Program Description

The Bachelor of Science program in Atmospheric Sciences addresses the needs of students interested in studying meteorology or climate science. The program provides students with an in-depth knowledge of the physical characteristics, motions and processes of air; as well as the interactions of this protective layer with the underlying oceans and continents. The undergraduate program emphasizes a systems approach, combining traditional atmospheric sciences with emerging fields. In particular, the program focuses on the fields of tropical meteorology and oceanography that are directly linked to the Gulf of Mexico and surrounding coastal regions where the university is strategically located.

Student Learning Outcomes

Students will:

- Possess a broad understanding of the field of atmospheric sciences in preparation for successful careers in related disciplines;
- Gain experience and professional competence in the use of scientific method to develop and conduct atmospheric sciences related work;
- Acquire the necessary skills to effectively communicate the meteorology and climate sciences information to a range of audiences and participate in community and/or professional service through various organizations.

General Requirements

The Bachelor of Science in Atmospheric Sciences degree requires a minimum of 120 semester credit hours: 42 are from designated University Core Curriculum Program courses, 57 are from atmospheric sciences core courses and 21 are from career track courses. The atmospheric sciences core provides students with a broad background in meteorology and climate sciences, and satisfy the requirements for federal employment as a National Weather Service meteorologist (also referred to as NOAA GS1340 positions). The students can choose a career track in either general atmospheric sciences or the broadcast meteorology. Students should select a career track as soon as possible after they complete their freshman year and well before they begin their junior year.

Program Requirements

Full-time, First-year Students

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIV 1101</td>
<td>University Seminar I</td>
<td>1</td>
</tr>
<tr>
<td>UNIV 1102</td>
<td>University Seminar II</td>
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Core Curriculum Program

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td></td>
<td>University Core Curriculum 1</td>
<td>42</td>
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ATSC majors are required to take:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2413</td>
<td>Calculus I</td>
<td></td>
</tr>
<tr>
<td>PHYS 2425</td>
<td>University Physics I</td>
<td></td>
</tr>
<tr>
<td>PHYS 2426</td>
<td>University Physics II</td>
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</tbody>
</table>

Atmospheric Sciences Core Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATSC 2403</td>
<td>Introduction to Meteorology</td>
<td>4</td>
</tr>
<tr>
<td>ATSC 2301</td>
<td>Weather Observations</td>
<td>3</td>
</tr>
<tr>
<td>ATSC 2302</td>
<td>Introduction of Data Analysis in Atmospheric Sciences</td>
<td>3</td>
</tr>
<tr>
<td>ATSC 3305</td>
<td>Physical Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>ATSC 3306</td>
<td>Atmospheric Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>ATSC 3401</td>
<td>Synoptic Meteorology</td>
<td>4</td>
</tr>
<tr>
<td>ATSC 3402</td>
<td>Mesoscale Meteorology</td>
<td>4</td>
</tr>
<tr>
<td>ATSC 4301</td>
<td>Dynamic Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>ATSC 4305</td>
<td>Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 1411</td>
<td>General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>ATSC 4335</td>
<td>Climate and Climate Variability</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2414</td>
<td>Calculus II (3 hours included in University Core)</td>
<td>1</td>
</tr>
<tr>
<td>MATH 3311</td>
<td>Linear Algebra</td>
<td>3</td>
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<tr>
<td>MATH 3315</td>
<td>Differential Equations</td>
<td>3</td>
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<tr>
<td>MATH 2415</td>
<td>Calculus III</td>
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<tr>
<td>ESCI 4360</td>
<td>Physical Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3345</td>
<td>Statistical Modeling and Data Analysis</td>
<td>3</td>
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</tbody>
</table>

Career Tracks in Atmospheric Sciences

Select one of the following Tracks: 18-21

- Atmospheric Sciences Track (p. 2)
- Broadcast Meteorology Track (p. 2)

Electives

<table>
<thead>
<tr>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective to get to 120</td>
<td>1-6</td>
</tr>
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</table>

Total Hours

120-125

1 Full-time, first time in college students are required to take the first-year seminars.

- UNIV 1101 University Seminar I (1 sch)
- UNIV 1102 University Seminar II (1 sch)

2 Electives can range between 1-6 hours.

The ATSC Freshmen are encouraged to take advantage of the First-Year Writing classes (COMM 1311 Foundation of Communication (3 sch) & ENGL 1301 Writing and Rhetoric I (3 sch)) as part of the First-year Learning Communities Program to give them opportunities to work together, get to know each other, and learn together.
These three 4 semester credit hours courses will result in 3 extra semester credit hours, which may be counted as part of the Component Area Option in the University Core Curriculum.

