergraduate Research (ATM 499) leading to an undergraduate thesis and oral presentation.

Graduate Program:

Our department also has an active graduate program, offering Ph.D. and M.S. degrees in atmospheric science. A multitude of prominent research in atmospheric science has come from graduate work at UAlbany, and many of our alumni are now employed at some of the top research and teaching facilities in the world.

Minors:

While adding a minor isn't required for atmospheric science majors, many of our students choose to minor in one of these related fields:

- Math *(only two additional courses required)*
- Physics
- Chemistry
- Computer Science
- Broadcast Meteorology *(only for Atmos. Sci. majors)*
- Sustainability
- Business
- Informatics
- Geographic Information Systems (Certificate)

Careers:

Many of our undergraduate degree recipients continue their education in graduate school, although there are a significant number of jobs available to students with Bachelor's degrees. Some of the more common jobs are in:

- Research
- Teaching
- Air quality monitoring
- Weather forecasting (private sector and NOAA)
- TV broadcasting and production
- Solar and wind energy, and energy forecasting
- Risk and emergency management
- Finance/derivatives
- Meteorological instrumentation
- Environmental legislation
- Forensic meteorology
- Scientific and engineering consultation
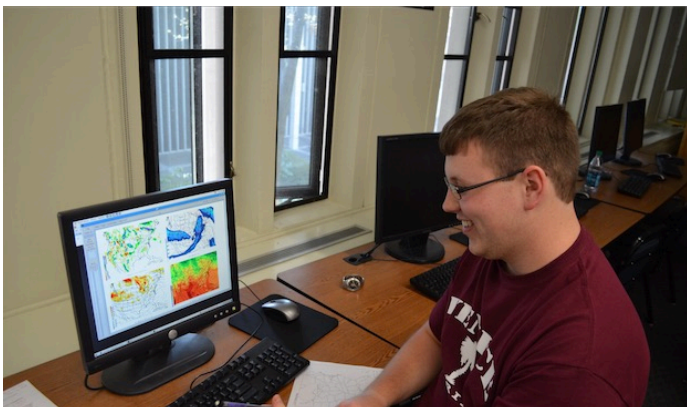
Preparing an ATM 401 discussion

Graduates at the senior dinner and faculty roast

Faculty Research Interests and Contact Information

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Synoptic meteorology and the weather-climate interface

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Tropical cyclones and lightning

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Climate change and the global water cycle

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Paleoclimatology and regional climate change

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Numerical weather prediction and mesoscale meteorology

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Paleoclimatology using lake sediments

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Synoptic-dynamic meteorology

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Planetary-scale climate dynamics

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Tropical atmospheric waves and midlatitude interaction

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Tropical cyclones and mesoscale meteorology

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West African monsoon and African easterly waves

Ryan Torn, Professor and Dept. Chair (Ph.D., Univ. of Washington)
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Predictability, data assimilation, and mesoscale meteorology

Kevin R. Tyle, Manager of Departmental Computing (M.S., University at Albany)
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Big data, and meteorological data visualization

Mathias Vuille, Professor (Ph.D., Univ. of Bern)
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Tropical paleoclimatology and climate change

Liming Zhou, Professor (Ph.D., Boston University)
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Remote sensing and land-climate interactions

The ETEC building will be our new home in 2021. It will have state of the art teaching and research facilities. ETEC will be shared with the Atmospheric Science Research Center, NYS Mesonet, and College of Emergency Preparedness, Homeland Security and Cybersecurity.

CONTACT THE DEPARTMENT

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