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.

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.)
- 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

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
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>MATH 251</td>
<td>Ordinary and Partial Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 211</td>
<td>General Physics: Mechanics</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

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>MATH 140</td>
<td>Calculus With Analytic Geometry I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Calculus with Analytic Geometry II</td>
<td>4</td>
</tr>
<tr>
<td>METEO 300</td>
<td>Fundamentals of Atmospheric Science</td>
<td>4</td>
</tr>
<tr>
<td>METEO 411</td>
<td>Synoptic Meteorology Laboratory</td>
<td>4</td>
</tr>
</tbody>
</table>
METEO 421 Atmospheric Dynamics 4
METEO 431 Atmospheric Thermodynamics 3
METEO 440W Principles of Atmospheric Measurements 3
METEO 470 Climate Dynamics 3

Additional Courses
CAS 100 Effective Speech 3
or ENGL 202C Effective Writing: Technical Writing
ENGL 15 Rhetoric and Composition 3
or ENGL 30H Honors Rhetoric and Composition
Select one of the following: 3
CMPSC 101 Introduction to Programming
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
EBF 472 Quantitative Analysis in Earth Sciences
STAT 301

Additional Courses: Require a grade of C or better
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
Select 6-9 credits of the following: 6-9
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 440W Principles of Atmospheric Measurements

Environmental Meteorology Option (27-29 credits)
Code Title Credits
Prescribed Courses
CE 370 Introduction to Environmental Engineering 3
METEO 455 Atmospheric Dispersion 3

Prescribed Courses: Require a grade of C or better
METEO 454 Introduction to Micrometeorology 3

Additional Courses 1
Select 15-17 credits of the following: 15-17
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 447 Stream Restoration
ERM 450 Wetland Conservation
GEOL 311 Landscape Ecology
GEOL 312 Introduction to Field Geography
GEOL 314 Biogeography and Global Ecology
GEOL 361 Cartography–Maps and Map Construction
GEOL 362 Image Analysis
GEOL 363 Geographic Information Systems
GEOL 417 Satellite Climatology
GEOL 463 Geospatial Information Systems
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

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.
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<tr>
<th>Code</th>
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<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>

1 May apply to General Education

### General Option (27 credits)

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<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>

Select one of the following: 3

- METEO 436 Radiation and Climate
- METEO 437 Atmospheric Chemistry and Cloud Physics
- METEO 454 Introduction to Micrometeorology

### 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

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)

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<tr>
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<tbody>
<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>
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</table>

### Additional Courses

Select 6-9 credits of the following: 6-9

- EE/METEO 477 Fundamentals of Remote Sensing Systems
- ENGL 416 Science Writing
- GEOG 333 Human Dimensions of Natural Hazards
- GEOG 361 Cartography–Maps and Map Construction
- GEOG 362 Image Analysis
- GEOG 363 Geographic Information Systems
- GEOG 417 Satellite Climatology
- GEOG 467 Applied Cartographic Design
- GEOSC 402Y Natural Cartographic Design
- METEO 413 Map Analysis
- METEO 416 Advanced Forecasting
- METEO 418
- METEO 419 Air Quality Forecasting
- METEO 422 Advanced Atmospheric Dynamics
- METEO 434 Radar Meteorology
- METEO 451 Introduction to Physical Oceanography
- METEO 452 Tropical Meteorology
- METEO 454 Introduction to Micrometeorology
- METEO 471

### Weather Risk Management Option (27 credits)

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<thead>
<tr>
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<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>EBF 473</td>
<td>Risk Management in Energy Industries</td>
<td>3</td>
</tr>
<tr>
<td>ECON 102</td>
<td>Introductory Microeconomic Analysis and Policy</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: 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)