**Career Tracks in Atmospheric Sciences**

The atmospheric sciences program offers the general Atmospheric Sciences Track and the Broadcast Meteorologist Track. The students from both tracks will satisfy the requirements for federal employment as a National Weather Service meteorologist (also referred to as NOAA GS1340 positions). A total of 21 semester hours of electives courses are required for both career tracks.

**Atmospheric Sciences Track**

The students in the general atmospheric sciences track are required to take 21 Sem. Hrs. from the following electives.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Select 21 hours of the following electives:</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>10 hours of electives must be Upper Division hours</td>
<td></td>
</tr>
<tr>
<td>ATSC 2101</td>
<td>Weathercasting</td>
<td>1</td>
</tr>
<tr>
<td>ESCI 1401</td>
<td>Environmental Science I: Intro to Environmental Science</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 4311</td>
<td>Paleoclimatology</td>
<td>3</td>
</tr>
<tr>
<td>ESCI 3351</td>
<td>Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>GISC 1470</td>
<td>Geospatial Systems I</td>
<td>3</td>
</tr>
<tr>
<td>ATSC 4590</td>
<td>Selected Topics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 1304</td>
<td>Introduction to Astronomy: Solar System</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 1412</td>
<td>General Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 3411</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 4444</td>
<td>Hydrogeology</td>
<td>3</td>
</tr>
<tr>
<td>MATH 4315</td>
<td>Partial Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 1403</td>
<td>Physical Geology</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2305</td>
<td>Discrete Mathematics I</td>
<td>3</td>
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<tr>
<td>ATSC 4498</td>
<td>Internship in Atmospheric Science</td>
<td>3</td>
</tr>
<tr>
<td>ATSC 4302</td>
<td>Dynamic Meteorology II</td>
<td>3</td>
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<tr>
<td>GISC 1301</td>
<td>Physical Geography</td>
<td>3</td>
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<tr>
<td>COSC 3385</td>
<td>Numerical Methods</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 4330</td>
<td>Mathematical Methods for Physicists</td>
<td>3</td>
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</table>

**Total Hours** 21

1
If COMM 1311 Foundation of Communication (3 sch) is taken as part of the university core, only 18 hours are required for this section.

2
Additional 8 semester hours of the electives from the general Atmospheric Sciences Track will be needed to satisfy the 18 semester hours of electives requirement. Other MEDA/COMM courses may be substituted with faculty mentor approval.

**Course Sequencing**

### General Atmospheric Sciences

**First Year**

**Fall**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIV 1101</td>
<td>University Seminar I</td>
<td>1</td>
</tr>
<tr>
<td>MATH 2413</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>ATSC 2403</td>
<td>Introduction to Meteorology</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 1301</td>
<td>Writing and Rhetoric I</td>
<td>3</td>
</tr>
<tr>
<td>ATSC 2302</td>
<td>Introduction of Data Analysis in Atmospheric Sciences</td>
<td>3</td>
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</table>

**Spring**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIV 1102</td>
<td>University Seminar II</td>
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</tr>
<tr>
<td>PHYS 2425</td>
<td>University Physics I</td>
<td>4</td>
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<tr>
<td>COMM 1311</td>
<td>Foundation of Communication</td>
<td>3</td>
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<tr>
<td>POLS 2306</td>
<td>State and Local Government</td>
<td>3</td>
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<tr>
<td>MATH 2414</td>
<td>Calculus II</td>
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</table>

**Total Hours** 15

**Second Year**

**Fall**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MATH 2415</td>
<td>Calculus III</td>
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</tr>
<tr>
<td>ATSC 3306</td>
<td>Atmospheric Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>HIST 1302</td>
<td>U.S. History Since 1865</td>
<td>3</td>
</tr>
</tbody>
</table>

To view this page as a natural text, please ensure your text editor is set to default settings.
## Atmospheric Sciences, BS

PHYS 2426  University Physics II  4  
**Hours**  14  

### Spring

- ATSC 4301  Dynamic Meteorology I  3  
- ATSC 2301  Weather Observations  3  
- CHEM 1411  General Chemistry I  4  
- HIST 1302  U.S. History Since 1865  3  
- ATSC Elective  4  

**Hours**  17  

### Third Year

#### Fall

- MATH 3311  Linear Algebra  3  
- ATSC 3305  Physical Meteorology  3  
- ATSC 3401  Synoptic Meteorology  4  
- POLS 2305  U.S. Government and Politics  3  
- Social and Behavioral Sciences Core Requirement  3  

