Meteorology-Climatology

Description
The Department of Earth and Atmospheric Sciences offers a bachelor of science degree 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.

A bachelors degree in meteorology-climatology fulfills the recommended curriculum of the American Meteorological Society (AMS) and the University Corporation for Atmospheric Research (UCAR). The degree program 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 degree, 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. Results of participation in this assessment activity will in no way affect a student’s GPA or graduation.

College Requirements
College Admission

College Admission
The entrance requirements for the College of Arts and Sciences are the same as the UNL General Admission Requirements. Students who are admitted through the Admission by Review process may have certain conditions attached to their enrollment at UNL. These conditions are explained under “Removal of Deficiencies.”

In addition to these requirements, the College of Arts and Sciences strongly recommends a third and fourth year of one foreign language. 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 UNL, and provide more opportunity to study abroad.

Transfer Students
To be considered for admission as a transfer student, Nebraska resident or nonresident, students must have an accumulated average of C (2.0 on a 4.0 scale) and a minimum C average in the last semester of attendance at another college. Transfer students who graduated from high school January 1997 and after must also meet the UNL General Admission Requirements. Those transfer students who graduated before January 1997 must have completed in high school: 3 years of English, 2 years of the same foreign language, 2 years of algebra, and 1 year of geometry.

Transfer students who have completed less than 12 credit hours of college study must also submit either their ACT or SAT scores.

Ordinarily, hours earned at a similarly accredited college or university are applicable to the UNL degree. The College, however, will evaluate all hours submitted on an application for transfer, and reserves the right to accept or reject any of them, based upon its exclusion and restriction policies. Sixty is the maximum number of hours the University will accept on transfer from a two-year college or international institution. Transfer credit in the major or minor must be approved by the departmental advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major or minor. At least half of the hours in the major field must be completed at the University regardless of the number of hours transferred.

The College of Arts and Sciences will accept no more than 15 semester hours of C- and D grades from other schools. The C- and D grades cannot be applied toward requirements for a major or minor. This policy does not apply to the transfer of grades from UNO or UNK to UNL. All D grades may be transferred from UNO or UNK, but they are not applicable to a major or minor.

Readmitted Students
UNL students who choose not to take courses for more than 2 consecutive terms, must reapply to UNL. Students readmitted to the College of Arts and Sciences will follow the requirements stated in the catalog for the academic year of readmission and re-enrollment as a degree-seeking student in 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.

Admission Deficiencies/Removal of Deficiencies
Students must remove entrance deficiencies in geometry and foreign language as soon as possible, and before graduating from the College of Arts and Sciences. For questions and more information, students should consult a college advisor in the Academic and Career Advising Center in 107 Oldfather Hall.

Removing Foreign Language Deficiencies
Students must complete the second semester of a first year language sequence to clear the deficiency and the second semester of the second year language sequence to complete the college graduation requirement in language.

Removing Geometry Deficiencies
A deficiency of one year of geometry can be removed by taking high school geometry courses through an approved independent study program, or by completing a geometry course from an accredited community college or a four-year institution. Neither of these options will count for college credit.

College Degree Requirements

College Distribution Requirements
Bachelor of Arts or Bachelor of Science (16 hours + Language)
The College of Arts and Sciences distribution requirements are designed to further the purposes of liberal education by encouraging study in several different areas within the College. All requirements are in addition to University ACE requirements. A student may not use a single course
to satisfy more than one of the following five distribution requirements. A student cannot use a single course to satisfy both an ACE outcome and a College distribution requirement. A student cannot use a course from their primary major to satisfy the Breadth Requirement (F), but may apply an ancillary requirement of the primary major or a course from their second major toward this requirement. Independent study or reading courses and internships cannot be used to satisfy distribution requirements. To see a complete list of excluded courses, run a degree audit through MyRED.

Courses from interdisciplinary programs will count in the same area as courses from the home/cross-listed department(s).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDR A - Written Communication</td>
<td>3</td>
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<tr>
<td>CDR B and BL - Natural, Physical, and Mathematical Sciences with Lab</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CDR C - Humanities</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CDR D - Social Science</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CDR E - Language</td>
<td>0-16</td>
<td></td>
</tr>
<tr>
<td>CDR F - Additional Breadth</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Credit Hours Subtotal: 16-32

1. See degree audit or a College of Arts and Sciences advisor for approved geography and anthropology courses that apply as natural science.
2. Language courses numbered 210 or below apply only for the foreign language requirement.
3. 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.

