**METEOROLOGY AND ATMOSPHERIC SCIENCE, B.S.**

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

## 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>

23-26 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 8 credits of GN courses; 6 credits of GQ courses; 0-3 credits of GS courses; 9 credits of GWS courses.

### Requirements for the Major

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 (https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/).

### Common Requirements for the Major (All Options)

#### Prescribed Courses
- CHEM 110 Chemical Principles I 3 credits  
- EMSC 100S Earth and Mineral Sciences First-Year Seminar 1 3 credits  
- MATH 251 Ordinary and Partial Differential Equations 4 credits  
- PHYS 211 General Physics: Mechanics 4 credits  
- PHYS 212 General Physics: Electricity and Magnetism 4 credits  

#### Additional Courses: Require a grade of C or better
- MATH 140 Calculus With Analytic Geometry I 4 credits  
- MATH 141 Calculus with Analytic Geometry II 4 credits  
- METEO 300 Fundamentals of Atmospheric Science 4 credits  
- METEO 411 Synoptic Meteorology Laboratory 4 credits  
- METEO 421 Atmospheric Dynamics 4 credits  
- METEO 431 Atmospheric Thermodynamics 3 credits  
- METEO 440W Principles of Atmospheric Measurements 3 credits  
- METEO 470 Climate Dynamics 3 credits  

### Supporting Courses and Related Areas

- CAS 100 Effective Speech 3 credits  
- or ENGL 202C Effective Writing: Technical Writing 3 credits  
- ENGL 15 Rhetoric and Composition 3 credits  
- or ENGL 30H Honors Rhetoric and Composition 3 credits  

Select one of the following: 3 credits
- CMPSC 101 Introduction to Programming 3 credits

### Additional Courses

#### Prescribed Courses
- METEO 422 Advanced Atmospheric Dynamics 3 credits

#### Additional Courses
- Select 6-13 credits of the following: 1 6-13 credits
  - 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
  - METEO 477 Fundamentals of Remote Sensing Systems
  - METEO 480W

#### Additional Courses: Require a grade of C or better
- Select 3-6 credits of the following: 3-6 credits
  - METEO 473 Application of Computers to Meteorology
  - METEO 474 Computer Methods of Meteorological Analysis and Forecasting

#### Supporting Courses and Related Areas

- CMPSC 200 Programming for Engineers with MATLAB
- CMPSC 201 Programming for Engineers with C++
- CMPSC 202
- METEO 273 Introduction to Programming Techniques for Meteorology

Select one of the following: 3 credits
- EBF 472 Quantitative Analysis in Earth Sciences
- STAT 301
- STAT 401 Experimental Methods

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>

#### Additional Courses
- Select 6-13 credits of the following: 1 6-13 credits
- 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

#### Additional Courses: Require a grade of C or better
- Select 3-6 credits of the following: 3-6 credits
- METEO 473 Application of Computers to Meteorology
- METEO 474 Computer Methods of Meteorological Analysis and Forecasting

#### Supporting Courses and Related Areas

- CMPSC 200 Programming for Engineers with MATLAB
- CMPSC 201 Programming for Engineers with C++
- CMPSC 202
- METEO 273 Introduction to Programming Techniques for Meteorology

Select one of the following: 3 credits
- EBF 472 Quantitative Analysis in Earth Sciences
- STAT 301
- STAT 401 Experimental Methods

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.
Select 3 credits of W courses or their equivalent in addition to the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO 440W</td>
<td>Principles of Atmospheric Measurements</td>
<td>3</td>
</tr>
</tbody>
</table>

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: Require a grade of C or better**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO 454</td>
<td>Introduction to Micrometeorology</td>
<td>3</td>
</tr>
</tbody>
</table>

