

# METEOROLOGY-CLIMATOLOGY

## Description

The Department of Earth and Atmospheric Sciences offers a bachelor of science (BS) degree only with a major in meteorology-climatology. This degree program is comprehensive, but flexible so that you can pursue your own interests within the broad field of atmospheric sciences while meeting the federal government requirements for employment as a meteorologist. If you choose to further your education, your degree also prepares you for graduate school in the atmospheric sciences and related fields.

The major in meteorology-climatology fulfills the recommended curriculum of the American Meteorological Society (AMS) and the University Corporation for Atmospheric Research (UCAR). The major and degree also meets or exceeds the minimum hiring requirements for employment as a meteorologist with the Federal government, thus preparing you for employment with federal agencies such as the National Weather Service, National Aeronautics and Space Administration, Environmental Protection Agency, National Park Service, and military. With this major, you can also work in private weather consulting; broadcast meteorology; and the agriculture, education, and energy sectors.

The University of Nebraska–Lincoln is a member of UCAR.

**Program Assessment.** To assist the department in evaluating the effectiveness of its program in meteorology-climatology, each major during their last semester prior to graduation will participate in an exit survey to gather information about the program from the student's perspective. The undergraduate advisor will inform students of the scheduling and format of the assessment activities. The results of participation in this assessment activity will in no way affect a student's GPA or graduation.

## College Admission

The entrance requirements for the College of Arts and Sciences (CAS), including any of the majors or minors offered through the college, are the same as the University of Nebraska–Lincoln General Admission Requirements. In addition to these requirements, the College of Arts and Sciences strongly recommends a third and fourth year of one foreign language in high school. Four years of high school coursework in the same language will fulfill the College of Arts and Sciences' language requirement. It will also allow students to continue language study at a more advanced level at the University of Nebraska–Lincoln and provide more opportunity to study abroad.

## Academic and Career Advising

### Academic and Career Advising Center

Not sure where to go or who to ask? The Advising Center team in 107 Oldfather Hall can help. The Academic and Career Advising Center is the undergraduate hub for CAS students in all majors. Centrally located and easily accessed, students encounter friendly, knowledgeable people who are eager to help or connect students to partner resources. Students also visit the Advising Center in 107 Oldfather Hall to:

- Choose or change their major, minor, or degree program.
- Check on policies, procedures, and deadlines.
- Get a college approval signature from the Dean's representatives.

CAS Career Coaches are available by appointment (in-person or zoom) and located in the CAS Academic and Career Advising Center, 107 Oldfather Hall. They help students explore majors and minors, gain experience, and develop a plan for life after graduation.

## Assigned Academic Advisors

Academic advisors are critical resources dedicated to students' academic, personal, and professional success. Every CAS student is assigned an academic advisor based on their primary major. Since most CAS students have more than just a single major, it is important to get to know the advisor for any minors or additional majors. Academic advisors work closely with the faculty to provide the best overall support and the discipline specific expertise. They are available for appointments (in-person or zoom) and through weekly virtual drop-ins. Assigned advisors are listed in MyRED (<https://its.unl.edu/myunl/>) and their offices may be located in or near the department of the major for which they advise.

Students who have declared a pre-health or pre-law area of interest will also work with advisors in the Exploratory and Pre-Professional Advising Center (Explore Center) in 127 Love South, who are specially trained to guide students preparing to enter a professional school.

For complete and current information on advisors for majors, minors, or pre-professional areas, visit <https://cas.unl.edu/major-advisors> (<https://cas.unl.edu/major-advisors/>), or connect with the Arts and Sciences Academic and Career Advising Center, 107 Oldfather Hall, 402-472-4190, [casadvising@unl.edu](mailto:casadvising@unl.edu).

## Career Coaching

The College believes that **Academics + Experience = Opportunities** and encourages students to complement their academic preparation with real-world experience, including internships, research, education abroad, service, and leadership. Arts and sciences students have access to a powerful network of faculty, staff, and advisors dedicated to providing information and support for their goals of meaningful employment or advanced education. Arts and sciences graduates have unlimited career possibilities and carry with them important career competencies—communication, critical thinking, creativity, context, and collaboration. They have the skills and adaptability that employers universally value. Graduates are prepared to effectively contribute professionally and personally with a solid foundation to excel in an increasingly global, technological, and interdisciplinary world.

Students should contact the career coaches in the Arts and Sciences Academic and Career Advising Center in 107 Oldfather Hall, or their assigned advisor, for more information. The CAS career coaches help students explore career options, identify ways to build experience and prepare to apply for internships, jobs, or graduate school, including help with resumes, applications, and interviewing.

