METEOROLOGY AND ATMOSPHERIC SCIENCE, B.S.

Begin Campus: Any Penn State Campus
End Campus: University Park

Program Description
Meteorology and atmospheric science is a rigorous scientific discipline devoted to the attainment of an increased understanding of the atmosphere and the development of methods for applying that knowledge to practical problems. Although this field is usually associated with weather prediction, it also has significance in environmental, energy, agricultural, oceanic, and hydrological sciences. For students wishing to pursue many of these areas, the department offers several options within the major.

The major requires a solid foundation in mathematics and the physical sciences, and it provides a comprehensive survey of the fundamentals of atmospheric science. It has sufficient flexibility to permit intensive advanced study in such related areas as mathematics, Earth sciences, or engineering. The department has particular strengths in weather analysis and prediction, including forecast uncertainty and severe weather, physical meteorology, including radar meteorology, instrumentation and atmospheric measurements; and applied areas, including atmospheric diffusion, air pollution chemistry, dynamic meteorology, tropical meteorology, climate, weather risk, and remote sensing.

Graduating meteorologists are prepared for professional employment with industry, private consulting firms, government, and the armed forces or for further study toward graduate degrees normally required for research, university, or management positions.

The first and second years are largely devoted to preparatory work in science, mathematics, and the liberal arts. The junior and senior years involve a core of basic courses in applied and theoretical topics and a choice of courses offering specialized training. The courses unique to each option are normally taken in the junior and senior years.

Atmospheric Science Option
This option challenges students to strengthen and broaden their understanding of the physics and chemistry of both the atmosphere and oceans. It helps prepare them for employment in the diverse field of the atmospheric sciences and for graduate study in the atmospheric or related disciplines. Students are encouraged to participate in undergraduate research projects under the supervision of atmospheric and oceanic scientists in the department college.

Environmental Meteorology Option
Environmental Meteorology prepares the student for understanding the impact of the weather and climate on the environment, which is to say the impacts of air and water on natural and human-altered ecosystems. In order to do this, the option establishes links between atmospheric physics and a variety of environmental disciplines pertaining to land, water, soils, and plants. Depending on his/her interests, the student will select courses in Air Quality and Dispersion, Ecology, Environmental Chemistry, Geographic Information Systems, or Hydrology.

General Option
This option has sufficient flexibility to serve the needs of students who wish to pursue topics chosen broadly from subdisciplines of meteorology or from related areas in consultation with the academic adviser. The General option is appropriate both for students who intend to pursue postgraduate degrees and for students who want to emphasize a topic for which no option exists.

Weather Forecasting and Communications Option
This option prepares students for careers in which their skills as weather forecasters are effectively used in a variety of ways, from science reporting and television broadcasting to web design and computer-based weather graphics production, and developing innovative applications of weather and climate data to industry.

Weather Risk Management Option
The option combines study of meteorology and atmospheric sciences with training in risk, finance, and quantitative decision-making. Weather affects a wide range of industries, including energy, agriculture, insurance, construction, retail, and transport, among others. Weather and climate variation play central roles in the availability of water resources, the spread of disease, and an array of other processes vital for human welfare. There are, consequently, many organizations that confront risks related to weather, and that have a demand for experts who can help them manage these risks. The option in Weather Risk Management is designed for students who wish to work professionally at this intersection of meteorology and risk management.

What is Meteorology and Atmospheric Science?
Meteorology is one of the oldest of modern sciences. The word itself was coined by Aristotle more than 2,000 years ago for the first book on the science of “things lifted up.” Meteorology and atmospheric science is an interdisciplinary field that uses scientific principles to explain, understand, observe, and forecast the behavior of the Earth's atmosphere. Meteorologists and atmospheric scientists explore the significance of weather and climate as it relates to the environmental, energy, agricultural, oceanic, and hydrological sciences. From severe weather, numerical weather prediction, and climate change to weather risk and air pollution—there's no shortage of practical applications in meteorology and atmospheric science.

You Might Like This Program If...
- You are interested in applying mathematics, physics, and computer programming to real-world problems.
- You are fascinated with weather, climate, or the environment.
- You are a self-described “weather geek.”
- You would like to be a “weather communicator” such as a television meteorologist or science writer.
- You want to study global warming and the Earth’s changing climate.
- You would like to work with data from satellites, radar, and other environmental sensors.

Entrance to Major
In addition to the minimum grade point average (GPA) requirements described in the University Policies, the Meteorology entrance-to-major requirement must also be completed with a minimum grade of C: MATH 140.
Degree Requirements

For the Bachelor of Science degree in Meteorology, a minimum of 121 credits is required:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Electives</td>
<td>4-9</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>93-95</td>
</tr>
</tbody>
</table>

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (http://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required.)
- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

Knowledge Domains
- Arts (GA): 6 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 6 credits
- Social and Behavioral Sciences (GS): 6 credits
- Natural Sciences (GN): 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)
- Inter-Domain or Approved Linked Courses: 6 credits

23-26 of these 45 credits are included in the Requirements for the Major.

