Atmospheric and Oceanic Sciences (ATM)

Major in
Atmospheric and Oceanic Sciences
School of Marine and Atmospheric Sciences (SoMAS)

DEAN AND DIRECTOR: David Conover DIRECTOR OF UNDERGRADUATE STUDIES: Mary I. Scranton
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Faculty

Bassam Allam, Assistant Professor, Ph.D., University of Western Brittany: Diseases of shellfish.
Josephine Y. Aller, Research Professor, Ph.D., University of Southern California: Marine benthic ecology; invertebrate zoology; marine microbiology; biogeochemistry.
Robert C. Aller, Distinguished Professor, Ph.D., Yale University: Marine geochemistry; marine animal-sediment relations.
Robert A. Armstrong, Associate Professor, Ph.D., University of Minnesota: Marine ecology and biogeochemistry.
Stephen B. Baines, Research Assistant Professor, Ph.D., Yale University: Aquatic biogeochemistry of carbon and trace elements.
David Black, Assistant Professor, Ph.D., University of Miami: Sedimentary geology; paleo-oceanography; paleoecology.
Henry J. Bokuniewicz, Professor, Ph.D., Yale University: Near-shore transport processes; coastal sedimentation; marine geophysics.
Malcolm J. Bowman, Professor, Ph.D., University of Saskatchewan: Estuarine and coastal ocean dynamics.
Bruce J. Brownawell, Associate Professor, Ph.D., Massachusetts Institute of Technology-Woods Hole Oceanographic Institution Joint Program: Biogeochemistry of organic pollutants in seawater and groundwater.
Michael J. Cahill, Adjunct Professor, J.D., DePaul University College of Law: Application and development of environmental law in local government.
Robert M. Cerrato, Associate Professor, Ph.D., Yale University: Benthic ecology; population and community dynamics.
Robert D. Cess, Professor Emeritus, Ph.D., University of Pittsburgh: Radiative transfer and climate modeling; greenhouse effect; nuclear winter theory; atmospheric structures of Mars, Saturn, and Jupiter.
Edmund K.M. Chang, Associate Professor, Ph.D., Princeton University: Atmospheric dynamics and synoptic meteorology.
J. Kirk Cochran, Professor, Ph.D., Yale University: Marine geochemistry; use of radionuclides as geochemical tracers; diagenesis of marine sediments.

Brian A. Colle, Associate Professor, Ph.D., University of Washington: Synoptic meteorology; mesoscale numerical modeling and forecasting; coastal meteorology.
Jackie L. Collier, Assistant Professor, Ph.D., Stanford University: Phytoplankton ecology, microbial diversity and biocomplexity.
David O. Conover, Professor, Ph.D., University of Massachusetts, Amherst: Ecology of fishes; fishery biology.
Robert A. DiGiovanni, Jr., Adjunct Lecturer, M.S., Stony Brook University: Director of Riverhead Foundation for Marine Research and Preservation. Pinniped and sea turtle strandings response; life history and migratory patterns of marine megafauna.

Mark Fast, Assistant Professor, Ph.D., University of Dalhouse: Diseases of fish; parasites; immunoresponse.
Nicholas S. Fisher, Distinguished Professor, Ph.D., Stony Brook University: Marine phytoplankton physiology and ecology; biogeochemistry of metals; marine pollution.
Charles N. Flagg, Research Professor, Ph.D., Massachusetts Institute of Technology-Woods Hole Oceanographic Institution Joint Program: Continental shelf dynamics; biophysical interactions in shelf systems; climate change effects on coastal systems.
Roger D. Flood, Professor, Ph.D., Massachusetts Institute of Technology-Woods Hole Joint Program: Marine geology; sediment dynamics; continental margin sedimentation.

Michael Frist, Assistant Professor, Ph.D., University of Maryland, College Park: Biology, life history, and conservation of elasmobranchs with an emphasis on western Atlantic skates.
Marvin A. Geller, Professor, Ph.D., Massachusetts Institute of Technology: Atmospheric dynamics; stratosphere dynamics; ozone behavior.

Christopher Gobler, Associate Professor, Ph.D., Stony Brook University: Phytoplankton; harmful algal blooms; estuarine ecology; aquatic biogeochemistry.

Sultan Hayeed, Professor, Ph.D., University of Manchester: Climate change.

Paul F. Kemp, Associate Research Professor, Ph.D., Oregon State University: Growth and activity of marine microbes in water and sediment; benthic-pelagic interactions; molecular ecology of marine bacteria.

Daniel Knope, Assistant Professor, Ph.D., Swiss Federal Institute of Technology: Aerosol physics; atmospheric chemistry.

Cindy Lee, Distinguished Professor, Ph.D., University of California, San Diego: Marine geochemistry of organic compounds; organic and inorganic nitrogen cycle biochemistry.

Darcy J. Lonsdale, Associate Professor, Ph.D., University of Maryland at College Park: Zooplankton ecotone with special interest in physiology; life history studies.

Glenn R. Lopez, Professor, Ph.D., Stony Brook University: Benthic ecology; animal-sediment interactions.