Scientific Base
Bachelor of Science Only (60 hours)
The bachelor of science degree requires students to complete 60 hours in mathematical, physical and natural sciences. Approved courses for scientific base credit come from the following College of Arts and Sciences disciplines: actuarial science, anthropology (selected courses), astronomy, biochemistry (excluding BIOS 203), biology (excluding BIOS 203), chemistry (excluding CHEM 101), computer science (excluding CSCE 10), geography (selected courses), geology, life sciences, mathematics (excluding courses below MATH 104), meteorology, microbiology, physics and statistics.

See your degree audit or a College of Arts and Sciences 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 a college advisor.

Foreign Languages/Language Requirement
Languages Exemption Policy
UNL and the College of Arts and Sciences will exempt or waive students from the UNL entrance requirement of two years of the same foreign language or from the College's language distribution requirement based on documentation only. The following are the options and procedures for documentation:

High School Transcripts
For the University entrance requirement, students must show an official high school transcript with two or more years of the same foreign language.

For the College of Arts and Sciences College Distribution Requirement
E-Language, students must show an official high school transcript with four or more years of the same foreign language in high school, or show evidence of graduation from a non-English-speaking foreign high school. Students whose native language is not English must show English as a Second Language study on an official high school transcript. Four years of ESL at the high school level (9th, 10th, 11th and 12th grades) will be the basis for a waiver of the CDR E Language requirement.

Proficiency Examination at UNL
For the University entrance requirement, students who do not have transcript documentation can request to take a proficiency exam in the language. (This is not the same test as the Modern Languages Placement Exam.) However, UNL will provide testing only in the languages it teaches. Currently, these languages are: Arabic, French, German, Spanish, Russian, Czech, Japanese, Chinese.

For the College of Arts and Sciences College Distribution Requirement
E-Language, the Department of Modern Languages will oversee the test at the 202 level. If the student passes the test, the department will sign the College Request for Waiver form and indicate the level of proficiency. The form is then forwarded to the Arts and Sciences Advising Center for approval.

The Department of Modern Languages will oversee the test and provide written documentation to the Arts and Sciences Advising Center the level of proficiency passed.

Distance Education
For the University entrance requirement, students without transcript documentation who claim proficiency in a language not taught at UNL, have the option of seeking out a distance education program in languages. If the student completes the equivalent of 102 from an
approved distance education program, the student will meet the UNL entrance requirement. The student must have the course work approved before he/she takes/completes the course as equivalent to 102 by a College advisor. The student then completes the course and has the distance education program send the transcript to the Admissions Office.

For the College of Arts and Sciences College Distribution Requirement E-Language, the student can seek out a distance education program and complete the equivalent of the 202-level course. The student must submit the request on the College Request for Substitution form and have the course work approved by a College advisor. The student then completes the course and has the distance education program send the transcript to the Admissions Office.

Third Language Option
If a student demonstrates knowledge of two foreign languages at the 102 level, the College of Arts and Sciences may consider waiving two semesters of the four semester College Distribution Requirement E-Languages requirement. If this waiver were granted, the student would then be required to complete 101 and 102 in another, 3rd foreign language at UNL.

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 total 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 schools except for UNO and UNK. No transfer C- and D grades can be applied toward requirements in a major or a minor. No UNL C- and D grades can be applied toward requirements in a major or a minor.

Pass/No Pass Privilege
University regulations for the Pass/No Pass (P/N) privilege state:

• The Pass/No Pass option is designed for your use by seeking to expand your intellectual horizons by taking courses in areas where you may have had minimal preparation.
• Neither the P nor the N grade contribute to your GPA.
• P is interpreted to mean C or above.
• A change to or from a Pass/No Pass may be made until mid-term (see academic calendar for specific dates per term).
• The Pass/No Pass or grade registration cannot conflict with the policy of the professor, department, college, or University governing the grading option.
• Changing to or from Pass/No Pass requires using the MyRED system to change the grading option or filing a Drop/Add form with the Office of the University Registrar, 107 Canfield Administration Building. After mid-term of the course, a student registered for Pass/No Pass cannot change to a grade registration unless the Pass/No Pass registration is in conflict with the policy of the professor, department, college, or University governing Pass/No Pass.
• The Pass/No Pass grading option cannot be used for the removal of C- or D or F grades.