## ACE Requirements

Students must complete one course for each of the ACE Student Learning Outcomes below. Certified course choices are published in the degree audit, or visit the ACE website (<http://ace.unl.edu>) for the most current list of certified courses.

### ACE Student Learning Outcomes

ACE 1: Write texts, in various forms, with an identified purpose, that respond to specific audience needs, integrate research or existing knowledge, and use applicable documentation and appropriate conventions of format and structure.

ACE 2: Demonstrate competence in communication skills.

ACE 3: Use mathematical, computational, statistical, logical, or other formal reasoning to solve problems, draw inferences, justify conclusions, and determine reasonableness.

ACE 4: Use scientific methods and knowledge to pose questions, frame hypotheses, interpret data, and evaluate whether conclusions about the natural and physical world are reasonable.

ACE 5: Use knowledge, historical perspectives, analysis, interpretation, critical evaluation, and the standards of evidence appropriate to the humanities to address problems and issues.

ACE 6: Use knowledge, theories, and research perspectives such as statistical methods or observational accounts appropriate to the social sciences to understand and evaluate social systems or human behaviors.

ACE 7: Use knowledge, theories, or methods appropriate to the arts to understand their context and significance.

ACE 8: Use knowledge, theories, and analysis to explain ethical principles and their importance in society.

ACE 9: Exhibit global awareness or knowledge of human diversity through analysis of an issue.

ACE 10: Generate a creative or scholarly product that requires broad knowledge, appropriate technical proficiency, information collection, synthesis, interpretation, presentation, and reflection.

## College Degree Requirements

### College Distribution Requirements – BA and BS

The College of Arts and Sciences distribution requirements are common to both the bachelor of arts and bachelor of science degrees and are designed to ensure a range of courses. By engaging in study in several different areas within the College, students develop the ability to learn in a variety of ways and apply their knowledge from a variety of perspectives. All requirements are in addition to University ACE requirements, and no course can be used to fulfill both an ACE outcome and a College Distribution Requirement.

- A student may not use a single course to satisfy more than one College Distribution Requirement, with the exception of CDR Diversity. Courses used to meet CDR Diversity may also meet CDR Writing, CDR Humanities, or CDR Social Science.
- Independent study or reading courses and internships cannot be used to satisfy distribution requirements.
- Courses from interdisciplinary programs will be applied in the same area as courses from the home/cross-listed department.

#### College Distribution Requirements

*CDR: Written Communication* 3

Select from courses approved for ACE outcome 1.

*CDR: Natural, Physical, and Mathematical Sciences with Lab* 4

Select from biochemistry, biological sciences, chemistry, computer science, geology, meteorology, mathematics, and physics. Must include one lab in the natural or physical sciences. Lab courses may be selected from biochemistry, biological sciences, chemistry, geology, meteorology, and physics.

Some courses from geography and anthropology may also be used to satisfy the lab requirement above.<sup>1</sup>

*CDR: Humanities* 3

Select from classics, English, film studies, history, modern languages and literatures, philosophy, and religious studies.<sup>2</sup>

*CDR: Social Science* 3

Select from anthropology, communication studies, geography, national security studies, political science, psychology, or sociology.<sup>3</sup>

*CDR: Human Diversity in U.S. Communities* 0-3

Select from a set of approved courses as listed in the degree audit.

*CDR: Language* 0-16

Fulfilled by the completion of the 6-credit-hour second-year sequence in a single foreign language in one of the following departments: Classics and religious studies or modern languages and literatures. Instruction is currently available in Arabic, Chinese, Czech, French, German, Greek, Japanese, Latin, Russian, and Spanish.

A student who has completed the fourth-year level of one foreign language in high school is exempt from the languages requirement, but encouraged to continue on in their language study.

Credit Hours Subtotal: 13-32

<sup>1</sup> See Degree Audit or a College of Arts and Sciences advisor for approved geography and anthropology courses that apply as natural science.

<sup>2</sup> Language courses numbered 220 and below do not fulfill the CDR Humanities.

<sup>3</sup> See Degree Audit or College of Arts and Sciences advisor for list of natural/physical science courses in anthropology, geography, and psychology that do not apply as social science.

### Language Requirement

The University of Nebraska–Lincoln and the College of Arts and Sciences place great value on academic exposure and proficiency in a second language. The University of Nebraska–Lincoln entrance requirement of two years of the same foreign language or the College's language distribution requirement (CDR: Language) will rarely be waived and only with relevant documentation. See the main College of Arts and Sciences page for more details.

