

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:

Requirement	Credits
General Education	45
Electives	4-9
Requirements for the Major	93-95

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)

Code	Title	Credits
Prescribed Courses		
CHEM 110	Chemical Principles I	3
EMSC 100S	Earth and Mineral Sciences First-Year Seminar ¹	3
MATH 251	Ordinary and Partial Differential Equations	4
PHYS 211	General Physics: Mechanics	4
PHYS 212	General Physics: Electricity and Magnetism	4
<i>Prescribed Courses: Require a grade of C or better</i>		
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
METEO 300	Fundamentals of Atmospheric Science	4
METEO 411	Synoptic Meteorology Laboratory	4

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	
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Select one of the following: 3

EBF 472	Quantitative Analysis in Earth Sciences	
STAT 301		
STAT 401	Experimental Methods	

Additional Courses: Require a grade of C or better

Select one of the following: 3

METEO 101	Understanding Weather Forecasting	
METEO 200A		
or METEO 2C		

METEO 201	Introduction to Weather Analysis	
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Select one of the following: 4

MATH 230	Calculus and Vector Analysis	
MATH 231	Calculus of Several Variables	
& MATH 232	and 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)**

Code	Title	Credits
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Prescribed Courses

METEO 422	Advanced Atmospheric Dynamics	3
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Additional Courses

Select 6-13 credits of the following: ¹ 6-13

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	Undergraduate Research	

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: 3

METEO 440W	Principles of Atmospheric Measurements	
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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)

Code	Title	Credits
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Prescribed Courses

CE 370	Introduction to Environmental Engineering	3
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METEO 455	Atmospheric Dispersion	3
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Prescribed Courses: Require a grade of C or better

METEO 454	Introduction to Micrometeorology	3
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Additional Courses ¹

Select 15-17 credits of the following: 15-17

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

METEO 473	Application of Computers to Meteorology	3
or METEO 474	Computer Methods of Meteorological Analysis and Forecasting	

¹ May apply to General Education

General Option (27 credits)

Code	Title	Credits
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Additional Courses

Additional Courses: Require a grade of C or better

METEO 473	Application of Computers to Meteorology	3
or 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	

Supporting Courses and Related Areas

Select 21 credits in consultation with adviser from 400-level METEO 21 courses and/or 300-, or 400-level courses from the Colleges of Agricultural Sciences, Earth and Mineral Sciences, Engineering, and/or Science¹

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)

Code	Title	Credits
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Prescribed Courses

METEO 414	Mesoscale Meteorology	4
METEO 415	Forecasting Practicum	3
METEO 481	Weather Communications I	3
METEO 482	Weather Communications II	3

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 Disasters	
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		

METEO 483	Weather Communications III	
METEO 486	Pennsylvania Climate Studies (1-2, max 3)	

Any two from:

METEO 495A	Meteorology Communications Internship	
METEO 495B	Meteorology Private Sector Internship	
METEO 495C	Meteorological Operations Internship	
METEO 495D	Meteorological International Internship	
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)

Code	Title	Credits
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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)	