Atmospheric and Oceanic Sciences (ATM)

Major in Atmospheric and Oceanic Sciences

Marine Sciences Research Center

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Faculty

Bassem 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: Aquatic biogeochemistry of carbon and trace elements.
Henny 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.
Alistair Dove, Assistant Professor, Ph.D., University of Queensland: Pathology; taxonomy; life cycles; ecology.
Nicholas S. Fisher, Distinguished Professor, Ph.D., Stony Brook University: Marine phytoplankton physiology and ecology; biogeochemistry of metals; marine pollution.
Roger D. Flood, Professor, Ph.D., Massachusetts Institute of Technology-Woods Hole Joint Program: Marine geology; sediment dynamics; continental margin sedimentation.
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.
Steven A. Goodbred, Jr., Assistant Professor, Ph.D., College of William and Mary: Marine sedimentology; coastal margin processes.
Sultan Hameed, 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.
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 ecology with special interest in physiology; life history studies.
Glenn R. Lopez, Professor, Ph.D., Stony Brook University: Benthic ecology; animal-sediment interactions.
Kamazine M. M. Luwiza, Associate Professor, Ph.D., University College of North Wales: Coastal ocean circulation; tides and tidal fronts; mixing.
John E. Mak, Associate Professor, Ph.D., University of California, San Diego: Atmospheric chemistry and biosphere-Atmosphere interactions; isotope geochemistry.
Jack Mattice, Director of Sea Grant Institute and Adjunct Professor, Ph.D., Syracuse University: Invertebrate zoology; physiological ecology; population biology; aquatic toxicology.
Anne E. McElroy, Associate Professor, Ph.D., Massachusetts Institute of Technology-Woods Hole Joint Program: Aquatic toxicology.
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 (USSR): 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. Roethel, Lecturer, Ph.D., Stony Brook University: Environmental chemistry; behavior of coal waste in the environment; solution chemistry.
Sergio A. Sanudo-Wilhelmy, Associate Professor, Ph.D., University of California, Santa Cruz: Chemical oceanography; coastal geochemistry; metal cycling in aquatic systems.
Mary I. Scranton, Professor, Ph.D., Massachusetts Institute of Technology-Woods Hole Oceanographic Institution Joint Program: Marine geochemistry; biological-chemical interactions 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.
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.
The Marine Sciences Research Center (MSRC) is the center for marine research, education, and public service in the marine and environmental sciences for the State University of New York system. In addition, MSRC is the Stony Brook University's center for research, education, and public service in the atmospheric sciences. MSRC is one of the nation’s leading coastal oceanographic and atmospheric institutions, and the expertise of MSRC’s faculty places them 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 MSRC faculty is on fundamental research designed to increase understanding of the processes that characterize the coastal ocean and the atmosphere. The Marine Sciences Research Center is also committed to applying the results of research to solve problems arising from society’s uses and misuses of the environment. The Center includes 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.

MSRC offers undergraduate majors in atmospheric and oceanic sciences and 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. MSRC 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 MSRC Web site at http://www.msrc.sunysb.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 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

http://www.stonybrook.edu/ugbulletin
### Sample Course Sequence for the Major in Atmospheric and Oceanic Sciences (Meteorology Track)

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<th>Semester</th>
<th>Fall Credits</th>
<th>Spring Credits</th>
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<td>Freshman</td>
<td>D.E.C. A 3</td>
<td>MAT 132 4</td>
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<td>MAT 131 4</td>
<td>CHE 132 or 142 4</td>
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<td></td>
<td>CHE 131 or 141 4</td>
<td>PHY 132/134 or PHY 142 4</td>
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<td>ATM 247 3</td>
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<td>MEC 111 3</td>
<td>D.E.C. 3</td>
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<td>Junior</td>
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<td>ATM 348 or 397 3</td>
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<td>Senior</td>
<td>ATM 347 3</td>
<td>ATM 348 or 397 3</td>
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<td>MAR 334 3</td>
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### 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 206 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. MEC 111 Computer Science for Engineers
6. PHY 277 Unix Computing for Physics

**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
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 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.