### Experiential Learning Requirement

All undergraduates in the College of Arts and Sciences must complete an Experiential Learning (EL) designated course. This may include 0-credit courses designed to document co-curricular activities recognized as Experiential Learning.

### Scientific Base - BS Only

The bachelor of science degree requires students to complete 60 hours in mathematical, physical, and natural sciences. Approved courses for scientific-based credit come from the following College of Arts and Sciences disciplines: actuarial science, anthropology (selected courses), astronomy, biochemistry (excluding BIOC 101), biological sciences (excluding BIOS 100 or BIOS 203), chemistry (excluding CHEM 101), geography (selected courses), geology, life sciences, mathematics (excluding courses below MATH 104), meteorology, microbiology (excluding MBI0 101), and physics (excluding PHYS 201.)

See your Degree Audit or your assigned academic advisor for a complete list, including individual classes that fall outside of the disciplines listed above. Up to 12 hours of scientific and technical courses offered by other colleges may be accepted toward this requirement with approval of the College of Arts and Sciences. See your assigned academic advisor to start the approval process.

## Minimum Hours Required for Graduation

A minimum of 120 semester hours of credit is required for graduation from the College of Arts and Sciences. A cumulative grade point average of at least 2.0 is required.

## Grade Rules

### Restrictions on C- and D Grades

The College will accept no more than 15 semester hours of C- and D grades from other domestic institutions except for UNO and UNK. All courses taken at UNO and UNK impact the UNL transcript. No transfer of C- and D grades can be applied toward requirements in a major or a minor. No University of Nebraska–Lincoln C- and D grades can be applied toward requirements in a major or a minor. International coursework (including education abroad) with a final grade equivalent to a C- or lower will not be validated by the College of Arts and Sciences departments to be degree applicable.

### Pass/No Pass Privilege

The College of Arts and Sciences adheres to the University regulations for the Pass/No Pass (P/N) privilege with the following additional regulations:

- Pass/No Pass hours can count toward fulfillment of University ACE requirements and college distribution requirements up to the 24-hour maximum.
- Most arts and sciences departments and programs do not allow courses graded Pass/No Pass to apply to the major or minor. Students should refer to the department's or program's section of the catalog for clarification. By college rule, departments can allow up to 6 hours of Pass/No Pass in the major or minor.
- Departments may specify that certain courses of theirs can be taken only on a P/N basis.
- The college will permit no more than a total of 24 semester hours of P/N grades to be applied toward degree requirements. This total includes all Pass grades earned at the University of Nebraska–Lincoln and other U.S. schools. **NOTE:** This 24-hour limit is more restrictive than the University regulation.

### Grading Appeals

A student who feels that he/she has been unfairly graded must ordinarily take the following sequential steps in a timely manner, usually by initiating the appeal in the semester following the awarding of the grade:

1. Talk with the instructor concerned. Most problems are resolved at this point.
2. Talk to the instructor's department chairperson.
3. Take the case to the Grading Appeal Committee of the department concerned. The Committee should be contacted through the department chairperson.
4. Take the case to the College Grading Appeals Committee by contacting the Dean's Office, 1223 Oldfather Hall.

## Course Level Requirements

### Courses Numbered at the 300 or 400 Level

Thirty (30) of the 120 semester hours of credit must be in courses numbered at the 300 or 400 level. Of those 30 hours, 15 hours (1/2) must be completed in residence at the University of Nebraska–Lincoln.

### Residency Requirement

Students must complete at least 30 of the 120 total hours for their degree at the University of Nebraska–Lincoln. Students must complete at least 1/2 of their major coursework, including 6 hours at the 300 or 400 level in their major and 15 of the 30 hours required at the 300 or 400 level, in residence. Credit earned during education abroad may be used toward the residency requirement only if students register through the University of Nebraska–Lincoln.

## Catalog to Use

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to and enrolled as a degree-seeking student at the University of Nebraska–Lincoln. In consultation with advisors, a student may choose to follow a subsequent catalog for any academic year in which they are admitted to and enrolled as a degree-seeking student at the University of Nebraska–Lincoln in the College of Arts and Sciences. Students must complete all degree requirements from a single catalog year. Beginning in 1990-1991, the catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

**Transfer Students:** Students who have transferred from a community college may be eligible to fulfill the requirements as stated in the catalog for an academic year in which they were enrolled at the community college prior to attending the University of Nebraska-Lincoln. This decision should be made in consultation with academic advisors, provided the student a) was enrolled in a community college during the catalog year they are utilizing, b) maintained continuous enrollment at the previous institution for 1 academic year or more, and c) continued enrollment at the University of Nebraska-Lincoln within 1 calendar year from their last term at the previous institution. Students must complete all degree requirements from a single catalog year and within the time frame allowable for that catalog year.

