APPLIED CLIMATE SCIENCE

Description
Website: http://snr.unl.edu/undergrad/majors/acs

Applied climate professionals are active in assessing climate risk, informing decision makers, working with policy makers, and providing climate information to private and public sectors. The ACS major will provide a foundation for understanding the climate system and its components, as well as interactions of the climate system components with, and impacts on, the environment and human activities. Upon the completion of the major, graduates will be prepared to address applied climate science issues such as climate change and climate variability.

The goal of the major is to provide a higher level of understanding in climatology in order to understand complex climate-based problems and their interrelationships with natural resources and ecosystem management issues that are pervasive today and will become even more important in the future. Issues such as natural hazard management, climate change, climate variability, changing frequency and severity of extreme climate events, environmental degradation, deforestation, and increased demand for water and other natural resources are at the root of this increased demand for applied climate professionals.

With a professional degree in Applied Climate Science graduates will have met the curriculum recommended by the American Association of State Climatologists. A minimum of 120 credit hours is required for the bachelor of science degree. Of these requirements, 32 credits are in an applied climate sciences curriculum designed to provide the foundation in meteorology and climatology. The applied climate science degree program also requires 30 credit hours of science and mathematics. Students select a specialization consisting of 22-23 credit hours, allowing students to develop an individualized area of study; the specialization is designed by the student in consultation with an advisor. Possible focus areas include but are not limited to Agroecosystems, Geospatial Techniques, Hazard Assessment, Human Dimensions and Environmental Policy, Livestock and Wildlife, and Water Resources. To complete the degree, the student must take 21 credit hours of communication, humanities and social science courses.

Students who successfully fulfill the requirements for the Applied Climate Science major are prepared for many career options. Opportunities include positions with environmental and climate consulting firms, planning agencies, non-governmental organizations (NGOs) and governmental agencies addressing climate issues. Additionally, students may major in ACS to fulfill a pre-professional degree requirement. The program also provides students the opportunity to prepare for graduate study in applied climate sciences and other related fields.

Application for UNL freshman scholarships automatically makes you eligible for SNR scholarships. For more information, visit http://snr.unl.edu. The University of Nebraska is a member of the University Corporation for Atmospheric Research.

College Requirements
College Admission

Requirements for admission into the College of Agricultural Sciences and Natural Resources (CASNR) are consistent with general University admission requirements (one unit equals one high school year): 4 units of English, 4 units of mathematics, 3 units of natural sciences, 3 units of social studies, and 2 units of foreign language. Students must also meet performance requirements (ACT composite of 20 or higher OR combined SAT score of 950 or higher OR rank in the top one-half of graduating class; transfer students must have a 2.0 (on a 4.0 scale) cumulative grade point average and 2.0 on the most recent term of attendance. For students entering the PGA Golf Management degree program, a certified golf handicap of 12 or better (e.g., USGA handicap card) or written ability (MS Word file) equivalent to a 12 or better handicap by a PGA professional or high school golf coach is required. For more information, please visit: http://pgm.unl.edu/requirements.

Admission Deficiencies/Removal of Deficiencies
Students who are admitted to CASNR with core course deficiencies must remove these deficiencies within the first 30 credit hours at UNL, or within the first calendar year at UNL, whichever takes longer, excluding foreign languages. Students have up to 60 credit hours to remove foreign language deficiencies. College-level course work taken to remove deficiencies may be used to meet degree requirements in CASNR.

Deficiencies in the required entrance subjects can be removed by completion of specified courses in the University or by correspondence.

The Office of Admissions, Alexander Building (south entrance), City Campus, provides information to new students on how deficiencies can be removed.

College Degree Requirements
Curriculum Requirements

The curriculum requirements of the College consist of three areas: ACE (Achievement-Centered Education); College of Agricultural Sciences and Natural Resources Core; and Degree Program requirements and electives. All three areas of the College Curriculum Requirements are incorporated within the description of the Major/Degree Program sections of the bulletin. The individual major/degree program listings of classes insures that a student will meet the minimum curriculum requirements of the College.

Foreign Languages/Language Requirement

Two units of a foreign language are required. This requirement is usually met with two years of high school language.