**Additional Courses**

Select 15-17 credits of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 110</td>
<td>Biology: Basic Concepts and Biodiversity</td>
<td></td>
</tr>
<tr>
<td>CE 360</td>
<td>Fluid Mechanics</td>
<td></td>
</tr>
<tr>
<td>CE 461</td>
<td>Water-resource Engineering</td>
<td></td>
</tr>
<tr>
<td>CE 475</td>
<td>Water Quality Chemistry</td>
<td></td>
</tr>
<tr>
<td>CE 479</td>
<td>Environmental Microbiology for Engineers</td>
<td></td>
</tr>
<tr>
<td>CHEM 112</td>
<td>Chemical Principles II</td>
<td></td>
</tr>
<tr>
<td>CHEM 113</td>
<td>Experimental Chemistry II</td>
<td></td>
</tr>
<tr>
<td>CHEM 450</td>
<td>Physical Chemistry - Thermodynamics</td>
<td></td>
</tr>
<tr>
<td>CHEM 457</td>
<td>Experimental Physical Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 464</td>
<td>Chemical Kinetics and Dynamics</td>
<td></td>
</tr>
<tr>
<td>ERM 430</td>
<td>Air Pollution Impacts to Terrestrial Ecosystems</td>
<td></td>
</tr>
<tr>
<td>ERM 435</td>
<td>Limnology</td>
<td></td>
</tr>
<tr>
<td>ERM 447</td>
<td>Stream Restoration</td>
<td></td>
</tr>
<tr>
<td>ERM 450</td>
<td>Wetland Science and Sustainability</td>
<td></td>
</tr>
<tr>
<td>GEOG 311</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEOG 313</td>
<td>Introduction to Field Geography</td>
<td></td>
</tr>
<tr>
<td>GEOG 314</td>
<td>Biogeography and Global Ecology</td>
<td></td>
</tr>
<tr>
<td>GEOG 361</td>
<td>Cartography–Maps and Map Construction</td>
<td></td>
</tr>
<tr>
<td>GEOG 362</td>
<td>Remote Sensing and Image Analysis</td>
<td></td>
</tr>
<tr>
<td>GEOG 363</td>
<td>Geographic Information Systems</td>
<td></td>
</tr>
<tr>
<td>GEOG 417</td>
<td>Satellite Climatology</td>
<td></td>
</tr>
<tr>
<td>GEOG 467</td>
<td>Applied Cartographic Design</td>
<td></td>
</tr>
<tr>
<td>GEOG 482</td>
<td>Weather Communications I</td>
<td></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>
<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>
</tbody>
</table>

**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 416</td>
<td>Advanced Forecasting</td>
<td></td>
</tr>
<tr>
<td>METEO 418</td>
<td></td>
<td></td>
</tr>
<tr>
<td>METEO 419</td>
<td>Air Quality Forecasting</td>
<td></td>
</tr>
<tr>
<td>METEO 422</td>
<td>Advanced Atmospheric Dynamics</td>
<td></td>
</tr>
<tr>
<td>METEO 434</td>
<td>Radar Meteorology</td>
<td></td>
</tr>
<tr>
<td>METEO 451</td>
<td>Introduction to Physical Oceanography</td>
<td></td>
</tr>
<tr>
<td>METEO 452</td>
<td>Tropical Meteorology</td>
<td></td>
</tr>
<tr>
<td>METEO 454</td>
<td>Introduction to Micrometeorology</td>
<td></td>
</tr>
<tr>
<td>METEO 471</td>
<td></td>
<td></td>
</tr>
<tr>
<td>METEO 483</td>
<td>Weather Communications III</td>
<td></td>
</tr>
<tr>
<td>METEO 486</td>
<td>Pennsylvania Climate Studies (1-2, max 3)</td>
<td></td>
</tr>
</tbody>
</table>

Any two from:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO 495A</td>
<td>Meteorology Communications Internship</td>
<td></td>
</tr>
<tr>
<td>METEO 495B</td>
<td>Meteorology Private Sector Internship</td>
<td></td>
</tr>
<tr>
<td>METEO 495C</td>
<td>Meteorological Operations Internship</td>
<td></td>
</tr>
<tr>
<td>METEO 495D</td>
<td>Meteorological International Internship</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>METEO 473</td>
<td>Application of Computers to Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>or METEO 474</td>
<td>Computer Methods of Meteorological Analysis and Forecasting</td>
<td></td>
</tr>
</tbody>
</table>

**Supporting Courses and Related Areas**

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

1. With the approval of a meteorology adviser, some 200-level courses from those Colleges may also be used.
Meteorology and Atmospheric Science, B.S.

METEO 495E Meteorological Off-Campus Research Internship

Additional Courses: Require a grade of C or better

METEO 436 Radiation and Climate 3
or METEO 437 Atmospheric Chemistry and Cloud Physics

Select 3-6 credits of the following: 3-6

METEO 473 Application of Computers to Meteorology
METEO 474 Computer Methods of Meteorological Analysis and Forecasting

Weather Risk Management Option (27 credits)

Prescribed Courses

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

Additional Courses

Select 6 credits of the following: 6

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

Select one of the following: 3

ECON 490

STAT 318 Elementary Probability
STAT 319 Elementary Mathematical Statistics
STAT 414 Introduction to Probability Theory
STAT 415 Introduction to Mathematical Statistics
STAT 460 Intermediate Applied Statistics
STAT 462 Applied Regression Analysis

Additional Courses: Require a grade of C or better

Select 6 credits of the following: 6

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: 3

METEO 436 Radiation and Climate
METEO 437 Atmospheric Chemistry and Cloud Physics
METEO 454 Introduction to Micrometeorology (preferred choice)

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 (https://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 and Inter-Domain courses do not meet this requirement.)

- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

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

Integrative Studies

- Inter-Domain Courses (Inter-Domain): 6 credits

Exploration

- GN, may be completed with Inter-Domain courses: 3 credits
- GA, GH, GN, GS, Inter-Domain courses. This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student’s degree program, whichever is higher: 6 credits

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 (https://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.