## Learning Outcomes

Graduates with a major in meteorology-climatology will be able to:

1. Explain fundamental atmospheric processes and develop conceptual models of the atmosphere, as well as its interaction with other components of the Earth system.
2. Analyze and interpret weather and climate data using mathematical, statistical, and computer programming tools.
3. Synthesize a broad understanding of basic weather and climate processes and system-scale interactions to generate short- and long-term predictions of the weather and climate.
4. Integrate disciplinary knowledge, technical proficiency, information collection, and data synthesis and analysis to conduct and interpret scientific research.
5. Communicate weather and climate information to diverse audiences using multi-media presentations and written scientific reports.

## Major Requirements

### Core Requirements

METR 100	Weather and Climate	4
METR 153	Introduction to Scientific Programming in Atmospheric Science	3
METR 205	Introduction to Atmospheric Science	4
METR 223	Atmospheric Thermodynamics	4
METR 311	Dynamic Meteorology I	3
METR 312	Dynamic Meteorology II	3
METR 323	Physical Meteorology	4
METR 341	Synoptic Meteorology	4
Select one of the following Capstone courses:		4
METR 442	Advanced Synoptic Meteorology-Climatology	
METR 470	The Climate System: Analysis and Prediction	
Select one of the following courses:		3
METR 463	Radar Meteorology	
METR 464	Satellite Meteorology	
<b>Total Credit Hours</b>		<b>36</b>

### Specific Major Requirements

#### Additional Advanced Meteorology Courses <sup>1</sup>

Select 12 hours of METR courses from the following:		12
METR 370 / NRES 370	Applied Climatology	
Any 400 level METR course outside the core requirements.		
Credit Hours Subtotal:		12

<sup>1</sup> No more than 3 hours from METR 446 or METR 497 may count toward the major.

### Ancillary Requirements

#### Mathematics

MATH 106	Calculus I	5
MATH 107	Calculus II	4
MATH 208	Calculus III	4
MATH 221	Differential Equations	3
STAT 380	Statistics and Applications	3
Credit Hours Subtotal:		19

#### Physics

PHYS 211 & PHYS 221	General Physics I and General Physics Laboratory I	5
PHYS 212	General Physics II	4
Credit Hours Subtotal:		9

#### Chemistry

CHEM 109A & CHEM 109L	General Chemistry I and General Chemistry I Laboratory	4
Credit Hours Subtotal:		4
<b>Total Credit Hours</b>		<b>32</b>

## ADDITIONAL MAJOR REQUIREMENTS

### Grade Rules

#### C- and D Grades

A grade of C or above is required for all courses in the major, including ancillary courses.

#### Pass/No Pass

No course taken Pass/No Pass will be counted toward the major.

#### METR 100 Weather and Climate

**Prerequisites:** MATH 101 or higher; or a qualifying Math Placement Exam score for MATH 102 or 104 or higher

**Description:** Physical behavior of the atmosphere; elements of weather and climate and their distribution over the earth. Weather map analysis and forecasting. Atmospheric circulation, precipitation processes, severe weather, air pollution, and the use of weather radar. Concepts of weather forecasting.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Graded with Option

**Prerequisite for:** GEOL 372; METR 153; METR 205; METR 270; METR 446

**ACE:** ACE 4 Science

**Course and Laboratory Fee:** \$20

#### METR 140 Severe and Unusual Weather

**Prerequisites:** MATH 101 or higher; or a qualifying Math Placement Exam score for MATH 102 or 104 or higher.

**Notes:** Will not count toward the major in METR.

**Description:** Meteorological basics to help understand ice storms, blizzards, tornadoes, hurricanes, flooding, droughts, and other unusual weather.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Prerequisite for:** METR 270

**ACE:** ACE 4 Science

#### METR 153 Introduction to Scientific Programming in Atmospheric Science

**Prerequisites:** METR 100

**Notes:** No prior programming experience is required.

**Description:** Introduction to problem solving with computers using MATLAB. Topics include language syntax, data types, program organization, problem-solving methods, and algorithm design and verification. Basics of problem solving with computers, and the skills necessary to analyze and visualize geophysical data sets.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 9