Kamazima M. M. Lwiza, Associate Professor, Ph.D., University of Western Brittany: Invertebrate zoology: physiological ecology; population biology; aquatic toxicology.

Anne E. McEroy, Associate Professor, Ph.D., Massachusetts Institute of Technology-Woods Hole Joint Program: Aquatic toxicology.

Stephan B. Munch, Assistant Professor, Ph.D., Stony Brook University: Evolutionary ecology of growth and life history traits; applied fisheries dynamics modeling; statistics.

Bradley J. Peterson, Assistant Professor, Ph.D., University of South Alabama: Community ecology of seagrass-dominated ecosystems.

Sergey A. Piontkovski, Research Associate Professor, Ph.D., Institute of Biology of the Southern Seas, Ukraine (UBMR): Physical-biological coupling in coastal and oceanic ecosystems.

Nicole Reimer, Assistant Professor, Ph.D., University of Karlsruhe (Germany): Trace gases; aerosols; microphysics; cloud formation.

Frank J. Rothel, Lecturer, Ph.D., Stony Brook University: Environmental chemistry; behavior of coal waste in the environment; solution chemistry.

Carl Safina, Research Professor, Ph.D., Rutgers University: President of Blue Ocean Institute: Marine conservation; fisheries; sea birds; sea turtles.

Sergio A. Sanudo-Wilhelmy, Professor, Ph.D., University of California, Santa Cruz: Chemical oceanography; coastal geochemistry; metal cycling in aquatic systems.
SoMAS is one of the nation's leading coastal oceanographic and atmospheric institutions, and the expertise of SoMAS' faculty places SBU in the forefront in addressing and answering questions about regional environmental problems, as well as problems relating to the global ocean and atmosphere. The primary focus of the SoMAS faculty is on fundamental research designed to increase understanding of the processes that characterize the coastal ocean and the atmosphere. SoMAS faculty are also committed to applying the results of research to solve problems arising from society's uses and misuses of the environment. SoMAS also includes mission-oriented institutes in several major areas: the Institute for Terrestrial and Planetary Atmospheres, the Living Marine Resources Institute, the Long Island Groundwater Resource Institute, and the Waste Reduction and Management Institute. These institutes add a wealth of resources to education and research.

The SoMAS offers undergraduate majors in atmospheric and oceanic sciences, environmental studies, marine sciences, and marine vertebrate biology; and minors in environmental studies and marine sciences. See the separate entries for environmental studies (ENS), marine sciences (MAR), and marine vertebrate biology (MVB) in the alphabetical listings of Approved Majors, Minors, and Programs. The SoMAS also offers several cooperative programs with departments in the College of Arts and Sciences (Chemistry, Biology, and Geosciences) and the College of Engineering and Applied Sciences (Chemical and Molecular Engineering). See the entries for those programs in the alphabetical listings of Approved Majors, Minors, and Programs for more information. Research opportunities in marine sciences, atmospheric sciences, environmental studies, and waste management are available to undergraduates. Information on research opportunities may be found by contacting faculty directly or on the SoMAS Web site at http://www.somas.stonybrook.edu.

Courses Offered in Atmospheric and Oceanic Sciences

See the Course Descriptions listing in this Bulletin for complete information.

ATM 101-E Long Island Sound: Science and Use
ATM 102-E Weather and Climate
ATM 205-E Introduction to Atmospheric Sciences
ATM 237-H Current Topics in World Climate and Atmosphere
ATM 247 Atmospheric Structure and Analysis
ATM 305-E Global Atmospheric Change
ATM 320 Spatial Data Analysis Using Matlab
ATM 345 Atmospheric Thermodynamics and Dynamics
ATM 346 Advanced Atmospheric Dynamics
ATM 347 Advanced Synoptic Meteorology and Weather Forecasting
ATM 348 Atmospheric Physics
ATM 397 Air Pollution and Its Control
ATM 437 Forecasting Practicum
ATM 447 Senior Tutorial in Atmospheric Sciences
ATM 487 Senior Research in Atmospheric Sciences
ATM 488 Internship

Courses Offered in Marine Sciences

See the Course Descriptions listing in this Bulletin for complete information.

MAR 101-E Long Island Sound: Science and Use
MAR 104-E Oceanography
MAR 301 Environmental Microbiology
MAR 302 Marine Microbiology and Microbial Ecology
MAR 303 Long Island Marine Habitats
MAR 304-E Waves, Tides, and Beaches
MAR 305 Experimental Marine Biology
MAR 308 Principles of Instrumental Analysis
MAR 315-H Conservation Biology and Marine Biodiversity
MAR 318 Engineering Geology and Coastal Processes
MAR 320 Limnology
MAR 333-H Coastal Oceanography
MAR 334-E Remote Sensing of the Environment
MAR 336 Marine Pollution
MAR 340-H Environmental Problems and Solutions
MAR 346 Marine Sedimentology
MAR 349 Introduction to Biological Oceanography
MAR 350 Introduction to Ocean Physics
MAR 351 Introduction to Ocean Chemistry
MAR 366 Plankton Ecology
MAR 370 Marine Mammals
MAR 371 The Biology and Conservation of Marine Birds and Sea Turtles

