Atmospheric and Oceanic Sciences (ATM)

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

DEAN AND DIRECTOR: David Conover
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Faculty

Bassam Alham, 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: Near 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 C. 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 Dalhousie: Diseases of fish; parasites; immunoreponses.

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; bio-physical 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 Frisk, Assistant Professor, Ph.D., University of Maryland at 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 Hameed, Professor, Ph.D., University of Maryland at College Park: Marine conservation; fisheries; sea birds; sea turtles.

Wendy I. Scranton, Professor, Ph.D., Massachusetts Institute of Technology-Woods Hole Oceanographic Institution Joint Program: Marine geochemistry; biological-chemical inter-
actions in seawater.

Robert L. Swanson, Adjunct Professor and Director, Waste Reduction and Management Institute; Ph.D., Oregon State University: Marine monitoring; environmental tradeoffs in waste disposal methodologies and sites especially in the marine environment.

Gordon T. Taylor, Professor, Ph.D., University of Southern California: Marine microbiology; microbial ecology; plankton trophodynamics; marine biofouling.

Prasad Varanasi, Professor, Ph.D., University of California, San Diego: Planetary spectroscopy.

Dong Ping Wang, Professor, Ph.D., University of Miami: Coastal ocean dynamics.

Joseph D. Warren, Assistant Professor, Ph.D., Massachusetts Institute of Technology-Woods Hole Oceanographic Institution: Joint Program: Acoustical oceanography; zooplankton behavior and ecology.

Michael E. White, Esq., Adjunct Lecturer, J.D., Touro Law School: Regulation of solid, liquid, and hazardous wastes; fishery management; brownfields redevelopment.

Robert E. Wilson, Associate Professor, Ph.D., The Johns Hopkins University: Estuarine and coastal ocean dynamics.

Peter M.J. Woodhead, Research Professor, B.S., University of Durham: Behavior and physiology of fish; coral reef ecology; ocean energy conversion systems.

Minghua Zhang, Professor and Director of the Institute of Terrestrial and Planetary Atmospheres, Ph.D., Academia Sinica: Atmospheric dynamics; climate modeling.

Affiliated Faculty

Robert L. deZafra, Physics
William H. Greene, Medicine
Lee E. Koppelman, Political Science
Jeffrey Levinton, Ecology and Evolution
Dianna Padilla, Ecology and Evolution
Sheldon Reaven, Technology and Society

Teaching Assistants

Estimated number: 20

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 varied 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 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

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

**Freshman Fall**
- First Year Seminar 101 1
- D.E.C. A 3
- MAT 131 4
- CHE 131 or 141 4
- PHY 131/133 or PHY 141 4
- Total 16

**Spring Credits**
- First Year Seminar 102 1
- D.E.C. A 3
- MAT 132 4
- CHE 132 or 142 4
- PHY 132/134 or PHY 142 4
- Total 16

**Sophomore Fall**
- ATM 205 3
- MAT 203 or 205 or AMS 261 or PHY 251 4
- PHY 277 or ESG 111 or CSE 130 3
- D.E.C. 3
- D.E.C. 3
- Total 16

**Spring Credits**
- ATM 247 3
- MAT 203 or 205 or AMS 261 or PHY 251 or ATM 320 4
- D.E.C. 3
- D.E.C. 3
- D.E.C. 3
- Total 16

**Junior Fall**
- ATM 345 3
- MAT 303 or 305 or AMS 361 3
- D.E.C. 3
- D.E.C. 3
- D.E.C. 3
- Total 15

**Spring Credits**
- ATM 346 3
- ATM 348 or 397 3
- D.E.C. 3
- Upper-Division elective 3
- Elective 3
- Total 15

**Senior Fall**
- ATM 347 3
- MAR 334 3
- Upper-Division elective 3
- Elective 3
- Elective 3
- Total 15

**Spring Credits**
- ATM 348 or 397 3
- MAR 350 2
- Upper-Division elective 3
- Elective 3
- Elective 3
- Total 14

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 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

MAR 394-H Environmental Toxicology and Public Health
MAR 395 Topics in Marine Environmental Sciences
MAR 447 Readings in Marine Science
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
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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
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 pre-

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.