**Grading Option:** Graded

**Offered:** SPRING

**Prerequisite for:** METR 205; METR 223; METR 311; METR 323



**METR 180 Climate Change, Energy, and the Environment**

**Description:** Concepts and processes of the environment, energy, and climate change and how they are interrelated.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**ACE:** ACE 4 Science

**METR 205 Introduction to Atmospheric Science**

**Prerequisites:** MATH 106; METR 100; PHYS 211 or 211H, METR 153

**Description:** Conceptual foundations for synoptic and dynamic meteorology. Meteorological data analysis, the dynamics of atmospheric motions, and atmospheric thermodynamics.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Graded with Option

**Offered:** FALL

**Prerequisite for:** METR 223; METR 311; METR 323

**Course and Laboratory Fee:** \$20

**METR 223 Atmospheric Thermodynamics**

**Prerequisites:** METR 153; METR 205; MATH 107 or parallel.

**Description:** Basic thermodynamic concepts relevant to atmospheric processes, atmospheric stability, and cloud and precipitation micro-physics.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Graded with Option

**Prerequisite for:** METR 341

**METR 270 Global warming: Science, Impacts, Solutions**

**Prerequisites:** METR 100 or METR 140 or METR 180

**Description:** Examine climate change at the global, regional, and local scale. Develop an awareness of the human elements of climate change through an exploration of impacts, adaptations, and vulnerability to climate change. Climate change solutions from the local through global scale.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**Offered:** FALL

**METR 291 Special Topics in Meteorology-Climatology**

**Description:** Topics vary.

**Credit Hours:** 1-6

**Min credits per semester:** 1

**Max credits per semester:** 6

**Max credits per degree:** 6

**Grading Option:** Graded with Option

**METR 296 Independent Study in Meteorology-Climatology**

**Prerequisites:** Permission.

**Description:** Independent reading or research under direction of a faculty member.

**Credit Hours:** 1-3

**Min credits per semester:** 1

**Max credits per semester:** 3

**Max credits per degree:** 6

**Grading Option:** Graded with Option

**METR 311 Dynamic Meteorology I**

**Prerequisites:** METR 153; MATH 208/208H; METR 205; PHYS 211/211H

**Description:** Equations of thermodynamics, momentum, and continuity are derived and applied to atmospheric motion. Energy conservation, flows, and conversions.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Prerequisite for:** METR 312

**METR 312 Dynamic Meteorology II**

**Prerequisites:** METR 311; MATH 221/821.

**Description:** Applications of the principles of dynamic meteorology to the problems of forecasting and meteorological problems.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Offered:** FALL/SPR

**METR 323 Physical Meteorology**

**Prerequisites:** METR 153; METR 205; PHYS 212/212H

**Description:** Physical principles that provide the foundation for meteorology. Absorption, scattering, and transmission of radiation in the atmosphere, atmospheric optics, atmospheric electricity, and lightning.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Graded with Option

**Course and Laboratory Fee:** \$20

**METR 341 Synoptic Meteorology**

**Prerequisites:** METR 223

**Description:** Dynamic and thermodynamic concepts and principles applied to synoptic-scale weather forecasting. Dynamics, energetics, structure, evolution, and motion of extra-tropical cyclones. Meteorological communications, interpretation and analysis of weather maps, and thermodynamic diagrams.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Graded with Option

**Course and Laboratory Fee:** \$40

**METR 370 Applied Climatology**

**Crosslisted with:** NRES 370

**Prerequisites:** Junior or Senior Standing

**Description:** Processes that give rise to spatial and temporal differences in climate. Various interrelationships between humans and climate.

Influence of climate on building styles, the economy, water resources, human health, and society. Humans' inadvertent and purposeful modification of the atmosphere.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Offered:** FALL

**Course and Laboratory Fee:** \$20

**METR 408 Microclimate: The Biological Environment**

**Crosslisted with:** PLAS 408, GEOG 408, NRES 408, WATS 408, AGRO 808, GEOG 808, HORT 808, METR 808, NRES 808

**Prerequisites:** Junior standing, MATH 106 or equivalent, 5 hrs physics, major in any of the physical or biological sciences or engineering.