Minimum Hours Required for Graduation

The College grants the bachelors degree in programs associated with agricultural sciences, natural resources and related programs. Students working toward a degree must earn at least 120 semester hours of credit. A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation.

Grade Rules
Removal of C-, D and F Grades

Only the most recent letter grade received in a given course will be used in computing a student’s cumulative grade point average if the student has completed the course more than once and previously received a grade or grades below C in that course.

The previous grade (or grades) will not be used in the computation of the cumulative grade point average, but it will remain a part of the academic record and will appear on any transcript.

A student can remove from his/her cumulative average a course grade of C, D+, D, D- or F if the student repeats the same course at the University of Nebraska and receives a grade other than P (pass), I (incomplete), N (no pass), W (withdrawn), or NR (no report). If a course is no longer being
offered, it is not eligible for the revised grade point average computation process.

For complete procedures and regulations, see the Office of the University Registrar website at http://www.unl.edu/regrec/course-repeats.

Pass/No Pass
Students in CASNR may take any course offered on a Pass/No Pass basis within the 24-hour limitation established by the Faculty Senate. However, a department may specify that the Pass/No Pass status of its courses be limited to non-majors or may choose to offer some courses for letter grades only.

GPA Requirements
A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation.

Transfer Credit Rules
To be considered for admission, a transfer student, Nebraska resident or nonresident, 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 have completed less than 12 credit hours of college study must submit either ACT or SAT scores.

Ordinarily, credits earned at an accredited college are accepted by the University. The College, however, will evaluate all hours submitted on an application for transfer and reserves the right to accept or reject any of them. Sixty is the maximum number of hours UNL will accept on transfer from a two-year college. Ninety is the maximum number of hours UNL will accept from a four-year college. Transfer credit in the degree program must be approved by the degree program advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the major. At least 9 hours in the major field, including the capstone course, must be completed at UNL regardless of the number of hours transferred.

The College will accept no more than 10 semester hours of C, D+, D and D- grades from other schools. The C+, D+, D and D- grades can only be applied to free electives. This policy does not apply to the transfer of grades from UNO or UNK to UNL.

Joint Academic Transfer Programs
The College of Agricultural Sciences and Natural Resources has agreements with many institutions to support joint academic programs. The transfer programs include dual degree programs and cooperative degree programs. Dual degree programs offer students the opportunity to receive a degree from a participating institution and also to complete requirements for a bachelor of science degree in CASNR. Cooperative programs result in a single degree from either UNL or the cooperating institution.

Dual Degree Programs
A to B Programs
The A to B Program, a joint academic program offered by the CASNR and participating community colleges, allows students to complete the first two years of a degree program at the participating community college and continue their education and study in a degree program leading toward a bachelor of science degree.

The A to B Program provides a basic knowledge plus specialized course work. Students transfer into CASNR with junior standing.

Depending on the community college, students enrolled in the A to B Program may complete the requirements for an associate of science at the community college, transfer to UNL, and work toward a bachelor of science degree.

Participating community colleges include:
- Central Community College
- Metropolitan Community College
- Mid-Plains Community College
- Nebraska College of Technical Agriculture
- Northeast Community College
- Southeast Community College
- Western Nebraska Community College

3+2 Programs
Two specialized degree programs in animal science and veterinary science are offered jointly with an accredited college or school of veterinary medicine. These two programs permit CASNR animal science or veterinary science students to receive a bachelor of science degree from UNL with a degree in animal science or veterinary science after successfully completing two years of the professional curriculum in veterinary medicine at an accredited veterinary school. Students who successfully complete the 3+2 Program, must complete the “Application for Degree” form and provide transcripts to the Credentials Clerk, Office of the University Registrar, 107 Canfield Administration Building, UNL. Students should discuss these degree programs with their academic advisor.

Cooperative Degree Programs
Academic credit from UNL and a cooperating institution is applied towards a four-year degree from either UNL (UNL degree-granting program) or the cooperating institution (non UNL degree-granting program). All have approved programs of study.

UNL Degree-Granting Programs
A UNL degree-granting program is designed to provide students the opportunity to complete a two-year program of study at one of the four-year institutions listed below, transfer to CASNR and complete the requirements for a bachelor of science degree.