Pass/No Pass privileges in the College of Arts and Sciences are extended to students according to 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 UNL 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 above 299
Thirty of the 120 semester hours of credit must be in courses numbered above 299. Of the 30 hours above 299, 15 hours (1/2) must be completed in residence at UNL.

Graduate Courses
Seniors in the University who have obtained in advance the approval of the dean for Graduate Studies may receive up to 12 hours credit for graduate courses taken in addition to the courses necessary to complete their undergraduate work, provided that such credits are earned within the calendar year prior to receipt of the baccalaureate. For procedures, inquire at the Office of Graduate Studies.

Course work taken prior to receipt of the baccalaureate may not always be accepted for transfer to other institutions as graduate work.

Residency
Residency Requirement and Open Enrollment and Summer Independent Study Courses
Students must complete at least 30 of the 120 total hours for their degree at UNL. Students must complete at least 1/2 of their major course work including 6 hours above 299 in their major, and 15 of the 30 hours required above 299 in residence. Credit earned during education abroad may be used toward the residency requirement if students register through UNL and participate in prior-approved education abroad programs. UNL open enrollment and summer independent study courses count toward residence.

ACE Requirements
Consistent with the mission and values of the University, ACE is based on a shared set of four institutional objectives and ten student learning
outcomes. The ACE program was approved by faculty in all eight undergraduate colleges and endorsed by the Faculty Senate, the student government, and the Academic Planning Committee in January 2008 for implementation in the fall 2009. ACE aligns with current national initiatives in general education.

Key characteristics of ACE demonstrate the benefits of the program to students:

- Students receive a broad education with exposure to multiple disciplines, critical life skills and important reasoning, inquiry, and civic capacities.
- ACE is simple and transparent for students, faculty and advisors. Students complete the equivalent of 3 credit hours for each of the ten student learning outcomes.
- Students connect and integrate their ACE experiences with their selected major.
- Students can transfer all ACE certified courses across colleges within the institution to meet the ACE requirement and any course from outside the institution that is directly equivalent to a UNL ACE-certified course. Courses from outside institutions without direct equivalents may be considered with appropriate documentation for ACE credit (see academic advisor).

ACE allows faculty to assess and improve their effectiveness and facilitate students’ learning.

ACE Institutional Objectives and Student Learning Outcomes
To meet the ACE Program requirement, a student will complete a minimum of 3 credit hours for each of the ten ACE Student Learning Outcomes (a total of 30 ACE credit hours). See the ACE website at: http://ace.unl.edu for the most current information and the most recently certified courses.

Catalog Rule
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 UNL. 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 UNL 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.

Learning Outcomes
Majors in meteorology-climatology will be able to:

1. Be able to explain how the atmosphere interacts with other components of the Earth System to exchange matter and energy on short (weather) and long (climate) timescales.
2. Be able to apply mathematical, statistical, and computer programming tools to analyze meteorological data in order to conduct research, make forecasts, and develop conceptual models for the interaction of the atmosphere with other components of the Earth system.
3. Be able to synthesize a broad understanding of the basic processes and system-scale interactions to generate short and long term predictions of the weather and climate.
4. Be able to integrate disciplinary knowledge, technical proficiency, information collection, and data synthesis and analysis to conduct and interpret scientific research.
5. Be able to communicate weather and climate information, research, and events to diverse audiences using multi-media presentations and written scientific reports.

Major Requirements
Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
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<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>METR 100</td>
<td>Weather and Climate</td>
<td>4</td>
</tr>
<tr>
<td>METR 205</td>
<td>Introduction to Atmospheric Science</td>
<td>4</td>
</tr>
<tr>
<td>METR 223</td>
<td>Atmospheric Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>METR 311</td>
<td>Dynamic Meteorology I</td>
<td>3</td>
</tr>
<tr>
<td>METR 312</td>
<td>Dynamic Meteorology II</td>
<td>3</td>
</tr>
<tr>
<td>METR 323</td>
<td>Physical Meteorology</td>
<td>4</td>
</tr>
<tr>
<td>METR 341</td>
<td>Synoptic Meteorology</td>
<td>4</td>
</tr>
<tr>
<td>METR 442</td>
<td>Advanced Synoptic Meteorology-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Climatology</td>
<td></td>
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<tr>
<td>METR 463</td>
<td>Radar Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>OR METR 464 Satellite Meteorology</td>
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<tr>
<td>OR METR 465 Satellite Remote Sensing of</td>
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<tr>
<td>Atmospheric</td>
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</tbody>
</table>

