ATMOSPHERIC SCIENCES, MINOR

Program Requirements

Students from other disciplines who choose the minor in atmospheric sciences must complete 10 semester hours from the following courses.

Code	Title	Hours
Required Courses		
ATSC 2403	Introduction to Meteorology	4
ATSC 3306	Atmospheric Thermodynamics	3
ATSC 4335	Climate and Climate Variability	3
Select 9-12 hours of the following:		9-12
ATSC 2301	Weather Observations	
ATSC 2302	Introduction of Data Analysis in Atmospheric Sciences	
ATSC 3305	Physical Meteorology	
ATSC 3401	Synoptic Meteorology	
ATSC 3402	Mesoscale Meteorology	
ATSC 4301	Dynamic Meteorology I	
ATSC 4302	Dynamic Meteorology II	
ATSC 4305	Remote Sensing	
ATSC 4590	Selected Topics [1]	
Total Hours		**19-22**

[1] Pre-approval is required by ATSC faculty for taking ATSC 4590 Selected Topics (1-5 sch).

Notes:

Students should consult the catalog to determine any additional prerequisites for the courses. Students must earn a 2.50 minimum cumulative grade point average on all courses attempted in the minor discipline. The selection of courses must be made in agreement with the ATSC Advisor for minor programs.

Courses

ATSC 2301 Weather Observations
3 Semester Credit Hours (3 Lecture Hours)
This course is an introduction of the basic concept of meteorology. The focus is on the measurements of the atmosphere and weather related phenomenon. The principle of the instruments used to measure temperature, pressure, moisture, radiation, precipitation and other weather related properties of the atmosphere will be introduced. The differences among the observations from in-situ, balloon borne, airborne, and satellite borne instruments will be examined and discussed.
Prerequisite: ATSC 2403.

ATSC 2302 Introduction of Data Analysis in Atmospheric Sciences
3 Semester Credit Hours (3 Lecture Hours)
This course will enhance student skills for analyzing atmospheric science-related datasets under various scientific programming environments. The focus is on developing a data analysis and problem-solving skillsets using mostly Python. The course includes: basic concepts of operating systems and high-level programming languages; basics of programming in Python; general data analysis methods and tools; scientific data formats used in remote sensing data and numerical model output; publication-quality scientific graphics; and critical steps of building a large programming project. Examples with IDL and FORTRAN are also included.

ATSC 2308 Weathercasting
3 Semester Credit Hours (3 Lecture Hours)
This course overviews the concepts and procedures used for television weathercasts. Students will practice on-camera presentation procedures and articulation; learn the concept of the weather story; and summarize different city's broadcasts for a variety of weather events. Students will participate in greenscreen concepts through immersion in I-CREATE's broadcast studios. This class includes exercises which facilitate learning the regional audience, culture, and geography.
Prerequisite: ATSC 2403.

ATSC 2403 Introduction to Meteorology
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
This course is an introduction to the fundamentals of meteorology. Topics covered include atmospheric structure, heat balance, moisture, stability, precipitation, atmospheric motion, circulations on global and local scales, fronts, and weather charts. Lab exercises enhance the lecture material.
Co-requisite: SMTE 0096.

ATSC 3305 Physical Meteorology
3 Semester Credit Hours (3 Lecture Hours)
This course will cover the fundamentals of atmospheric physics including atmospheric composition, kinetic theory of gases, stratospheric ozone chemistry, magnetosphere phenomena, fair-weather electric field, nucleation processes, cloud microphysics, precipitation processes, visibility and optics, lightning and atmospheric electrification, hydrometeors and aerosol science, air pollution concepts and transport, and scattering of electromagnetic radiation.
Prerequisite: ATSC 2403 and PHYS 2425*.
* May be taken concurrently.

ATSC 3306 Atmospheric Thermodynamics
3 Semester Credit Hours (3 Lecture Hours)
This course introduces a foundation in the thermodynamics of the atmosphere. After a brief review of general thermodynamics, the emphasis is given to the basic principles that are useful for the application to atmospheric problems. The course covers a number of atmospheric processes that are basically thermodynamic in nature. The specific topics include aerological diagrams, atmospheric statics, and vertical stability.
Prerequisite: ATSC 2403 and PHYS 2425*.
* May be taken concurrently.

ATSC 3401 Synoptic Meteorology
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
This course focuses on introducing middle-latitude synoptic weather phenomenon, including planet waves, frontal systems etc. We will apply principles of Dynamic Meteorology in regards to processes in the atmosphere, weather elements and forecasting. We will examine the structure and dynamics of these systems by integrating weather observations with the current state of dynamic theory, numerical weather prediction models, and the physical principles of atmospheric thermodynamics and cloud and precipitation physics.
Prerequisite: ATSC 3306* and MATH 2413.
* May be taken concurrently.
Co-requisite: SMTE 0096.