**Hours**  16  

#### Spring

- MATH 3315  Differential Equations  3  
- ATSC 3402  Mesoscale Meteorology  4  
- ESCI 4360  Physical Oceanography  3  
- ATSC Elective  4  
- ATSC Elective  3  

**Hours**  17  

### Fourth Year

#### Fall

- MATH 3345  Statistical Modeling and Data Analysis  3  
- ATSC 4335  Climate and Climate Variability  3  
- UL ATSC Elective  3  
- Language, Philosophy, & Culture Core Requirement  3  

**Hours**  12  

#### Spring

- ATSC 4305  Remote Sensing  3  
- UL ATSC Elective  3  
- UL ATSC Elective  4  
- Creative Arts Core Requirement  3  

**Hours**  14  

**Total Hours**  120  

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**Broadcast Meteorology**

### First Year

#### Fall

- UNIV 1101  University Seminar I  1  
- MATH 2413  Calculus I  4  
- ATSC 2403  Introduction to Meteorology  4  
- ENGL 1301  Writing and Rhetoric I  3  
- ATSC 2302  Introduction of Data Analysis in Atmospheric Sciences  3  

**Hours**  15  

#### Spring

- UNIV 1102  University Seminar II  1  

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**Broadcast Meteorology**

### Second Year

#### Fall

- MATH 2415  Calculus III  4  
- ATSC 3306  Atmospheric Thermodynamics  3  
- HIST 1301  U.S. History to 1865  3  
- PHYS 2426  University Physics II  4  

**Hours**  14  

#### Second Year

#### Spring

- ATSC 4301  Dynamic Meteorology I  3  
- ATSC 2301  Weather Observations  3  
- CHEM 1411  General Chemistry I  4  
- HIST 1302  U.S. History Since 1865  3  
- ATSC Elective  3  

**Hours**  16  

### Third Year

#### Fall

- MATH 3311  Linear Algebra  3  
- ATSC 3305  Physical Meteorology  3  
- ATSC 3401  Synoptic Meteorology  4  
- POLS 2305  U.S. Government and Politics  3  
- Social and Behavioral Sciences Core Requirement  3  

**Hours**  16  

#### Spring

- MATH 3315  Differential Equations  3  
- ATSC 3402  Mesoscale Meteorology  4  
- ESCI 4360  Physical Oceanography  3  
- ATSC Elective  3  

**Hours**  17  

### Fourth Year

#### Fall

- MATH 3345  Statistical Modeling and Data Analysis  3  
- ATSC 4335  Climate and Climate Variability  3  
- UL ATSC elective  4  
- Language, Philosophy, & Culture Core requirement  3  

**Hours**  13  

#### Spring

- ATSC 4305  Remote Sensing  3  
- UL ATSC Elective  3  
- UL Elective or ATSC 4498 Internship in Atmospheric Science  3-4  
- Creative Arts Core Requirement  3  

**Hours**  14-15  

**Total Hours**  120-121
Courses

ATSC 2101 Weathercasting
1 Semester Credit Hour (1 Lecture Hour)
This course is to practice in preparing and presenting weathercasts for radio and television. The instructors of this course will provide the students with: (1) information in the form of lectures and supplemental readings; (2) opportunities to practice weathercasting on video, and (3) advice, supervision, and guidance. In lecture, students will spend most of the course learning about geography and weathercasting rules. A large portion of the course is to practice the weathercasting and report.
Prerequisite: ATSC 2403.

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 2403 Introduction to Meteorology
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
This course is an introduction to meteorology and the dynamics of planetary atmospheres. Emphasis on atmospheric accretion, composition, evolution, structure, and dynamics. Lab exercises cover basic measurement techniques, weather maps, and forecasting.
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.

ATSC 3402 Mesoscale Meteorology
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
This course focuses on introducing mesoscale weather systems including thunderstorms, squall lines and hurricanes, as well as the mechanisms of tornado and lightning. The methods of observing, analyzing, and predicting these severe weather systems with the interpretation of satellite and radar images will also be introduced in this class.
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 atmospheric dynamics. Basic concepts of geophysical fluid dynamics and its application to a variety of atmospheric phenomena are introduced. Specific topics include the equations of motion on rotating earth, vorticity, potential vorticity, divergence, circulation theorem, and planetary wave.
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 the introductory-level atmospheric dynamics. The course introduces more advance materials including equatorial waves, baroclinic and barotropic instability, two-dimensional turbulence, atmospheric teleconnection, El Nino/Southern Oscillation, Madden-Julian Oscillation, global warming, and numerical modeling of atmospheric circulations.
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 4335 Climate and Climate Variability  
3 Semester Credit Hours (3 Lecture Hours)  
This course is 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 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.