Total Credit Hours 33

Select one of the following Capstone courses: 1

METR 442 Advanced Synoptic Meteorology-Climatology
Or METR 470 The Climate System: Analysis and Prediction

Select one of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MATH 106</td>
<td>Calculus I</td>
<td>5</td>
</tr>
<tr>
<td>MATH 107</td>
<td>Calculus II</td>
<td>4</td>
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<tr>
<td>MATH 208</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 221</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>STAT 380 / MATH 380</td>
<td>Statistics and Applications</td>
<td>3</td>
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Credit Hours Subtotal: 12

Ancillary Requirements

Mathematics 1

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<tr>
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<td>Calculus III</td>
<td>4</td>
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<tr>
<td>MATH 221</td>
<td>Differential Equations</td>
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Credit Hours Subtotal: 19

Physics

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<tr>
<td>PHYS 211</td>
<td>General Physics I</td>
<td>5</td>
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<tr>
<td>&amp; PHYS 221</td>
<td>General Physics Laboratory I</td>
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<tr>
<td>PHYS 212</td>
<td>General Physics II</td>
<td>4</td>
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</table>

Credit Hours Subtotal: 9

Chemistry

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<tr>
<td>CHEM 109</td>
<td>General Chemistry I</td>
<td>4</td>
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</table>

Credit Hours Subtotal: 4

Computer Science
A minor in math can be obtained with the completion of the required mathematics and statistics courses.

ADDITIONAL MAJOR REQUIREMENTS

Grade Rules

C- and D Grades
A grade of C or above is required for all courses in the major and minor.

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

Requirements for Minor Offered by Department

Select either the Meteorology or Climatology Emphasis for the minor requirements.

Meteorology Emphasis (22-23 hours)

<table>
<thead>
<tr>
<th>Course</th>
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</tr>
</thead>
<tbody>
<tr>
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<td>METR 205</td>
<td>Introduction to Atmospheric Science</td>
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<tr>
<td>METR 311</td>
<td>Dynamic Meteorology I</td>
<td>3</td>
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<tr>
<td>METR 323</td>
<td>Physical Meteorology</td>
<td>4</td>
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<tr>
<td>METR 341</td>
<td>Synoptic Meteorology</td>
<td>4</td>
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<tr>
<td>METR 415</td>
<td>General Circulation of the Atmosphere</td>
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<tr>
<td>METR 421</td>
<td>Cloud Physics</td>
<td></td>
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<tr>
<td>METR 428</td>
<td>Air Pollution</td>
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<tr>
<td>METR 433</td>
<td>Boundary-layer Meteorology</td>
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<tr>
<td>METR 442</td>
<td>Advanced Synoptic Meteorology-Climatology</td>
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<tr>
<td>METR 443</td>
<td>Severe Storms Meteorology-Climatology</td>
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<td>METR 444</td>
<td>Mesoscale Meteorology</td>
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<td>METR 446</td>
<td>Broadcast Meteorology</td>
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<tr>
<td>METR 454</td>
<td>Statistical Analysis of Atmospheric Data</td>
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<td>METR 463</td>
<td>Radar Meteorology</td>
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<td>METR 464</td>
<td>Satellite Meteorology</td>
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<tr>
<td>METR 465</td>
<td>Satellite Remote Sensing of Atmosphere</td>
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<tr>
<td>METR 471</td>
<td>Tropical Meteorology</td>
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Total Credit Hours: 22-23

Climatology Emphasis (20 hours)

<table>
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<tr>
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<tr>
<td>METR 205</td>
<td>Introduction to Atmospheric Science</td>
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<tr>
<td>METR 475</td>
<td>Physical Climatology</td>
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<tr>
<td>METR 408</td>
<td>Microclimate: The Biological Environment</td>
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<tr>
<td>METR 450</td>
<td>Climate and Society</td>
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<tr>
<td>METR 454</td>
<td>Statistical Analysis of Atmospheric Data</td>
<td></td>
</tr>
<tr>
<td>METR 470</td>
<td>The Climate System: Analysis and Prediction</td>
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<tr>
<td>METR 478</td>
<td>Regional Climatology</td>
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<tr>
<td>METR 483</td>
<td>Global Climate Change</td>
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<tr>
<td>METR 487</td>
<td>Earth’s Climate: Past, Present, Future</td>
<td></td>
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</table>

Total Credit Hours: 20

Grade Rules

C- and D Grades
A grade of C or above is required for all courses in the major and minor.

