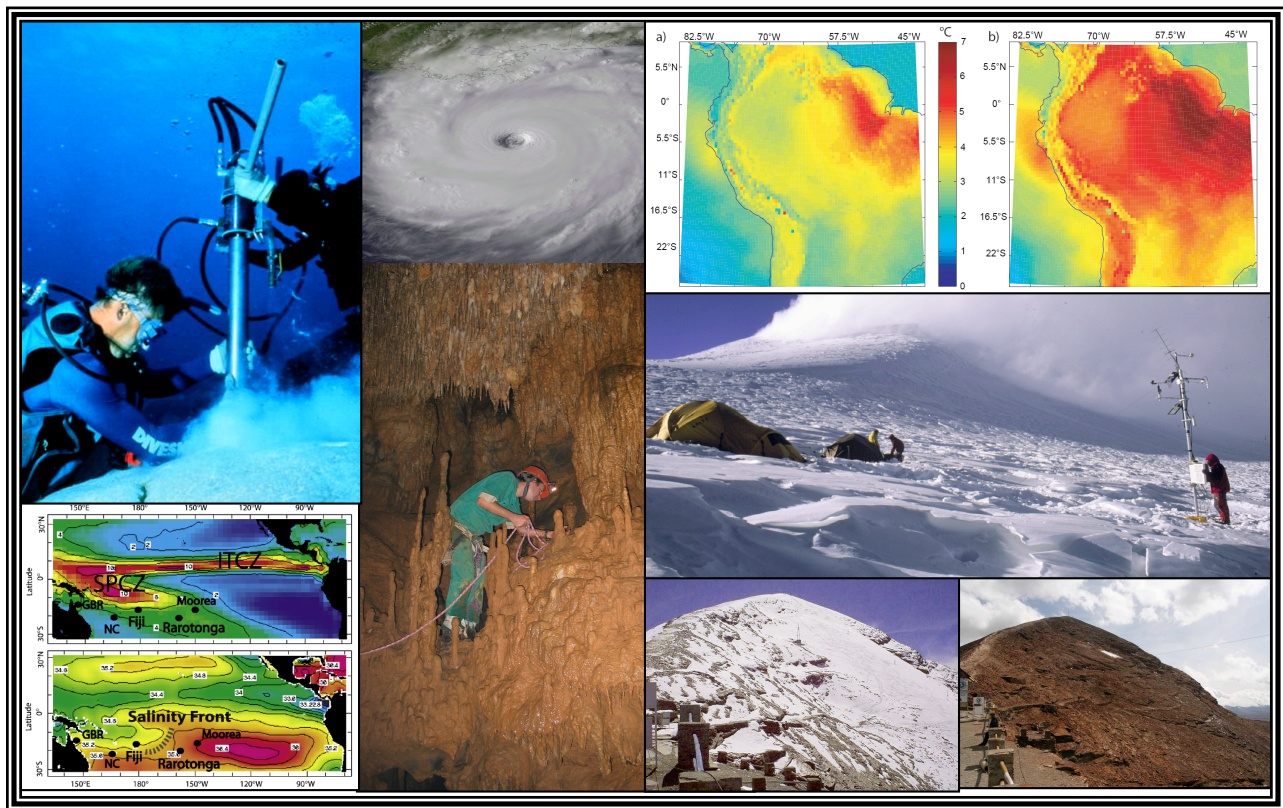




UNIVERSITY AT ALBANY
State University of New York

ENVIRONMENTAL SCIENCE PROGRAM



in the

Department of Atmospheric and Environmental Sciences

Bachelor of Science Degree in Environmental Science

Addressing environmental problems from a scientific perspective is becoming ever more important in today's world. We are faced with an increasing number of environmental challenges such as air pollution, water and soil contamination, climate change, land degradation and loss of biodiversity. Training the next generation of environmental scientists is therefore a mission of critical importance. The B.S. degree in Environmental Science at the University at Albany offers an excellent education and training in these areas and prepares our students for a successful career with governmental or non-governmental organizations, environmental consulting firms or graduate school. Our faculty members are engaged in world-class research relevant to the needs of society and focusing on a wide variety of aspects within the earth system, including research on planetary, atmospheric, hydrologic, cryospheric and terrestrial processes. Our students are also required to take some classes in the Geography and Biology Departments, where they are exposed to biologic and ecologic aspects of environmental science and are trained in computer mapping and Geographic Information Systems (GIS).