University Degree Requirements

First Year Engagement
All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement
6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum
3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits
A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work
Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition
The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80)). For more information, check the Suggested Academic Plan for your intended program.

Requirements for the Major
This includes 23-26 credits of General Education courses: 8 credits of GN courses; 6 credits of GQ courses; 0-3 credits of GS courses; 9 credits of GWS courses.

For a Meteorology course to serve as a prerequisite for any subsequent prescribed or supporting Meteorology course in the major, a grade of C or better must be earned in the prerequisite course.

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

Common Requirements for the Major (All Options)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 110</td>
<td>Chemical Principles I</td>
<td>3</td>
</tr>
<tr>
<td>EMSC 100S</td>
<td>Earth and Mineral Sciences First-Year Seminar</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 211</td>
<td>General Physics: Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Ordinary and Partial Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 212</td>
<td>General Physics: Electricity and Magnetism</td>
<td>4</td>
</tr>
</tbody>
</table>

Prescribed Courses: Require a grade of C or better

- MATH 140: Calculus With Analytic Geometry I
- MATH 141: Calculus with Analytic Geometry II
- METEO 300: Fundamentals of Atmospheric Science
- METEO 411: Synoptic Meteorology Laboratory
- METEO 421: Atmospheric Dynamics
- METEO 431: Atmospheric Thermodynamics
- METEO 440: Principles of Atmospheric Measurements
- METEO 470: Climate Dynamics

Credits
### Additional Courses

ENGL 15  
Rhetoric and Composition  
3  
or ENGL 30  
Honors Freshman Composition  
Select one of the following:  
METEO 273  
Introduction to Programming Techniques for Meteorology  
CMPSC 101  
Introduction to Programming  
CMPSC 200  
Programming for Engineers with MATLAB  
CMPSC 201  
Programming for Engineers with C++  
CMPSC 202  
Select one of the following:  
EBF 472  
Quantitative Analysis in Earth Sciences  
STAT 301  
Statistical Analysis I  
STAT 401  
Experimental Methods  
CAS 100  
Effective Speech  
or ENGL 202C  
Effective Writing: Technical Writing  
**Additional Courses: Require a grade of C or better**

Select one of the following:  
METEO 101  
Understanding Weather Forecasting  
METEO 200A  
Introduction to Weather Analysis I  
& METEO 200B  
Introduction to Weather Analysis II  
METEO 201  
Introduction to Weather Analysis  
Select one of the following:  
MATH 230  
Calculus and Vector Analysis  
MATH 231  
Calculus of Several Variables  
& MATH 232  
Integral Vector Calculus  

### Requirements for the Option

Select an option  
27-29  

1. The following substitutions are allowed for students attending campuses where the indicated courses is not offered: CAS 100 or ENGL 202C can be substituted for EMSC 100S.

### Requirements for the Option

#### Atmospheric Science Option (27-28 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO 422</td>
<td>Advanced Atmospheric Dynamics</td>
<td>3</td>
</tr>
</tbody>
</table>

**Prescribed Courses**

**Additional Courses**

Select 6-13 credits of the following:  
METEO 414  
Mesoscale Meteorology  
METEO 434  
Radar Meteorology  
METEO 451  
Introduction to Physical Oceanography  
METEO 452  
Tropical Meteorology  
METEO 455  
Atmospheric Dispersion  
METEO 465  
Middle Atmosphere Meteorology  
METEO 466  
Planetary Atmospheres  
METEO 471  
Observing Meteorological Phenomena  
METEO 477  
Fundamentals of Remote Sensing Systems  
METEO 480W  
Undergraduate Research  
**Additional Courses: Require a grade of C or better**

Select 3-6 credits of the following:  
METEO 473  
Application of Computers to Meteorology  

METEO 474  
Computer Methods of Meteorological Analysis and Forecasting  
Select 6-9 credits of the following:  
METEO 436  
Radiation and Climate  
METEO 437  
Atmospheric Chemistry and Cloud Physics  
METEO 454  
Introduction to Micrometeorology  

### Supporting Courses and Related Areas

Select 3 credits of W courses or their equivalent in addition to the following:  
METEO 440  
Principles of Atmospheric Measurements  

1. Up to 9 of these credits in relevant courses in Acoustics, Chemistry, Engineering, Mathematics, and Physics may be substituted with the approval of the student’s adviser.