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

METR 100 Weather and Climate
Prerequisites: MATH 101 or equivalent
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Format: LEC
Prerequisite for: GEOL 372
ACE: ACE 4 Science

METR 140 Severe and Unusual Weather
Prerequisites: MATH 101 or equivalent.
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
Format: LEC
ACE: ACE 4 Science

METR 180 Environment, Energy, and Climate Change
Description: Conceptual process of climate change, environmental quality and earth energy.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
ACE: ACE 4 Science

METR 205 Introduction to Atmospheric Science
Prerequisites: MATH 106/106B/108H; METR 100; PHYS 211/211H.
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
Format: LEC
Prerequisite for: METR 223; METR 323
METR 223 Atmospheric Thermodynamics  
**Prerequisites:** CSCE 155N; METR 205; MATH 107 or 109H 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  
**Format:** LEC  
**Prerequisite for:** METR 341

METR 311 Dynamic Meteorology I  
**Prerequisites:** CSCE 155N; 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  
**Format:** LEC  
**Prerequisite for:** METR 312

METR 332 Physical Meteorology  
**Prerequisites:** CSCE 155N; 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  
**Format:** LEC  
**Prerequisite for:** METR 465, METR 865

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  
**Format:** LEC

METR 370 Basic and Applied Climatology  
**Crosslisted with:** NRES 370  
**Prerequisites:** METR 100.  
**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  
**Format:** LEC

METR 399 Independent Study  
**Prerequisites:** Permission.  
**Credit Hours:** 1-24  
**Min credits per semester:** 1  
**Max credits per semester:** 24  
**Max credits per degree:** 24  
**Format:** IND

METR 399H Honors Course  
**Prerequisites:** Admission to the University Honors Program or by invitation; candidate for degree with distinction or with high distinction or with highest distinction in the College of Arts and Sciences; and permission.  
**Credit Hours:** 1-4  
**Min credits per semester:** 1  
**Max credits per semester:** 4  
**Max credits per degree:** 4  
**Format:** IND

METR 408 Microclimate: The Biological Environment  
**Crosslisted with:** AGRO 408, GEOG 408, HORT 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; or permission.  
**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  
**Format:** LEC  
**Groups:** Physical Geography

METR 415 General Circulation of the Atmosphere  
**Crosslisted with:** METR 815  
**Prerequisites:** Junior standing; MATH 106 or 108H; METR 205 and 475/875; PHYS 211 or 211H; 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  
**Format:** LEC
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
Format: LEC

METR 428 Air Pollution
Crosslisted with: METR 828
Prerequisites: 6 hrs METR; CHEM 109
Description: Basic processes (e.g., emission, transport, first-order chemical reaction, and deposition) associated with air pollution and their combination with meteorology for air quality forecasting. Environmental topics: acid rain; smog; air pollution; ozone hole; greenhouse gases; aerosols; long-range transport; civic regulations and international treaties on air pollution; and climate change.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

METR 433 Boundary-layer Meteorology
Crosslisted with: METR 833
Prerequisites: METR 205, METR 223; MATH 208/MATH 208H or MATH 109H; PHYS 211/PHYS 211H
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
Format: LEC

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
Format: LEC
Prerequisite for: METR 944
ACE: ACE 10 Integrated Product

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
Format: LEC

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
Format: LEC

METR 446 Broadcast Meteorology
Prerequisites: METR 100
Notes: Only 3 hours of credit from METR 446 or METR 447 may be applied to the major and/or minor in Meteorology through Group B requirements.
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
Format: LEC

METR 447 Broadcast Meteorology Practicum
Prerequisites: Permission of instructor.
Notes: Only 3 hours of credit from METR 446 or METR 447 may be applied to the major and/or minor in Meteorology through Group B requirements.
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
Format: LEC
METR 450 Climate and Society
Crosslisted with: AGRO 450, GEOG 450, NRES 452, AGRO 850, GEOG 850, METR 850, NRES 852
Prerequisites: METR 100 or NRES 370 or equivalent.
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
Format: LEC
Groups: Physical Geography