**Description:** Physical factors that create the biological environment. Radiation and energy balances of earth's surfaces, terrestrial and marine. Temperature, humidity, and wind regimes near the surface. Control of the physical environment through irrigation, windbreaks, frost protection, manipulation of light, and radiation. Applications to air pollution research. Instruments for measuring environmental conditions and remote sensing of the environment.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Prerequisite for:** BSEN 954, NRES 954

**METR 415 General Circulation of the Atmosphere**

**Crosslisted with:** METR 815

**Prerequisites:** Junior standing; METR 475/875; PHYS 211/211H; and PHYS 221.

**Description:** Development of the atmospheric circulation regimes, from planetary scale (e.g., the planetary waves) to synoptic scale (e.g., the cyclones and anticyclones) and mesoscale, their seasonal variations, and their roles in horizontal vertical energy and water transport and budgets in the Earth system.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 421 Cloud Physics**

**Crosslisted with:** METR 821

**Prerequisites:** METR 223 and METR 323 or equivalent

**Description:** Buoyancy and parcel mixing, cloud physics instrumentation, the role of aerosols in precipitation processes, growth of liquid cloud droplets/raindrops/ice crystals, processes associated with falling precipitation particles, drop size distributions and their moments, applications to convection, and parameterizations of cloud microphysical processes for numerical modeling applications.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 433 Boundary-layer Meteorology**

**Crosslisted with:** METR 833

**Prerequisites:** METR 223 and MATH 208/208H

**Description:** Basic concepts of atmospheric turbulence and fundamental dynamics, thermodynamics, and structure of the atmospheric boundary layer are discussed. Atmospheric boundary layer parameterizations used in modern weather and climate models are presented.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Prerequisite for:** METR 933

**METR 442 Advanced Synoptic Meteorology-Climatology**

**Crosslisted with:** METR 842

**Prerequisites:** METR 341.

**Description:** Analysis and forecasting of subsynoptic-scale weather systems. Convection, thunderstorm models, severe local storm forecasting techniques, mesoscale convective complexes, vertical cross-sections, isentropic analysis, and weather radar.

**Credit Hours:** 4

**Max credits per semester:** 4

**Max credits per degree:** 4

**Grading Option:** Graded with Option

**Prerequisite for:** METR 944

**ACE:** ACE 10 Integrated Product

**Course and Laboratory Fee:** \$40

**Experiential Learning:** Research

**METR 443 Severe Storms Meteorology-Climatology**

**Crosslisted with:** METR 843

**Prerequisites:** METR 311, METR 341 or parallel

**Description:** Dynamics of various types of severe weather (blizzards, flash floods, lightning, thunderstorms and winter and summer tornado outbreaks). Interpretation of the numerical and statistical models utilized to forecast these phenomena. Synoptic case studies of severe weather occurrences. Recent research on severe weather.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 444 Mesoscale Meteorology**

**Crosslisted with:** METR 844

**Prerequisites:** METR 311

**Description:** Dynamics and conceptual models of mesoscale meteorological phenomena and processes.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 446 Broadcast Meteorology**

**Prerequisites:** METR 100

**Notes:** Only 3 hours of credit from METR 446 or METR 497 may be applied to the major.

**Description:** Information about the history and current status of broadcast meteorology and related technology. Procedures and requirements to obtain Professional Society certification/seal in Broadcast Meteorology. Address on air requirements mandated by the Federal FCC rules and regulations and social impacts of broadcast meteorology. Opportunity to gain experience in presenting weather information through various media outlets, including the use of chromakey technology and social media.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 450 Climate and Society**

**Crosslisted with:** PLAS 450, GEOG 450, NRES 452, AGRO 850, GEOG 850, METR 850, NRES 852

**Prerequisites:** Junior standing or above.

**Notes:** Offered spring semester of even-numbered calendar years.

**Description:** Impact of climate and extreme climatic events on society and societal responses to those events. Global in scope and interdisciplinary.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Offered:** SPRING

**METR 453 GIS in Earth and Atmospheric Sciences**

**Crosslisted with:** GEOL 453, GEOL 853, METR 853

**Prerequisites:** Junior or above standing; and one of the following: GEOL 100 or 101, or METR 100

**Description:** Basic concepts of GIS, hands-on experience with various case studies from geology, meteorology, climatology and environmental applications.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded

**METR 454 Statistical Analysis of Atmospheric Data**

**Crosslisted with:** METR 854

**Prerequisites:** 6 hrs METR and MATH 107/107H.

**Description:** Application of univariate statistics, hypothesis testing, statistical forecasting, forecast verification, time-series analysis, principal component analysis, and cluster/multivariate analysis to atmospheric data for different applications in the atmospheric sciences (from short-term weather forecast to long-term climate prediction).