#### Environmental Meteorology Option (27-29 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 370</td>
<td>Introduction to Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>METEO 455</td>
<td>Atmospheric Dispersion</td>
<td>3</td>
</tr>
</tbody>
</table>

**Prescribed Courses**

**Required Courses: Require a grade of C or better**

**Additional Courses**

Select 15-17 credits of the following:  
Biol 110  
Biology: Basic Concepts and Biodiversity  
CE 360  
Fluid Mechanics  
CE 461  
Water-resource Engineering  
CE 475  
Water Quality Chemistry  
CE 479  
Environmental Microbiology for Engineers  
CHEM 112  
Chemical Principles II  
CHEM 113  
Experimental Chemistry II  
CHEM 450  
Physical Chemistry - Thermodynamics  
CHEM 457  
Experimental Physical Chemistry  
CHEM 464  
Chemical Kinetics and Dynamics  
ERM 430  
Air Pollution Impacts to Terrestrial Ecosystems  
ERM 435  
Limnology  
ERM 447  
Stream Restoration  
ERM 450  
Wetland Conservation  
GEOG 314  
Biogeography and Global Ecology  
GEOG 311  
Landscape Ecology  
GEOG 313  
Introduction to Field Geography  
GEOG 361  
Cartography–Maps and Map Construction  
GEOG 362  
Image Analysis  
GEOG 363  
Geographic Information Systems  
GEOG 417  
Satellite Climatology  
GEOG 463  
Geospatial Information Management  
ME 405  
Indoor Air Quality Engineering  
ME 433  
Fundamentals of Air Pollution  
METEO 419  
Air Quality Forecasting  
METEO 437  
Atmospheric Chemistry and Cloud Physics  
**Additional Courses: Require a grade of C or better**

METEO 473  
Application of Computers to Meteorology  

Meteorology and Atmospheric Science, B.S.

or METEO 474 Computer Methods of Meteorological Analysis and Forecasting

1 May apply to General Education

### General Option (27 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO 436</td>
<td>Radiation and Climate</td>
<td>3</td>
</tr>
<tr>
<td>METEO 437</td>
<td>Atmospheric Chemistry and Cloud Physics</td>
<td></td>
</tr>
<tr>
<td>METEO 454</td>
<td>Introduction to Micrometeorology</td>
<td></td>
</tr>
<tr>
<td>METEO 473</td>
<td>Application of Computers to Meteorology</td>
<td>3</td>
</tr>
</tbody>
</table>

### Additional Courses: Require a grade of C or better

Select one of the following:

- METEO 436 Radiation and Climate (3 credits)
- METEO 437 Atmospheric Chemistry and Cloud Physics
- METEO 454 Introduction to Micrometeorology
- METEO 473 Application of Computers to Meteorology
- or METEO 474 Computer Methods of Meteorological Analysis and Forecasting

### Supporting Courses and Related Areas

Select 21 credits in consultation with adviser from 400-level METEO courses and/or at least 300-level courses from the Colleges of Agricultural Sciences, Earth and Mineral Sciences, Engineering, and/or Science.

1 With the approval of a meteorology adviser, some 200-level courses from those colleges may also be used.

### Weather Forecasting and Communications Option (28 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO 481</td>
<td>Weather Communications I</td>
<td>3</td>
</tr>
<tr>
<td>METEO 482</td>
<td>Weather Communications II</td>
<td>3</td>
</tr>
<tr>
<td>METEO 414</td>
<td>Mesoscale Meteorology</td>
<td>4</td>
</tr>
<tr>
<td>METEO 415</td>
<td>Forecasting Practicum</td>
<td>3</td>
</tr>
</tbody>
</table>

### Prescribed Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 102</td>
<td>Introductory Microeconomic Analysis and Policy</td>
<td>3</td>
</tr>
<tr>
<td>EBF 473</td>
<td>Risk Management in Energy Industries</td>
<td>3</td>
</tr>
<tr>
<td>METEO 460</td>
<td>Weather Risk and Financial Markets</td>
<td>3</td>
</tr>
</tbody>
</table>

### Additional Courses

Select 6 credits of the following:

- EBF 301 Global Finance for the Earth, Energy, and Materials Industries
- EBF 483 Introduction to Electricity Markets
- EBF 484 Energy Economics
- EGEE 437 Design of Solar Energy Conversion Systems
- EGEE 438 Wind and Hydropower Energy Conversion
- EME 460 Geo-resource Evaluation and Investment Analysis

### Weather Risk Management Option (27 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 102</td>
<td>Introductory Microeconomic Analysis and Policy</td>
<td>3</td>
</tr>
<tr>
<td>EBF 473</td>
<td>Risk Management in Energy Industries</td>
<td>3</td>
</tr>
<tr>
<td>METEO 460</td>
<td>Weather Risk and Financial Markets</td>
<td>3</td>
</tr>
</tbody>
</table>