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
Format: LEC

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
Format: LEC

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
Format: LEC

METR 465 Satellite Remote Sensing of Atmosphere
Crosslisted with: METR 865
Prerequisites: METR 323
Description: Principles of atmospheric radiation and techniques for satellite image processing. Application of data calibration, image registration and enhancement, noise filtering and multi-spectral classification of satellite images. Survey of various satellite sensors used for monitoring different atmospheric processes and constituents.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

METR 469 Bio-Atmospheric Instrumentation
Crosslisted with: AGRO 469, GEOG 469, HORT 407, MSYM 469, NRES 469, AGRO 869, GEOG 869, HORT 807, METR 869, MSYM 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
Format: LEC

METR 470 The Climate System: Analysis and Prediction
Crosslisted with: METR 870
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
Format: LEC
ACE: ACE 10 Integrated Product

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
Format: LEC

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
Format: LEC

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
Format: LEC
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.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

METR 483 Global Climate Change
Crosslisted with: METR 883, NRES 467, NRES 867
Prerequisites: Junior standing; MATH 106/106B/106H; 5 hrs PHYS; METR 475/875.
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
Format: LEC

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
Format: LEC

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
Format: FLD

METR 498 Special Topics in Meteorology-Climatology
Crosslisted with: METR 898
Prerequisites: Permission.
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 24
Format: LEC

METR 499 Independent Study
Prerequisites: Prior agreement with instructor and permission.
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 24
Format: IND

METR 499H Honors Course
Prerequisites: Admission to the University Honors Program or by invitation, candidate for degree with distinction or with high distinction or with highest distinction in the College of Arts and Sciences, and permission.
Credit Hours: 1-4
Min credits per semester: 1
Max credits per semester: 4
Max credits per degree: 4
Format: IND

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.)

15 HR TERM 1

Calculus I
complete MATH 106
Credit Hours: 5

MATH 106 is ideally completed in the first term of enrollment. It becomes critical to your success in the major if not completed in the second term of enrollment. This course will fulfill the ACE 3 requirement.

Meteorology Core
complete METR 100
Credit Hours: 4

METR 100 will fulfill the ACE 4 requirement.

ACE 1 Written Texts
complete 1 from ACE1
Credit Hours: 3

CDR E: Language
recommend 1 or more courses
If not complete, choose a language course according to your placement and proficiency. CDR E is met after 4th level (202) of most languages.

**15 HR TERM 2**

**Mathematics And Statistics**
complete MATH 107

MATH 107 will fulfill the CDR F (Additional Breadth) requirement.

**Physics**
complete PHYS 211, PHYS 221

PHYS 211 becomes critical to your success in the major if not completed in the second term of enrollment. PHYS 211 will fulfill the CDR B requirement and PHYS 221 will fulfill the CDR BL requirement.

**Computer Science**
complete CSCE 155N

**CDR E: Language**
recommend 1 or more courses

If not complete, choose a language course according to your placement and proficiency. CDR E is met after 4th level (202) of most languages.

**15 HR TERM 3**

**Mathematics And Statistics**
complete MATH 208

**Meteorology Core**
complete METR 205

METR 205 becomes critical to your success in the major if not completed by the third term of enrollment.

**Physics**
complete PHYS 212

**14 HR TERM 4**

**Mathematics And Statistics**
complete MATH 221

**Meteorology Core**
complete METR 223

**Chemistry**
complete CHEM 109

**ACE 2 Communication Skill**
complete 1 from ACE2

JGEN 300 is recommended for the ACE 2 requirement.

**16 HR TERM 5**

**Meteorology Core**
complete METR 311, METR 323

**Mathematics And Statistics**
complete STAT 380

**ACE 5 Humanities**
complete 1 from ACE5

**CDR C: Humanities**
complete 1 from Any Arabic Course at the 300 Level, Any Classics Course, Any Czech Course at the 300 Level, Any Czech Course at the 400 Level, Any English Course, FREN 282, Any French Course at the 300 Level, Any French Course at the 400 Level, GERM 282, Any German Course at the 300 Level, Any German Course at the 400 Level, Any Greek Course at the 300 Level, Any Greek Course at the 400 Level, Any Hebrew Course at the 300 Level, Any History Course, Any Japanese Course at the 300 Level, Any Latin Course at the 300 Level, Any Latin Course at the 400 Level, Any Philosophy Course, Any Religious Studies Course at any Level, Any Russian Course at the 300 Level, Any Russian Course at the 400 Level, SPAN 264, SPAN 265, Any Spanish Course at the 300 Level, Any Spanish Course at the 400 Level.