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MAR 380 Ichthyology
MAR 385 Principles of Fishery Biology and Management
MAR 392-H Waste Management Issues
MAR 394-H Environmental Toxicology and Public Health
MAR 395 Topics in Marine Environmental Sciences
MAR 475 Undergraduate Teaching Practicum
MAR 487 Research in Marine Sciences
MAR 488 Internship

Requirements for the Major in Atmospheric and Oceanic Sciences (ATM)

The major in Atmospheric and Oceanic Sciences leads to the Bachelor of Science degree. Two tracks of study are available in the major. One is intended for students wishing to learn about the physical behavior of the atmosphere and its application to weather forecasting and the other track is for students who wish to learn about physical phenomena in the atmosphere and the oceans and their interactions.

Of the 65 credits required for the major, at least 61 credits must be passed with a letter grade of C or higher.

Completion of the major requires approximately 65 credits.

The core courses for both tracks are as follows:

A. Required Courses in Mathematics, Chemistry, Physics, and Computer Science
1. MAT 131 and 132 Calculus I and II (See note below)

2. MAT 203 Calculus III with Applications
   or MAT 205 Calculus III
   or AMS 261 Applied Calculus III

3. CHE 131 General Chemistry I
   or CHE 141 Honors Chemistry I

4. PHY 125, 126, 127 Classical Physics A, B, and C
   or PHY 131/133, 132/134 Classical Physics I and II with labs
   or PHY 141, 142 Classical Physics I and II: Honors

5. PHY 277 Computation for Physics and Astronomy
   or ESG 111 C Programming for Engineers
   or CSE 130 Introduction to Programming in C

B. Required Departmental Courses:
1. ATM 205 Introduction to Atmospheric Sciences
2. ATM 247 Atmospheric Structure and Analysis
3. ATM 345 Atmospheric Thermodynamics and Dynamics
4. ATM 348 Atmospheric Physics
5. ATM 397 Air Pollution and Its Control
6. MAR 334 Remote Sensing
7. MAR 350 Ocean Physics

Additional Requirements for the Meteorology Track:
CHE 132 General Chemistry II
or CHE 142 Honors Chemistry II
MAT 303 or MAT 305 Calculus IV with applications
or AMS 361 Applied Calculus
ATM 346 Advanced Atmospheric Dynamics
ATM 347 Advanced Synoptic Meteorology
PHY 251 Modern Physics
or ATM 320 Spatial Data Analysis Using Matlab

In this track, students learn both the mathematics and physics governing atmospheric behavior and apply this knowledge to forecasting the weather using real-time data received at our weather laboratory. Opportunities are available for students to gain additional practical experience by working under cooperative agreements at two nearby NOAA weather forecasting installations as well as local TV stations. Students graduating in this track will have satisfied all of the
coursework recommended by the American Meteorological Society for undergraduate training in meteorology and also the course work required by NOAA for certification as an entry-level government meteorologist. Students graduating in this track will have taken the coursework necessary for graduate study leading to degrees that prepare them for research and teaching positions in the atmospheric sciences. Students are also prepared for positions in other technically related fields.

**Additional Requirements for the Atmosphere/Ocean Track:**

- AMS 102 Elements of Statistics
- AMS 394 Statistical Lab or AMS 210 Linear Algebra

**Sample Course Sequence for the Major in Atmospheric and Oceanic Sciences (Oceanography Track)**

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ATM 320 Spatial Data Analysis Using Matlab
MAR 333 Coastal Oceanography
MAR 340 Environmental Problems and Solutions or ENS 301 Contemporary Environmental Issues

This track is not intended for students who are interested in the NOAA/National Weather Service or graduate school in atmospheric science. Rather, students graduating in this track receive a solid background in statistics, atmospheric science, and oceanography and are therefore well qualified for jobs in the private sector (instrument companies, weather and climatology consultants, weather support for major industry such as airlines and utilities, as well as forecast and climate modeling companies). The ocean-related courses also help those students who are interested in the M.S. graduate program in physical oceanography. Students are also prepared for positions in other technically related fields.

Note: The following alternate beginning calculus sequences may be substituted for major requirements or prerequisites: MAT 125, 126, 127 or 141, 142 or MAT 171 or AMS 151, 161 for MAT 131, 132. Equivalency for MAT courses achieved by earning the appropriate score on a placement test is accepted as fulfillment of the requirement without the necessity of substituting other credits. For more detailed information about the various calculus sequences, see “Beginning Mathematics Courses” under the Mathematics Department in this Bulletin.

**C. Upper-Division Writing Requirement:**

All students majoring in Atmospheric Sciences/Meteorology must submit two papers from required departmental courses (term papers, laboratory reports, or independent research papers) to the director of undergraduate studies for evaluation by the end of the junior year. If this evaluation is satisfactory, the student has fulfilled the upper-division writing requirement. If it is not, the student must fulfill the requirement before graduation.