The Environmental Science Program at the University at Albany is housed in the Department of Atmospheric and Environmental Sciences. It is one of two undergraduate programs offered by our department, the other one being the B.S. degree in Atmospheric Science. The Department also has an internationally recognized graduate program, offering both Masters and PhDs in Atmospheric Science.

Environmental Science Programs around the country vary significantly regarding their main focus and emphasis toward certain aspects of the environment. While some Departments emphasize Environmental Policy, Environmental Health, Environmental Law or Ecology, the strength of our program lies in its core emphasis on the Natural Sciences. Our students are required to take two semesters of calculus, physics and chemistry which give them a very solid foundation to understand and analyze the natural processes that dominate our environment. We also encourage all our Environmental Science students to acquire some working experience by serving as an intern with an environmental consulting firm or a local, state or federal agency. The students earn credit for the internship, but it also gives them a valuable working experience with a potential future employer. Hence our students graduate with a competitive advantage in the job market for all positions that require work experience, a solid scientific background and advanced quantitative skills.



Atmospheric Science Map Room



Research Geochemist Stephen Howe in the SIRMS Lab

Our research and teaching facilities are among the most advanced in the nation. We maintain a fully equipped electronic map room with satellite, radar, observation, lightning detection, and model forecast data from around the world. This room is used for teaching and for weather discussions, but also serves as a lab with many Linux/Windows workstations. Students are encouraged to use the room as a group or individual study area.

We also host a world-class Stable Isotope Ratio Mass Spectrometer (SIRMS) Laboratory where students can perform undergraduate research and learn how to analyze past climate variations using corals, plants, soils, etc.

Requirements for the B.S. Degree in Environmental Science

Students planning to study environmental science should have a good academic preparation in physics, chemistry and mathematics. The core program consists of two semesters of chemistry, mathematics and physics and introductory courses in Environmental and Atmospheric Science, Biology, Geology and Geography. All students have to complete a core program of 45 credits and then select one of three concentrations (21 additional credits): Biology, Climate, or Geography. Each concentration represents an emphasis within the overall program that would best match a student's interest and desired career path. For example, those most interested in studying the climate–environment system would opt for the Climate concentration, while those seeking careers in land use planning and geographic information systems might opt for the Geography concentration. Correspondingly, students keen on aspects of biological processes and ecology would select the Biology concentration.

Courses offered:

Core (45 credits):

ATM 210: Atmospheric Structure, Thermodynamics, and Circulation
ATM/ENV 315: Environmental Statistics
ATM/ENV 327: Meteorological and Environmental Measurements
BIO 120: General Biology I
CHM 120 or 130 or T CHM 130: General Chemistry I or Advanced General Chemistry I
CHM 121 or 131 or T CHM 131: General Chemistry II or Advanced General Chemistry II
ENV/GEO/GOG 201: Environmental Analysis
ENV 250: Sustainable Development: Energy and Resources
ENV 490: Major Topics in Environmental Science
GEO 221: Minerals, Rocks and Geological Time
MAT 111 or 112 or 118 or T MAT 118: Algebra and Calculus II, Calculus I or Honors Calculus I
MAT 113 or 119 or T MAT 119: Calculus II or Honors Calculus II
PHY 140 or 141 or T PHY 141: Physics I: Mechanics or Honor Physics I: Mechanics
PHY 150 or 151 or T PHY 151 or PHY 202: Physics II: Electromagnetism or Honors Physics II: Electromagnetism

Geography Concentration (21 credits):

Required courses (10 credits):

GOG/PLN 220: Introductory Urban Geography
GOG 290: Introduction to Cartography
GOG/PLN 330 or 430: Principles of Environmental Management or Environmental Planning