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Prerequisite for:** METR 965

**METR 463 Radar Meteorology**

**Crosslisted with:** METR 863

**Prerequisites:** METR 323.

**Description:** The fundamental principles of weather radars and the basic application of these principles.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Offered:** SPRING

**Course and Laboratory Fee:** Total Seats Needed: 150

**Experiential Learning:** Research

**METR 464 Satellite Meteorology**

**Crosslisted with:** METR 864

**Prerequisites:** METR 223

**Description:** Concepts and principles related to meteorological observations from satellites. Applications for weather analysis and forecasting.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Course and Laboratory Fee:** \$20

**METR 469 Bio-Atmospheric Instrumentation**

**Crosslisted with:** GEOG 469, PLAS 407, AGST 469, NRES 469, AGRO 869, GEOG 869, HORT 807, METR 869, AGST 869, NRES 869

**Prerequisites:** Junior standing; MATH 106; 4 hrs physics; physical or biological science major.

**Description:** Discussion and practical application of principles and practices of measuring meteorological and related variables near the earth's surface including temperature, humidity, precipitation, pressure, radiation and wind. Performance characteristics of sensors and modern data collection methods are discussed and evaluated.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 470 The Climate System: Analysis and Prediction**

**Crosslisted with:** METR 870

**Prerequisites:** Senior standing; major or minor in meteorology.

**Description:** Maintenance of the climate system and climate change over time. Global budgets of energy, water, and momentum and their balance. Development of simple, physically-based models of climate and of climate change.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**ACE:** ACE 10 Integrated Product

**Experiential Learning:** Research

**METR 471 Tropical Meteorology**

**Crosslisted with:** METR 871

**Prerequisites:** METR 223 and METR 311

**Description:** Atmospheric phenomena unique to the tropics, and their connection to the global circulation.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 475 Physical Climatology**

**Crosslisted with:** METR 875

**Prerequisites:** METR 205.

**Description:** Global energy and water balance regimes of the earth and its atmosphere. Utilization of physical laws to reveal causes and effects of interrelationships in the climatic system.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**Prerequisite for:** METR 415, METR 815; METR 483, METR 883, NRES 467, NRES 867

**METR 478 Regional Climatology**

**Crosslisted with:** METR 878, NRES 478, NRES 878

**Prerequisites:** NRES/METR 370.

**Description:** Regional differentiation of the climates of the earth on both a descriptive and dynamic basis. The chief systems of climatic classification.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 479 Hydroclimatology**

**Crosslisted with:** NRES 479, WATS 479, BSEN 479, NRES 879, METR 879, BSEN 879

**Prerequisites:** NRES 208 or METR 100 or METR/NRES 370.

**Notes:** Offered spring semester of even-numbered calendar years.

**Description:** Interaction between earth's climate and the hydrologic cycle. Energy and water fluxes at the land-atmosphere interface. Atmospheric moisture transport, precipitation, evaporation, snowmelt, and runoff. Impacts of climate variability and change on the hydrologic cycle.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 483 Global Climate Change**

**Crosslisted with:** METR 883, NRES 467, NRES 867

**Prerequisites:** Junior standing; and METR 475/875.

**Notes:** Offered fall semester of even-numbered calendar years.

**Description:** Elements of climate systems, El Nino/LaNina cycle and monsoons, natural variability of climate on interannual and interdecadal scales. Paleoclimate, and future climate, developed climate change scenarios and climate change impacts on natural resources and the environment.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 487 Earth's Climate: Past, Present, Future**

**Crosslisted with:** METR 887

**Prerequisites:** 6 hrs METR or 6 hrs GEOL.

**Description:** How the Earth's climate has varied and the forcing mechanisms related to those changes. Themes that reappear through Earth's climate history and into the future; causes of climate change; the natural response times of the multiple components; and the role of greenhouse gases within the climate system at differing time scales.