### Prescribed Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ECON 490</td>
<td>Introduction to Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 318</td>
<td>Elementary Probability</td>
<td></td>
</tr>
<tr>
<td>STAT 319</td>
<td>Applied Statistics in Science</td>
<td></td>
</tr>
<tr>
<td>STAT 414</td>
<td>Introduction to Probability Theory</td>
<td></td>
</tr>
<tr>
<td>STAT 415</td>
<td>Introduction to Mathematical Statistics</td>
<td></td>
</tr>
<tr>
<td>STAT 460</td>
<td>Intermediate Applied Statistics</td>
<td></td>
</tr>
<tr>
<td>STAT 462</td>
<td>Applied Regression Analysis</td>
<td></td>
</tr>
</tbody>
</table>

### Additional Courses: Require a grade of C or better

Select 6 credits of the following:

- METEO 415 Forecasting Practicum (does not require a grade of C or better)
- METEO 473 Application of Computers to Meteorology
- METEO 474 Computer Methods of Meteorological Analysis and Forecasting

### Additional Courses

Select one of the following:

- METEO 415 Forecasting Practicum (does not require a grade of C or better)
- METEO 473 Application of Computers to Meteorology
- METEO 474 Computer Methods of Meteorological Analysis and Forecasting

Select one of the following:

- ECON 102 Introductory Microeconomic Analysis and Policy (3 credits)
- EBF 473 Risk Management in Energy Industries (3 credits)
- METEO 460 Weather Risk and Financial Markets (3 credits)

### Additional Courses

- METEO 436 Radiation and Climate
- METEO 437 Atmospheric Chemistry and Cloud Physics
- METEO 454 Introduction to Micrometeorology (preferred choice)
Integrated B.S./M.S. Program in Meteorology

The Department of Meteorology offers an integrated B.S./M.S. (IUG) Program that is designed to allow academically superior students to obtain both the B.S. and the M.S. degree in Meteorology in five years of study. In order to complete the program in five years, students interested in the Integrated B.S./M.S. Program in Meteorology must apply for admission to the Graduate School and the Integrated B.S./M.S. Program by the end of their junior year.

During the first three years, the student will follow the course scheduling of one of the options in the B.S. degree, normally the Atmospheric Sciences or the General option (see the Undergraduate Bulletin). Students who intend to enter the Integrated B.S./M.S. program are encouraged to take upper level classes during their first three years whenever appropriate. By the end of the junior year, students normally apply for admission to both the IUG program and to the Graduate School. Acceptance decisions will be made prior to the beginning of the senior year and M.S. advising committees appointed for successful applicants. During the senior year, IUG students follow the scheduling of the selected B.S. Meteorology option, with an emphasis on completing 500-level course work as appropriate. During the senior year, IUG students will start work on their theses or papers that are designed to meet the requirements of the M.S. degree in Meteorology. During the fifth year, IUG students take courses fulfilling the departmental M.S. degree requirements and complete their M.S. theses or papers. Typical scheduling plans for students pursuing the General or Atmospheric Sciences options are given on the departmental website http://www.met.psu.edu. Undergraduate tuition rates will apply as long as the student is an undergraduate, unless the student receives financial support, for example, via an assistantship requiring the payment of graduate tuition.

Admission Requirements

Students who wish to complete the Integrated B.S./M.S. Program in Meteorology should apply for admission to both the Graduate School and the Integrated B.S./M.S. Program by no later than the end of their junior year. In this case, successful students will be admitted formally into the graduate program in Meteorology just prior to their senior year, if their progress has been satisfactory. Admission prior to the senior year is also possible in some unusual circumstances. In all cases, admission to the program will be at the discretion of the Graduate Admissions Officer for the Department of Meteorology, who will determine the necessary criteria for all applicants. These criteria include the setting of the minimum required scores on the GRE and the minimum cumulative GPA for consideration, the receipt of sufficiently strong recommendation letters from three faculty and a strong letter of support from the department head, and the writing of an excellent proposal for a workable research project with a specific adviser; normally, evidence of significant research progress must be provided in the application as well.

The details of the program requirements can be found in the Graduate Degree Programs Bulletin.

Program Learning Objectives

1. Graduates can demonstrate skills for interpreting and applying atmospheric observations.
2. Graduates can demonstrate knowledge of the atmosphere and its evolution.
3. Graduates can demonstrate knowledge of the role of water in the atmosphere.
4. Graduates can demonstrate facility with computer applications to atmospheric problems.
5. Graduates can demonstrate skills for communicating their technical knowledge.