Elective courses (at least 6 credits):

GOG 304: Climatology
GOG/PLN 330: Principles of Environmental Management
GOG 344Y: World Population
GOG 354: Environment & Development
GOG 390: Intermediate Cartography
GOG 407: Biogeography
GOG 414: Computer Mapping
GOG/PLN 430: Environmental Planning
GOG 431: Climatic Change
GOG 479: Fundamentals of Applied Global Positioning Systems (GPS)
GOG 484: Remote Sensing I
GOG 485: Remote Sensing II
GOG/PLN 496: Geographic Information Systems
MAT 308: Topics in Statistical Inference

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Additional electives (at least 11 elective credits from the combination of the previous elective list and):

GOG 293: Use and Interpretation of Aerial Photographs
ENV 496: Environmental Internships
MAT 214: Calculus of Several Variables
MAT 220: Linear Algebra
MAT 311: Ordinary Differential Equations
CSI 201: Introduction to Computer Science

Climate Concentration (21 credits):

Required courses (9 credits):

ATM 301: Surface Hydrology and Hydrometeorology
ATM 306: Climate Variability and Change
ENV/GEO 450: Paleoclimatology

Elective courses (at least 3 credits)

ATM 304: Air Quality
ATM 307: Introduction to Atmospheric Chemistry
ATM 335: Meteorological Remote Sensing
ATM 414: Air Pollution Meteorology
ENV/GEO 350: Environmental Geochemistry
GOG 304: Climatology
MAT 308: Topics in Statistical Inference

Additional electives (at least 12 elective credits from the combination of the previous elective list and):

CHM 220: Organic Chemistry I
CHM 221: Organic Chemistry II
ENV 496: Environmental Internships
MAT 214: Calculus of Several Variables
MAT 311: Ordinary Differential Equations
PHY 150 or 151 or T PHY 151 or A PHY 202: Physics II: Electromagnetism or Environmental Physics
PHY 240: Physics III: Structure of Matter
CSI 201: Introduction to Computer Science

Biology Concentration (21 credits):

Required courses (12 credits):

BIO 121: General Biology II
BIO 201: General Biology I Lab
BIO 202Z: General Biology II Lab
BIO 212Y: Introductory Genetics
BIO 320: Ecology

Elective courses: At least 6 credits from BIO 218 or higher, and 9 credits from this list and:

CHM 220: Organic Chemistry I
CHM 221: Organic Chemistry II
ENV/GEO 466: Marine and Estuary Systems
ENV 496: Environmental Internships
GOG 407: Biogeography
MAT 214: Calculus of Several Variables
MAT 308: Topics in Statistical Inference
MAT 311: Ordinary Differential Equations

The Environmental Science B.S. is a combined major-minor (i.e. has a "built in" minor due to the required foundation coursework) that, in total, requires a minimum of 66 credits. Although no minor is required for those majoring in Environmental Science, some students do choose to add an additional minor, or minors. Some common choices are Geography and Planning, Biology, Atmospheric Science and Business. Some students also choose to "double major" with any of the aforementioned programs.

The department also offers a Bachelor of Science degree in *Atmospheric Science*. This degree provides a more specialized education in meteorology and weather forecasting for students interested in atmospheric processes. Additional information on the Atmospheric Science degree is given in a separate brochure.



Students hard at work in a DAES classroom

Typical B.S. Program in Environmental Science

Note that this is an example for the climate concentration; the required concentration courses (ENV 450, ATM 301 and ATM 306) would be different for the other 3 concentrations.