**Credit Hours:** 3

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Graded with Option

**METR 491 Special Topics in Meteorology-Climatology**

**Crosslisted with:** METR 891

**Description:** Topics vary.

**Credit Hours:** 1-6

**Min credits per semester:** 1

**Max credits per semester:** 6

**Max credits per degree:** 8

**Grading Option:** Graded with Option

**METR 495 Internship in Meteorology-Climatology**

**Crosslisted with:** METR 895

**Prerequisites:** Permission.

**Description:** Application of meteorology-climatology learning with on-the-job training.

**Credit Hours:** 1-6

**Min credits per semester:** 1

**Max credits per semester:** 6

**Max credits per degree:** 6

**Grading Option:** Pass No Pass

**METR 496 Independent Study in Meteorology-Climatology**

**Prerequisites:** Permission.

**Description:** Independent reading or research under direction of a faculty member.

**Credit Hours:** 1-3

**Min credits per semester:** 1

**Max credits per semester:** 3

**Max credits per degree:** 6

**Grading Option:** Graded with Option

**METR 497 Broadcast Meteorology Practicum**

**Prerequisites:** Permission.

**Notes:** Only 3 hours from METR 446 or METR 497 may be applied to the major.

**Description:** Produce weather presentations worthy of airing live during Star City News. Learn how to develop weather presentations for production, including development of graphics, lead ins and promos. One-on-one critiquing/coaching to improve the presentation and content of the presentation will also take place throughout the semester.

**Credit Hours:** 1-3

**Min credits per semester:** 1

**Max credits per semester:** 3

**Max credits per degree:** 3

**Grading Option:** Pass No Pass

**METR 499 Undergraduate Thesis**

**Prerequisites:** Permission.

**Description:** Independent research leading to a thesis.

**Credit Hours:** 1-3

**Min credits per semester:** 1

**Max credits per semester:** 3

**Max credits per degree:** 6

**Grading Option:** Graded with Option

**METR 499H Honors Undergraduate Thesis**

**Prerequisites:** Permission.

**Description:** Independent research leading to a thesis.

**Credit Hours:** 1-3

**Min credits per semester:** 1

**Max credits per semester:** 3

**Max credits per degree:** 6

**Grading Option:** Graded with Option

**PLEASE NOTE**

This document represents a sample 4-year plan for degree completion with this major. Actual course selection and sequence may vary and should be discussed individually with your college or department academic advisor. Advisors also can help you plan other experiences to enrich your undergraduate education such as internships, education abroad, undergraduate research, learning communities, and service learning and community-based learning.

## Meteorology-Climatology (B.S.) Career Information

*The following represents a sample of the internships, jobs and graduate school programs that current students and recent graduates have reported.*

**Transferable Skills**

- Analyze and explain data
- Use quantitative analysis techniques



- Use qualitative analysis techniques
- Define problems and identifying causes
- Apply mathematical and scientific skills to solve real-world problems
- Make predictions using mathematical, statistical, and scientific modeling methods
- Make decisions carefully, using appropriate theoretical frameworks
- Simplify complex information and present it to others
- Communicate results of scientific experiments to scientific and non-scientific audiences
- Read, understand, and critically review scientific information
- Support and communicate claims using clear evidence
- Listen actively and facilitate individual and group communication
- Collaborate with a team to develop solutions
- Communicate clearly using different forms of writing to and for a variety of different audiences
- Coordinate people, activities, and event details

- Ph.D., Earth & Atmospheric Science – Meteorology-Climatology, University of Nebraska-Lincoln – Lincoln NE

### Jobs of Recent Graduates

- Environment Scientist II, North Dakota Department of Environment Quality – Bismarck, ND
- Palace Acquire Program, U.S. Air Force 557 Weather Wing – Offutt AFB, NE
- Payroll Specialist, Omaha National – Omaha, NE
- Systems Engineer, Northrop Grumman – Bellevue, NE
- Systems Engineer, Raytheon – Omaha, NE
- Meteorologist, Nebraska Department of Roads – Lincoln, NE
- Meteorologist, Weather or Not – Shawnee, KS
- Coding Specialist, National Research Corporation – Lincoln, NE
- Meteorologist, National Weather Service – Silver Spring, MD
- Underwriting Assistant, National Indemnity – Omaha, NE

### Internships

- Weather Intern, Channel 8 - Lincoln NE
- Research Technician, Planetary Data, Inc. - Prague NE
- Research Assistant, UNL Earth and Atmospheric Sciences - Lincoln NE
- Architectural Engineering Intern, Ezenics, Inc. - Omaha NE
- Intern, MMC Contractors - Omaha NE

### Graduate & Professional Schools

- Master's Degree, Environment and Society, Utah State University – Salt Lake City, UT
- Master's Degree, Geospatial Analysis, East Tennessee State University – Johnson City, TN
- Master's Degree, Meteorology, University of Wisconsin–Madison – Madison, WI
- Master's Degree, Meteorology, University of Oklahoma – Norman, OK
- Master's Degree, Meteorology, Penn State University – State College, PA
- Master's Degree, Meteorology, University of Nebraska–Lincoln – Lincoln, NE
- Master's Degree, Earth & Atmospheric Science – Meteorology-Climatology, University of Nebraska-Lincoln – Lincoln, NE