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 201 - E: Introduction to Climate and Climate Change
An introduction to the earth's climate system as it exists today, how the climate system has changed in the past, and what future climates may look like in the future. Topics include the causes of climate change, the response times of different parts of the climate system, interactions and feedbacks between the atmosphere, oceans, ice, continents, and vegetation, and the role of carbon as it moves within the climate system on different timescales.
3 credits

ATM 205 - E: Introduction to Climate and Climate Change
An introduction to the earth's climate system as it exists today, how the climate system has changed in the past, and what future climates may look like in the future. Topics include the causes of climate change, the response times of different parts of the climate system, interactions and feedbacks between the atmosphere, oceans, ice, continents, and vegetation, and the role of carbon as it moves within the climate system on different timescales.
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. Labora-tories include weather discussions and case study analysis.
Prerequisite: ATM 205
3 credits

ATM 274: 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. Labora-tories 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.
Prerequisite: CSE 130 or ESG 111 or PHY 277; MAT 127 or 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: ATM 205; MAT 203 or MAT 205 or AMS 261; PHY 126/PHY 127 or PHY 132/PHY 134 or PHY 142; CSE 130 or ESG 111 or PHY 277
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, or PHY 125 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 Programs 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 Programs 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