

METEOROLOGY AND ATMOSPHERIC SCIENCE, B.S.

Seven Penn State campuses are scheduled for closure after Spring 2027: DuBois, Fayette, New Kensington, Mont Alto, Shenango, Wilkes-Barre, and York. New students are not being admitted at these campuses.

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	5-10
Requirements for the Major	93-95

24-27 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 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)

Code	Title	Credits
Prescribed Courses		
CHEM 110	Chemical Principles I	3
MATH 251	Ordinary and Partial Differential Equations	4
PHYS 211	General Physics: Mechanics	4
PHYS 212	General Physics: Electricity and Magnetism	4
STAT 401	Experimental Methods	3
<i>Prescribed Courses: Require a grade of C or better</i>		
EMSC 100S	Earth and Mineral Sciences First-Year Seminar ¹	3
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		
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++	
METEO 273	Introduction to Programming Techniques for Meteorology	
<i>Additional Courses: Require a grade of C or better</i>		
METEO 101	Understanding Weather Forecasting	3
or METEO 201	Introduction to Weather Analysis	
Select one of the following:		3
CAS 100A	Effective Speech	
ENGL/CAS 138T	Rhetoric and Civic Life II	
ENGL 202C	Effective Writing: Technical Writing	
Select one of the following:		3
ENGL 15	Rhetoric and Composition	
ENGL 15A	Rhetoric and Composition	
ENGL 30H	Honors Rhetoric and Composition	
ENGL/CAS 137H	Rhetoric and Civic Life I	
ESL 15	ESL Composition for American Academic Communication II	
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 100A, ENGL 138T or ENGL 202C can be substituted for EMSC 100S.

² Students who complete Basic ROTC may substitute 6 credits of ROTC for 3 credits of GHW courses and 3 credits of electives.

Requirements for the Option

Atmospheric Science Option (27-28 credits)

Code	Title	Credits
Prescribed Courses		
METEO 422	Advanced Atmospheric Dynamics	3
Additional Courses		
Select 6-13 credits from 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 471W	Atmospheric Optics	
METEO 477	Fundamentals of Remote Sensing Systems	
METEO 481	Weather Communications I	
<i>Additional Courses: Require a grade of C or better</i>		
Select 3-6 credits from the following:		3-6

METEO 473	Application of Computers to Meteorology	
METEO 474	Computer Methods of Meteorological Analysis and Forecasting	
Select 6-9 credits from 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

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.

Climate Science Option (27-28 credits)

Code	Title	Credits
Prescribed Courses		
<i>Prescribed Courses: Require a grade of C or better</i>		
METEO 436	Radiation and Climate	3
METEO 437	Atmospheric Chemistry and Cloud Physics	3
METEO 451	Introduction to Physical Oceanography	3
METEO 469	From Meteorology to Mitigation: Understanding Global Warming	3
METEO 473	Application of Computers to Meteorology	3
Additional Courses		
Select 12-13 credits from the following:		12-13
ABSM 300	Introduction to Agricultural and Biorenewable Products	
ABSM 350	Introduction to Life Cycle Assessment	
EMSC 460	Environmental Data Analytics	
ERM 309	Measurement & Monitoring of Hydrologic Systems	
ERM 402	Foundations of Sustainable Business	
ERM 430	Air Pollution Impacts to Terrestrial Ecosystems	
ERM 449	Sustainable Water Management: Economics and Policy	
GEOG 310	Introduction to Global Climatic Systems	
GEOG 310W	Introduction to Global Climatic Systems	
GEOG 412W	Climatic Change and Variability	
GEOG 413	Cryosphere and Climate Systems	
GEOG 438W	Human Dimensions of a Changing Climate	
GEOSC 402Y	Natural Disasters	
GEOSC 450	Risk Analysis in the Earth Sciences	
METEO 414	Mesoscale Meteorology	
METEO 422	Advanced Atmospheric Dynamics	
METEO 426	Inside Numerical Weather Prediction Models	
METEO 452	Tropical Meteorology	
METEO 466	Planetary Atmospheres	
METEO 477	Fundamentals of Remote Sensing Systems	
METEO 481	Weather Communications I	
METEO 486	Pennsylvania Climate Studies ((maximum 3 credits toward degree))	
METEO 494	Research Project ((max 6 credits toward degree))	

STAT 380	Data Science Through Statistical Reasoning and Computation	
STAT 462	Applied Regression Analysis	
STAT 463	Applied Time Series Analysis	

Environmental Meteorology Option (27-29 credits)

Code	Title	Credits
Prescribed Courses		
CE 370	Introduction to Environmental Engineering	3
METEO 455	Atmospheric Dispersion	3
<i>Prescribed Courses: Require a grade of C or better</i>		
METEO 454	Introduction to Micrometeorology	3
Additional Courses		
Select 15-17 credits from 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 435	Limnology	
ERM 447	Stream Restoration	
ERM 450	Wetland Science and Sustainability	
GEOG 313	Introduction to Field Geography	
GEOG 314	Biogeography and Global Ecology	
GEOG 361	Cartography--Maps and Map Construction	
GEOG 362	Remote Sensing and 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	
METEO 481	Weather Communications I	
<i>Additional Courses: Require a grade of C or better</i>		
METEO 473	Application of Computers to Meteorology	3
or METEO 474 Computer Methods of Meteorological Analysis and Forecasting		

General Option (27 credits)

Code	Title	Credits
Additional Courses		
<i>Additional Courses: Require a grade of C or better</i>		
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
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 from 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	Remote Sensing and 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 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 471W	Atmospheric Optics	
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	
<i>Additional Courses: Require a grade of C or better</i>		
METEO 436	Radiation and Climate	3
or METEO 437	Atmospheric Chemistry and Cloud Physics	
Select 3-6 credits from the following:		3-6
METEO 473	Application of Computers to Meteorology	

METEO 474	Computer Methods of Meteorological Analysis and Forecasting	
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Weather Risk Management Option (27 credits)

Code	Title	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 from 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
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	
<i>Additional Courses: Require a grade of C or better</i>		
Select 6 credits from the following:		6
METEO 415	Forecasting Practicum (does not require a grade of C or better)	
or METEO 481	Weather Communications I	
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/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/>)). For more information, check the Suggested Academic Plan for your intended program.