Complete an approved course from a Humanities discipline: ARAB, CLAS, CZEC, ENGL, FILM, FREN, GERM, GREK, HEBR, HIST, JAPN, LATN, PHIL, RELG, RUSS, SPAN.

**16 HR TERM 6**

**Meteorology Core**

complete 3 from METR 312, METR 341, METR 463, METR 464, METR 465

You must take METR 312 and 341 and then choose one between METR 463, 464, or 465.

**ACE 8 Ethical Principles**

complete 1 from ACE8

**ACE 6 Social Sciences**

complete 1 from ACE6

**14 HR TERM 7**

**Meteorology Core**

complete METR 442

METR 442 will fulfill the ACE 10 requirement.

**Additional Meteorology**

complete Any Meteorology Course at the 400 Level

Complete 2 approved METR courses at the 400 level.

**ACE 7 Arts**

complete 1 from ACE7

**ACE 9 Global/Human Divers**

complete 1 from ACE9

**CDR D: Social Sciences**

complete 1 from Any Anthropology Course, Any Communications Course, Any Geography Course, Any National Securities Studies Course, Any Political Science Course, Any Psychology Course, Any Sociology Course

**Electives**

complete Any Course

In consultation with your advisor, select elective courses or courses that meet a 2nd major, minor, sci-base or upper level requirement.

**15 HR TERM 8**

**Additional Meteorology**

complete Any Meteorology Course at the 400 Level

Complete 2 approved METR courses at the 400 level.

**ACE 8 Global/Human Divers**

complete 1 from ACE9

**CDR D: Social Sciences**

complete 1 from Any Anthropology Course, Any Communications Course, Any Geography Course, Any National Securities Studies Course, Any Political Science Course, Any Psychology Course, Any Sociology Course

**Electives**

complete Any Course

In consultation with your advisor, select elective courses or courses that meet a 2nd major, minor, sci-base or upper level requirement.

**Graduation Requirements**

1. A minimum 2.00 GPA required for graduation.
2. ***Total Credits Applying Toward 120 Total Hours***
3. Complete 30 hours in residence at UNL.

**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

• Comprehend and critically evaluate complex information
• Use quantitative analytical computational techniques
• Make predictions using mathematical, statistical, and scientific modeling methods
• Understand and use proper laboratory and technical skills and instruments
• Define problems and identifying causes
• Support and communicate claims using clear evidence
• Simplify complex information and present it to others
• Apply mathematical and scientific skills to solve real-world problems
• Document and replicate processes and procedures
• Design and implement research experiments

Jobs of Recent Graduates

• Meteorologist Intern, National Weather Service - La Crosse WI
• Extension Educator, University of Nebraska-Lincoln - Phelps and Gosper Counties
• Meteorologist, Nebraska Department of Roads - Lincoln NE
• Broadcast Journalism Intern, Flood Communications/NewsChanelNebraska - Columbus NE
• Underwriting Assistant, National Indemnity - Omaha NE
• Pilot, United States Air Force
• Research Associate, High Plains Regional Climate Center - Lincoln NE
• Coding Specialist, National Research Corporation - Lincoln NE
• Weekend Meteorologist/Reporter, KNOP-TV - North Platte NE
• Photo Journalist, Channel 8 Eye Witness News - Lincoln NE

Internships

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

Grad Schools

• Meteorology-Climatology, University of Nebraska-Lincoln - Lincoln NE
• Earth and Atmospheric Science, University of Nebraska - Lincoln - Lincoln NE
• Atmospheric Science, University of Utah - Salt Lake City UT
• Geography, Texas A M - College Station TX
• Natural Resources Science, University of Nebraska - Lincoln - Lincoln NE
• Masters in Physics, Florida Institute of Technology
• Environmental Engineering, Washington State University - Pullman WA
• Masters Public Administration, University of Nebraska-Omaha - Omaha NE
• Masters of Arts in Mathematics Teaching, University of Nebraska-Lincoln - Lincoln NE
• M.S. Meteorology, Florida State University - Tallahassee FL