

# ATM

## Atmospheric and Oceanic Studies

### ATM 102-E Weather and Climate

Introduces the nature and causes of common meteorological phenomena, severe weather occurrences, and climatic patterns. Topics include formation and movement of air masses and large-scale storms; techniques for weather prediction; weather satellites; hurricanes, tornadoes, and thunderstorms; cloud and precipitation types; the climatic history of the earth; and actual and potential effect of human activities on weather and climate, and of weather and climate on humans. This course is offered as both ATM 102 and EST 102.

3 credits

### ATM 205-E Introduction to Atmospheric Sciences

A study of the nature and causes of atmospheric phenomena, along with basic physical and chemical processes and energetics. Topics include composition and structure of the atmosphere, atmospheric thermodynamics, hydrostatics, solar and terrestrial radiation, cloud and precipitation processes, elementary dynamics, atmospheric wind and pressure patterns, and severe storms.

*Prerequisites:* ENS/PHY 119 or PHY 121/123 or 125 or 131/133 or 141; MAT 125 or 131 or 141 or AMS 151

3 credits

### ATM 237-H Current Topics in World Climate and Atmosphere

An exploration of current concerns about the greenhouse effect, acid rain, and global ozone loss, in a format accessible to non-science majors. The social and political steps being taken to limit global atmospheric pollution and climate change are discussed. Not for major credit. This course is offered as both ATM 237 and PHY 237.

*Prerequisites:* One D.E.C. category E course; satisfaction of entry skill in mathematics requirement

3 credits

### ATM 247 Atmospheric Structure and Analysis

Real-world applications of basic dynamical principles to develop a physical understanding of various weather phenomena. Topics include the hypsometric equation, structure and evolution of extratropical cyclones, fronts, hurricanes, and convective systems, surface and upper air analysis techniques, radar and satellite interpretation, and introduction to operational products and forecasting. Two hours of lecture and one two-and-one-half hour laboratory per week. Laboratories include weather discussions and case study analysis.

*Prerequisite:* ATM 205

3 credits

### ATM 305-E Global Atmospheric Change

An application of chemical principles to the analysis and prediction of climate changes on earth. The course analyzes climates that have occurred in the earth's past and uses this information to infer climate changes that are likely to occur in the near and distant future. Topics covered include atmospheric chemistry, paleoclimates, greenhouse warming, ozone changes, and urban pollution.

*Prerequisites:* MAT 125 or 131 or 141 or AMS 151; CHE 131 or 141

Advisory *Prerequisite:* One of the following: ENS/PHY 119, 132/134, 142, or 127

3 credits

### ATM 320 Spatial Data Analysis Using Matlab

Provides a working knowledge of the multivariate analysis methods used in the earth and atmospheric sciences and the Matlab programming tool. Topics

include regression, eigenvalue, principal component analysis, and objective mapping.

*Prerequisites:* MEC 111; MAT 132

3 credits

### ATM 345 Atmospheric Thermodynamics and Dynamics

A quantitative introduction to the thermodynamical and dynamical processes of Earth's atmosphere. Topics include moist and dry thermodynamical processes, hydrostatic stability, external forces of atmospheric motion, equations of atmospheric motions on a rotating planet, coordinate transformations, and horizontal motions under balanced forces.

*Prerequisites:* MAT 203 or 205 or AMS 261; MEC 111; PHY 126/127 or 132/134 or 142

3 credits

### ATM 346 Advanced Atmospheric Dynamics

Advanced concepts of mid-latitude and tropical atmospheric motions, wave dynamics, and numerical methods. Topics include circulation and vorticity, turbulence and boundary-layer structure, quasi-geostrophic theory, large-scale and buoyancy-driven waves, baroclinic instability and energetics, equatorial wave theory, and barotropic and primitive equation models.

*Prerequisites:* ATM 345; MAT 303 or AMS 361

3 credits

### ATM 347 Advanced Synoptic Meteorology and Weather Forecasting

The application of dynamical and physical meteorology to the analysis and prediction of the atmosphere. Topics include application of numerical and statistical models, diagnosis of vertical motion, development of midlatitude synoptic systems, mesoscale phenomena associated with cyclones, convective systems, and radar applications. Laboratories include extensive practice in forecasting and diagnosis of synoptic and convective systems.

*Prerequisites:* ATM 346 and 348

3 credits

### ATM 348 Atmospheric Physics

The application of the laws of physics to a variety of atmospheric phenomena and processes. Topics include cloud and precipitation processes with emphasis on the microphysics, atmospheric electricity, solar and terrestrial radiation, photochemical processes, and boundary layer heat and mass transfer.

*Prerequisite:* ATM 345

3 credits

### ATM 397 Air Pollution and Its Control

A detailed introduction to the causes, effects, and control of air pollution. The pollutants discussed include carbon monoxide, sulfur oxides, nitrogen oxides, ozone, hydrocarbons, and particulate matter. The emissions of these gases from natural and industrial sources and the principles used for controlling the latter are described. The chemical and physical transformations of the pollutants in the atmosphere are investigated and the phenomena of urban smog and acid rain are discussed.

*Prerequisites:* ENS/PHY 119 or PHY 132/134 or 142, or PHY 126 and 127; CHE 131 or 141 or 198; MAT 125 or 131 or 141 or AMS 151; U3 or U4 standing

3 credits

### ATM 437 Forecasting Practicum

The course provides students with additional forecasting experience. Students make at least three forecasts per week for either Long Island or a city designated by the National Forecast Contest. Students write a weather discussion for each forecast and verify their forecasts to show their progress during the semester.

*Pre- or Corequisite:* ATM 347

1 credit

### ATM 447 Senior Tutorial in Atmospheric Sciences

Independent readings in advanced topics to be arranged prior to the beginning of the semester. Weekly conferences are held with a faculty member. May be repeated once.

*Prerequisite:* Permission of instructor and SoMAS Undergraduate Program Director

1-3 credits

### ATM 487 Senior Research in Atmospheric Sciences

Under the supervision of a faculty member, a student majoring in atmospheric and oceanic sciences may conduct research for academic credit. A research proposal must be prepared by the student and submitted to the MSRC Undergraduate Director for approval before the beginning of the semester in which credit is to be given. A written report must be submitted before the end of the semester. May be repeated once.

*Prerequisite:* Permission of instructor and SoMAS Undergraduate Program Director

0-6 credits

### ATM 488 Internship

Participation in research at off-campus laboratories, including the National Weather Service. Students are required to submit to the department a proposal at the time of registration and a report at the end of the semester. May be repeated up to a limit of 12 credits.

*Prerequisites:* ATM 347; permission of instructor and SoMAS Undergraduate Program Director

0-6 credits, S/U grading