ATSC 3402 Mesoscale Meteorology
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
This course provides an introduction to the basics of weather radar and mesoscale atmospheric phenomena, covering scales from 10- to 1000-km. Key topics include single-cell convection, multicell convective systems, squall lines, and supercells. The mechanisms behind tornadoes and lightning will also be explored. Additionally, the course will cover methods for observing, analyzing, and predicting severe weather systems, with a focus on interpreting satellite and radar images.
Prerequisite: ATSC 3306.
Co-requisite: SMTE 0096.

ATSC 4301 Dynamic Meteorology I
3 Semester Credit Hours (3 Lecture Hours)
This course focuses on introductory-level dynamics, which is the study of motions that control the atmosphere and the ocean. The fundamental equations are derived with variations based on reference frames, vertical coordinates, horizontal coordinates, length scales, time scales, the Eulerian concept, and the Lagrangian concept. Equation components are then applied to different types of quasi-balanced flow with applications to mesoscale and synoptic meteorology. Topics such as trajectories, streamlines, divergence, vorticity, advection, and baroclinicity are introduced.
Prerequisite: MATH 2413.

ATSC 4302 Dynamic Meteorology II
3 Semester Credit Hours (3 Lecture Hours)
This course is a continuation of ATSC 4301 (Dynamic Meteorology I), which covers introductory-level atmospheric dynamics. The course introduces more advance material including wave theory, hydrodynamic instability, boundary layer theory, teleconnections, and quasi-geostrophic theory.
Prerequisite: ATSC 4301.

ATSC 4305 Remote Sensing
3 Semester Credit Hours (3 Lecture Hours)
This course aims to introduce the fundamentals of satellite/airborne remote sensing techniques and demonstrates its application to various aspects of Earth Sciences. Topics include physical principles of remote sensing from ultraviolet to the microwave, radiometry, sensors and sensor technology, calibration, and environmental applications for land, ocean and atmosphere research.
Prerequisite: PHYS 2426.

ATSC 4318 Broadcast Meteorology Practicum
3 Semester Credit Hours (3 Lecture Hours)
Broadcast meteorology involves clearly and efficiently conveying a concise weather message to the public through different types of medias. In modern society, this information is relayed on TV, radio, websites, and social media. This course provides an overview on all aspects of the broadcast market and teaches the fundamentals of relaying weather information in this medium.
Prerequisite: ATSC 2403.

ATSC 4335 Climate and Climate Variability
3 Semester Credit Hours (3 Lecture Hours)
This course intended to guide environmental science undergraduate students in developing a conceptual understanding of Earth's global climate and its variability. Review past climates, present mean state of the climate system, climate variability from seasonal to multi-decadal time scales, and climate change. Special attention will be given to climates of the Gulf of Mexico, Caribbean Sea and surrounding land regions. Plausible climate-change scenarios, as well as mitigation and adaptation strategies will also be discussed. Cross listed with ESCI 4335.
Prerequisite: ATSC 2403.

ATSC 4380 Atmospheric Modeling
3 Semester Credit Hours (3 Lecture Hours)
Numerical modeling solves prognostic equations using a time-stepping procedure to simulate fluid behavior. Atmospheric models input a statistically optimized set of observations and solve momentum equations, a thermodynamic equation, the ideal gas law, and a conservation of mass equation. Atmospheric models are used for weather forecasting, case study simulations, climate change studies, and diagnostic studies. This course teaches the fundamental concepts of atmospheric modeling and a variety of practical applications.
Prerequisite: MATH 2413.

ATSC 4496 Directed Independent Study
1-4 Semester Credit Hours (1-4 Lecture Hours, 4 Lab Hours)
Requires a formal proposal of study to be completed in advance of registration and to be approved by the supervising faculty, the Chairperson, and the Dean of the College. This class may be repeated for credit after proper approval.

ATSC 4498 Internship in Atmospheric Science
1-4 Semester Credit Hours
ATSC 4498 (Internship in Atmospheric Science) gives ATSC undergraduates an opportunity to obtain valuable paid or unpaid work experience related to atmospheric science, to better position them for employment after graduation. Students contract to work a specified number of hours weekly over a full semester with a state or federal agency or private industry related to atmospheric science, in return for college credit as follows: 3-6 hrs./week=1 sem. hr., 6-9 hrs./week =2 sem. hrs., 9-12 hrs./week=3 sem. hrs., 12-15 hrs./week=4 sem. hrs. Students may contract for 1-2 sem. hrs. in a single summer session (5.5 weeks) but may contract for up to 4 sem. hrs. if carrying out internship over a regular long semester or two summer sessions (11 weeks). If interning for the summer, students should increase the number of hours interned weekly to account for the shortened period worked, so total hours interned will be equivalent to those in a regular long semester. A student may intern only twice with a single office or agency. The internships will not apply towards graduate credit.

ATSC 4590 Selected Topics
1-5 Semester Credit Hours (1-5 Lecture Hours, 5 Lab Hours)
This course includes special topics with variable content. May be repeated for credit. Offered on sufficient demand.