Academic Advising

The objectives of the university’s academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee’s unit of enrollment will provide each advisee with a primary academic adviser, the information need plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy)

University Park

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j2n@psu.edu

Suggested Academic Plan

General Option at University Park Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

<table>
<thead>
<tr>
<th>First Year</th>
<th>Credits</th>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MATH 140 or 140G (GQ)††</td>
<td>4</td>
<td>MATH 141 or 141G (GQ)††</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CHEM 110</td>
<td>3</td>
<td>ENGL 15, 30, or ESL 15 (GWS)††</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EMSC 100S (GWS)††</td>
<td>3</td>
<td>PHYS 211 (GN)‡</td>
<td>4</td>
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<tr>
<td></td>
<td></td>
<td>METEO 201‡</td>
<td>3</td>
<td>General Education knowledge domain (CHEM 111 or GN)</td>
<td>3-1</td>
</tr>
<tr>
<td>General Education</td>
<td>3</td>
<td>Elective (3 cr elective needed if CHEM 111 taken; 1 cr elective needed if 3 cr GN taken)</td>
<td>1-3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 212 (GN)†</td>
<td>3</td>
<td>METEO 431*</td>
<td>3</td>
</tr>
<tr>
<td>METEO 300*</td>
<td>3</td>
<td>METEO 273, CMPS 101, CMPS 200, CMPS 201, or 202</td>
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</tr>
<tr>
<td>MATH 230 or 231 and 232*</td>
<td>4</td>
<td>MATH 251</td>
<td>4</td>
</tr>
<tr>
<td>General Education knowledge domain</td>
<td>3</td>
<td>General Education Health and Wellness (GHW)</td>
<td>3</td>
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<tr>
<td></td>
<td>15</td>
<td>16</td>
<td></td>
</tr>
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</table>

### Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO 421*</td>
<td>3</td>
<td>METEO 470*</td>
<td>3</td>
</tr>
<tr>
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### Fourth Year

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Total Credits 121

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

 № Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

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### General Option at Commonwealth Campuses

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### First Year

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<td>PHYS 211 (GN)†</td>
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<td>ENGL 15, 30, or ESL 15†τ</td>
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<td>METEO 101 (online)*</td>
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<td>General Education knowledge domain (CHEM 111 or GN)</td>
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<td>General Education Health and Wellness (GHW)</td>
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<td>Elective (3 cr elective needed if CHEM 111 taken; 1 cr elective needed if 3 cr GN taken)</td>
<td>1-3</td>
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### Second Year

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<th>Fall</th>
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<th>Spring</th>
<th>Credits</th>
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<tr>
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<td>METEO 273, CMPS 101, CMPS 200, CMPS 201, or 202</td>
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<td>MATH 230 or 231 and 232*</td>
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<td>MATH 251</td>
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Meteorology and Atmospheric Science, B.S.

Atmospheric Sciences Option at University Park Campus

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First Year

Fall | Credits | Spring | Credits
--- | --- | --- | ---
MATH 140 or 140G (GQ)†* | 4 | MATH 141 or 141G (GQ)†† | 4
CHEM 110 | 3 | ENGL 15, 30, or ESL 15 (GWS)††† | 3
EMSC 100S (GWS)†* | 3 | PHYS 211 (GN)† † | 4
METEO 201* | 3 | General Education knowledge domain (CHEM 111 or GN) | 3-1

General Education knowledge domain | 3 Elective (3 cr elective needed if CHEM 111 taken; 1 cr elective needed if 3 cr GN taken) | 1-3

| Credits | Credits |
--- | ---
16 | 15

Second Year

Fall | Credits | Spring | Credits
--- | --- | --- | ---
PHYS 212 (GN)† | 4 | METEO 431* | 3
METEO 300* | 3 | METEO 273, CMPSC 101, CMPSC 200, CMPSC 201, or 202 | 3
MATH 230 or 231 and 232* | 4 | MATH 251 | 4
General Education knowledge domain | 3 | STAT 301, 401, or EBF 472 | 3
General Education Health and Wellness (GHW) | 3

| Credits | Credits |
--- | ---
15 | 16

Third Year

Fall | Credits | Spring | Credits
--- | --- | --- | ---
METEO 421* | 4 | METEO 470* | 3
METEO 436, 437, or 454* | 3 | METEO 440* | 3
METEO 411* | 4 | General Education Foundation selection (GWS)†† | 3
METEO 473 or 474* | 3 | General Education knowledge domain | 3
Professional elective* | 3 | Professional elective | 3

| Credits | Credits |
--- | ---
14 | 15

Fourth Year

Fall | Credits | Spring | Credits
--- | --- | --- | ---
METEO 422 | 3 | General Education knowledge domain | 3
METEO 436, 437, or 454* | 3 | Professional elective* | 3
General Education knowledge domain | 3 | Professional elective* | 3
General Education knowledge domain | 3 | Professional elective* | 3

| Credits | Credits |
--- | ---
2 | 2

Notes:

* Course requires a grade of C or better for the major
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2 Professional elective: Select 21 credits, in consultation with adviser, from 400-level METEO courses and/or 300-, or 400-level courses from the Colleges of Agricultural Sciences, Earth and Mineral Sciences, Engineering, and/or Science. With the approval of a meteorology adviser, some 200-level courses from those Colleges may also be used.
Professional elective\(^2\) 3 Elective 3

Total Credits 121

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2 Students should select 3-6 credits from METEO 473(3) and METEO 474(3); 6-9 credits from METEO 436(3), METEO 437(3), and METEO 454(3); and 6-13 credits from METEO 414(4), METEO 434(3), METEO 451(3), METEO 452(3), METEO 455(3), METEO 465(3), METEO 466(3), METEO 471(3), METEO 477(3), METEO 480W(3). Up to 9 of these credits in relevant courses in Acoustics, Chemistry, Engineering, Mathematics, and Physics may be substituted with the approval of the student’s faculty adviser. Students must also select 3 credits of Writing across the curriculum courses, or their equivalent, in addition to METEO 440.

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**Academic Requirements**

- **First Year**
  - **Fall**
    - Credits Spring
    - **Credits**
    - MATH 140**‡†‡‡
    - CHEM 110
    - ENGL 15, 30, or ESL 15††
    - General Education knowledge domain
    - General Education Health and Wellness (GHW)
    - Total Credits 121
  - **Second Year**
    - **Fall**
      - Credits Spring
      - **Credits**
      - PHYS 212 (GN)†
      - MATH 230 or 231 and 232*
      - General Education Foundation selection (GWS)††
      - General Education knowledge domain
      - General Education Health and Wellness (GHW)
  - **Third Year**
    - **Fall**
      - Credits Spring
      - **Credits**
      - METEO 300*
      - METEO 431*
      - STAT 301, 401, or EBF 472
      - General Education knowledge domain
      - General Education Knowledge Domain
      - Total Credits 15.5
  - **Fourth Year**
    - **Fall**
      - Credits Spring
      - **Credits**
      - METEO 470*
      - METEO 473 or 474*
      - METEO 436, 437, or 454*
      - METEO 422
      - Professional elective
  - Total Credits 121

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<td>CHEM 110</td>
<td>3 ENGL 15, 30, or ESL 15 (GWS)</td>
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<td>EMSC 100S (GWS)</td>
<td>3 PHYS 211 (GN)</td>
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<td>METEO 201*</td>
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<td>PHYS 212 (GN)</td>
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<td>METEO 300*</td>
<td>4 METEO 273, CMPSC 101, CMPSC 200, CMPSC 201, or 202</td>
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<td>MATH 230 or 231 and 232*</td>
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<td>3 Elective</td>
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<td>MATH 212 (GN)†</td>
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<td>PHYS 211 (GN)†</td>
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<td>ENGL 15, 30, or ESL 15††</td>
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<td>METEO 101 (online) *</td>
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<td>General Education knowledge domain (CHEM 111 or GN)</td>
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<tr>
<td>General Education Health and Wellness (GHW)</td>
<td>1.5 Elective</td>
<td>(3 cr elective needed if CHEM 111 taken; 1 cr elective needed if 3 cr GN taken)</td>
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<td>14.5</td>
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<th>Credits</th>
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<td></td>
<td><strong>Fall</strong></td>
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<td>METEO 300‡</td>
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<td>METEO 470†</td>
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<td>METEO 473 or 474‡</td>
<td>3</td>
</tr>
<tr>
<td>STAT 301, 401, or EBF 472</td>
<td>4</td>
<td>METEO 454§</td>
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<tr>
<td>CE 370</td>
<td>3</td>
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<td>General Education Knowledge Domain</td>
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<td>Professional elective</td>
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</tr>
<tr>
<td></td>
<td>15.5</td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

Total Credits 121

* Course requires a grade of C or better for the major
‡ Course requires a grade of C or better for General Education
# Course is an Entrance to Major requirement
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Weather Risk Management Option at University Park Campus