Courses required for this major are shown in bold

<u>Semester 1</u>		<u>Semester 2</u>	
MAT 112: Calculus I	4	MAT 113: Calculus II	4
PHY 140: Physics I	3	PHY 150: Physics II	3
CHM 120: General Chemistry I	3	ENV 201: Environmental Analysis	3
University Gen. Ed. Requirement	*	CHM 121: General Chemistry II	3
University Gen. Ed. Requirement	*	University Gen. Ed. Requirement	*
<u>Semester 3</u>		<u>Semester 4</u>	
BIO 120: General Biology I	3	ENV 250: Sustainable Development	3
GEO 221: Minerals, Rocks, Geol. Time	4	ATM 210: Atmos. Structure	3
University Gen. Ed. Requirement	*	Elective	*
University Gen. Ed. Requirement	*	University Gen. Ed. Requirement	*
		University Gen. Ed. Requirement	*
<u>Semester 5</u>		<u>Semester 6</u>	
ATM 301: Hydrology and Hydromet.	3	ATM 306: Climate Var. & Change	3
ENV 315: Environmental Statistics	3	Concentration elective	3
ENV 327: Met. & Env. Measurements	3	Elective	*
Concentration elective	*	University Gen. Ed. Requirement	*
University Gen. Ed. Requirement	*	University Gen. Ed. Requirement	*
<u>Semester 7</u>		<u>Semester 8</u>	
ENV 450: Paleoclimatology	3	ENV 490: Major Topics in Env. Sci.	3
Concentration elective	3	Concentration elective	3
Elective	*	Elective	*
Elective	*	Elective	*
Elective	*	Elective	*

Undergraduate Internship and Research Opportunities

Internships: Our Environmental Science students have the possibility to pursue an internship with a local, state or federal government agency or with a private consulting firm. This internship opportunity is open to all junior and senior year students who have a GPA of at least 2.5 in both their major and overall and can be repeated once. These internships provide students with practical work experience in environmental science and allow them to make contacts with potential future employers. It is the student's responsibility to line up the internship but our faculty regularly help with the search by disseminating information regarding current opportunities to students and by directing students toward useful resources and databases of potential employers.

Research: Stimulating and attractive research opportunities exist for our undergraduates. This research, supervised by a department instructor should be done at the beginning of the senior year and can be repeated once for credit (A ENV 498). It requires approval of both the instructor and the chair. In some cases, students work on a faculty member's ongoing research project, but students are also encouraged to come up with their own ideas. More information on the types of research covered by our faculty can be found beginning on page 7.

Graduate Program

Our department does not offer advanced degrees in environmental science but has an active graduate program, offering Ph.D. and M.S. degrees, in atmospheric science. This program is viewed to be one of the top atmospheric science programs in the country. A multitude of prominent research in the field has come from graduate work at UAlbany, and many of our graduates are now employed at the top research and teaching institutions in the world. Several of our environmental science students have applied and been accepted to our atmospheric science graduate program in the past.

Careers

Graduates with a B.S. in Environmental Science will be well qualified for a broad range of



DAES Undergraduate Commencement ceremony

positions within the highly interdisciplinary field of environmental science. Consulting firms, industry, federal and state government agencies all require employees with this type of training. The demand for individuals with such a degree is anticipated to remain strong as our society attempts to cope with and address a myriad of environmental impacts that are occurring on local, regional, national and global scales. Additionally, graduates with this degree are well prepared to consider advanced degrees in the sciences, or other fields such as business administration (M.B.A.) or law (J.D.). In fact many of our undergraduate degree recipients advance to graduate study.

Our Faculty

Members of the Department of Atmospheric and Environmental Sciences are funded externally by agencies such as the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), the Office for Naval Research (ONR), the National Oceanic and Atmospheric Administration (NOAA), the Air Force Office for Science Research (AFOSR) and others. Research interests of the Faculty teaching in the *Environmental Science program* include:

Climatology / Climate Change / Paleoclimatology

Dr. Aiguo Dai
Dr. Roberta Johnson
Dr. Jiping Liu
Dr. Mathias Vuille
Dr. Liming Zhou

Tropical Meteorology

Dr. Paul Roundy
Dr. Christopher Thorncroft
Dr. Mathias Vuille

Physical Meteorology and Instrumentation

Dr. Vince Idone
Dr. Justin Minder

Atmospheric Chemistry

Dr. Robert Keesee

Remote Sensing

Dr. Junhong Wang
Dr. Liming Zhou

Tropical Glaciology and Hydrology

Dr. Mathias Vuille



Prof. Vuille working on an automated weather station at 5760 m in the Peruvian Andes

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