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First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 140 or 140G (GQ)††††</td>
<td>4 MATH 141 or 141G (GO)††††</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>3 ENGL 15, 30, or ESL 15 (GWS)††</td>
<td>3</td>
</tr>
<tr>
<td>EMSC 100S (GWS)†††</td>
<td>3 PHYS 211 (GN)†</td>
<td>4</td>
</tr>
<tr>
<td>METEO 201*</td>
<td>3 General Education knowledge domain (CHEM 111 or GN)</td>
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<tr>
<td>ECON 102‡</td>
<td>3 Elective (3 cr elective needed if CHEM 111 taken; 1 cr elective needed if 3 cr GN taken)</td>
<td>1-3</td>
</tr>
</tbody>
</table>

| Credits | 16 | 15 |

Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 212 (GN)†</td>
<td>4 METEO 431*</td>
<td>3</td>
</tr>
<tr>
<td>METEO 300*</td>
<td>4 METEO 273, CMPSC 101, CMPSC 200, CMPSC 201, or 202</td>
<td>3</td>
</tr>
<tr>
<td>MATH 230 or 231 and 232*</td>
<td>4 MATH 251</td>
<td>4</td>
</tr>
<tr>
<td>General Education knowledge domain</td>
<td>3 STAT 301, 401, or EBF 472</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Education Health and Wellness (GHW)</td>
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</table>

| Credits | 15 | 16 |

Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits Spring</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>METEO 421*</td>
<td>4 METEO 470*</td>
<td>3</td>
</tr>
<tr>
<td>METEO 436, 437, or 454*</td>
<td>3 METEO 440*</td>
<td>3</td>
</tr>
<tr>
<td>METEO 411†</td>
<td>4 EBF/EGEE selection†</td>
<td>3</td>
</tr>
<tr>
<td>General Education knowledge domain</td>
<td>3 METEO 415, 473, or 474‡2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Education Foundation selection (GWS)†††</td>
<td>3</td>
</tr>
</tbody>
</table>

| Credits | 14 | 15 |

Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits Spring</th>
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<tr>
<td>METEO 415, 473, or 474*</td>
<td>3 METEO 460</td>
<td>3</td>
</tr>
<tr>
<td>EBF 473</td>
<td>3 EBF/EGEE selection*</td>
<td>3</td>
</tr>
<tr>
<td>General Education knowledge domain</td>
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<tr>
<td>Elective</td>
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<td>3</td>
</tr>
<tr>
<td></td>
<td>Total Credits 121</td>
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</tr>
</tbody>
</table>

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‡ Course requires a grade of C or better for General Education
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All incoming Schreyer Honors College first-year students at University Park will take ENGL/CAS 137 in the fall semester and ENGL/CAS 138 in the spring semester. These courses carry the GWS designation and replace both ENGL 30 and CAS 100. Each course is 3 credits.

Students who begin their studies at non-UP locations and/or join the college after their first year should substitute CAS 100 (GWS), CAS 100A, CAS 100B, or CAS 100C; or ENGL 202C (GWS) for EMSC 100S (GWS). EMSC 100S Earth and Mineral Sciences First Year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.

Select 6 credits from METEO 415(3), METEO 473(3) or METEO 474(3).

Select 6 credits from EBF 301(3); EBF 483(3), EBF 484(3); EGEE 437(3); EGEE 438(3); or EME 460(3).

Select 3 credits from ECON 490(3), STAT 318(3), STAT 319(3), STAT 414(3), STAT 415(3), STAT 460(3) or STAT 462(3).

Weather Risk Management Option at Commonwealth Campuses

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any
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<table>
<thead>
<tr>
<th>What If</th>
<th>Credits</th>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education and Wellness (GHW)</td>
<td>1.5 Elective (3 cr elective needed if CHEM 111 taken; 1 cr elective needed if 3 cr GN taken)</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>General Education Health and Wellness (GHW)</td>
<td>1.5 Elective (3 cr elective needed if CHEM 111 taken; 1 cr elective needed if 3 cr GN taken)</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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2. Select 6 credits from METEO 415(3), METEO 473(3) or METEO 474(3).

3. Select 6 credits from EBF 301(3); EBF 483(3), EBF 484(3); EGEE 437(3); EGEE 438(3); or EME 460(3).

4. Select 3 credits from ECON 490(3), STAT 318(3), STAT 319(3), STAT 414(3), STAT 415(3), STAT 460(3) or STAT 462(3).

weather forecasting and communications Option at University Park Campus

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<table>
<thead>
<tr>
<th>What If</th>
<th>Credits</th>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Knowledge Domain</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

# Course is an Entrance to Major requirement
† Course satisfies General Education and degree requirement

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### Meteorology and Atmospheric Science, B.S.

**Academic Requirements**

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**First Year**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 140*##†</td>
<td>4</td>
<td>MATH 141*##†</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>3</td>
<td>PHYS 211 (GN)†</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 15, 30, or ESL 15††</td>
<td>3</td>
<td>METEO 101 (online)*</td>
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<tr>
<td>General Education knowledge domain</td>
<td>3</td>
<td>General Education knowledge domain (CHEM 111 or GN)</td>
<td>3-1</td>
</tr>
<tr>
<td>General Education Health and Wellness (GHW)</td>
<td>1.5</td>
<td>Elective (3 cr elective needed if 3 cr GN taken)</td>
<td>1-3</td>
</tr>
<tr>
<td>Total Credits</td>
<td>14.5</td>
<td></td>
<td>15</td>
</tr>
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</table>

**Second Year**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 212 (GN)†</td>
<td>4</td>
<td>METEO 273, CMPSC 101, CMPSC 200, CMPSC 201, or 202</td>
<td>3</td>
</tr>
<tr>
<td>MATH 230 or 231 and 232*</td>
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<td>MATH 251</td>
<td>4</td>
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<tr>
<td>General Education Foundation selection (GWS)††</td>
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<td>General Education Foundation selection (GWS)††</td>
<td>3</td>
</tr>
<tr>
<td>Total Credits</td>
<td>14.5</td>
<td></td>
<td>15</td>
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</tbody>
</table>

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2. Professional elective: Select 6-9 credits from CAS 211(3), EE 477(3) or METEO 477(3); ENGL 416(3), GEOG 333(3), GEOG 361(3), GEOG 362(3), GEOG 363(3), GEOG 471(3), GEOG 467(3), GEOSC 402 IL(3), METEO 413(3), METEO 416(3), METEO 418(3), METEO 419(3), METEO 422(3), METEO 434(3), METEO 451(3), METEO 452(3), METEO 454(3), METEO 471(3), METEO 483(3), METEO 486(1-2, max 3), any two from METEO 495A(3), METEO 495B(3), METEO 495C(3), METEO 495D(3) or METEO 495E(3).

3. Select 3-6 credits from METEO 473(3) and METEO 474(3).
### Meteorology and Atmospheric Science, B.S.

<table>
<thead>
<tr>
<th>General Education knowledge domain</th>
<th>General Education knowledge domain</th>
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</thead>
<tbody>
<tr>
<td>General Education Health and Wellness (GHW)</td>
<td>General Education knowledge domain</td>
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<td>3</td>
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<td><strong>Total Credits</strong></td>
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#### Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
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<td>METEO 300*</td>
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<td>METEO 440*</td>
<td>3</td>
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<tr>
<td>METEO 431*</td>
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<td>METEO 411†</td>
<td>4</td>
</tr>
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<td>METEO 481</td>
<td>3</td>
<td>METEO 421†</td>
<td>4</td>
</tr>
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<td>STAT 301, 401, or EBF 472</td>
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<td>METEO 482</td>
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<td>General Education knowledge domain</td>
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<tr>
<td><strong>Total Credits</strong></td>
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<td><strong>14</strong></td>
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#### Fourth Year

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<tbody>
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<td>METEO 470*</td>
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<td>METEO 414</td>
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<td>METEO 436 or 437³</td>
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<td>METEO 415</td>
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<td>Professional elective²</td>
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</tbody>
</table>

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³ Select 3-6 credits from METEO 473(3) and METEO 474(3).

### Career Paths

Graduating meteorologists and atmospheric scientists are prepared for professional employment with industry, private consulting firms, government, and the armed forces. Students who graduate with a B.S. in Meteorology and Atmospheric Science from Penn State and who have some research or internship experience are positioned well for graduate study. Typically, about one-third of our B.S. graduates pursue an M.S. or Ph.D.

### Careers

According to the Occupational Outlook Handbook, employment of atmospheric scientists, including meteorologists, is projected to grow 12 percent from 2016 to 2026, faster than the average for all occupations. The best job prospects for atmospheric scientists will be in private industry as businesses demand specialized weather forecasts and weather information.

More Information (http://www.met.psu.edu/prospective-students/undergraduate-students-bs-degree/who-employs-our-b-s-graduates)

### Opportunities for Graduate Studies

Further study toward an M.S. or Ph.D. can lead to research, university, or management positions.

More Information (http://www.met.psu.edu/prospective-students/graduate-students-ms-and-phd-degrees)

### Professional Resources

- Campus Weather Service (http://campusweatherservice.com)
- Weather Risk Management Club (http://www.wxriskclub.org)
- Penn State Branch of the American Meteorological Society and National Weather Association (PSUBAMS) (http://www.met.psu.edu/academics/undergraduate-studies/clubs-and-organizations/psubams)

### Contact

University Park
DEPARTMENT OF METEOROLOGY AND ATMOSPHERIC SCIENCE
503 Walker Building
University Park, PA 16802
814-865-0478
meteoundergrad@meteo.psu.edu
http://www.met.psu.edu