Chadron State College. Chadron State College offers a 2+2 program leading to a grassland ecology and management degree program and a transfer program leading to a Bachelor of Science in Agricultural Education in the teaching option.

Wayne State College. Wayne State College offers a 3+1 program leading to a Bachelor of Science in Plant Biology in the ecology and management option.

University of Nebraska at Kearney. Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

University of Nebraska at Omaha. The University of Nebraska at Omaha (UNO) cooperates with CASNR in providing four-semester pre-agricultural sciences, pre-natural resources, pre-food science and technology, pre-horticulture and pre-turfgrass and landscape management transfer programs.

A student enrolled in these programs may transfer all satisfactorily completed academic credits identified in the suggested program of study, and enter CASNR to study toward a degree program leading to a bachelor of science degree. The total program would require a minimum of four years or eight semesters (16 credit hours/semester or 120 credit hours).
UNL CASNR faculty teach horticulture and food science and technology courses at UNO to assist an urban population in better understanding the food processing, horticulture, and landscape horticulture industries.

For more information, contact the CASNR Dean’s Office, 800-472-8800, ext. 2541.

**Non UNL Degree-Granting Programs**
The CASNR cooperates with other institutions to provide course work that is applied towards a degree at the cooperating institution. Pre-professional programs offered by CASNR allow students to complete the first two or three years of a degree program at UNL prior to transferring and completing a degree at the cooperating institution.

**Chadron State College–Range Science.** The 3+1 Program in range science allows Chadron State College students to pursue a range science degree through Chadron State College. Students complete three years of course work at Chadron State College and one year of specialized range science course work (32 credit hours) at CASNR.

**Dordt College (Iowa) – Agricultural Education: Teaching Option.** This program allows students to pursue an Agricultural Education Teaching Option degree leading toward a bachelor of science in agricultural education. Students at Dordt College will complete 90 credit hours in the Agricultural Education: Teaching Option Transfer Program.

**Residency**
Students must complete at least 30 of the total hours for their degree using UNL credits. At least 18 of the 30 credit hours must be in courses offered through CASNR\(^1\) (>299) including the appropriate ACE 10 degree requirement or an approved ACE 10 substitution offered through another UNL college and excluding independent study regardless of the number of hours transferred. 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.

\(^1\) Includes courses taught by CASNR faculty through interdisciplinary prefixes (e.g., LIFE, MBIO, ENVR, SCIL, EAEP, HRTM, ENSC) and CASNR crosslisted courses taught by non-CASNR faculty.

**Online and Distance Education**
There are many opportunities to earn college credit through the University of Nebraska–Lincoln Office of Online and Distance Education. Some of these credits may be applicable not only as elective credits, but also toward the fulfillment of the College’s education requirements. Credits earned through the UNL Online and Distance Education program may count toward residency. However, certain offerings may not be counted toward scholarship requirements or academic recognition criteria.

For further information, contact:
Office of Online and Distance Education
University of Nebraska–Lincoln
1520 N 20th Circle, PO Box 888307
Lincoln, NE 68588-8307
402-472-2175
http://online.unl.edu/

**Independent Study Rules**
Students wishing to take part in independent studies must obtain permission; complete and sign a contract form; and furnish copies of the contract to the instructor, advisor, departmental office, and the Dean’s Office. The contract should be completed before registration. Forms are available in 103 Agricultural Hall or online at the CASNR website.

Independent study projects include research, literature review or extension of course work under supervision and evaluation of a departmental faculty member.

Students may only count 12 hours of independent study toward their degrees and no more than 6 hours can be counted during their last 36 hours earned, excluding senior thesis, internships, and courses taught under an independent study number.

**Other College Degree Requirements**

**Capstone Course Requirement**
A capstone course is required for each CASNR degree program. A capstone course is defined as a course in which students are required to integrate diverse bodies of knowledge to solve a problem or formulate a policy of societal importance.

**ACE Requirements**
All students must fulfill the Achievement Centered Education (ACE) requirements. Information about the ACE program may be viewed at www.ace.unl.

The minimum requirements of CASNR reflect the common core of courses that apply to students pursuing degrees in the college. Students should work with an advisor to satisfy ACE outcomes 1, 2, 3, 4, 6 and 10 with the college requirements.

**Bulletin Rule**
Students must fulfill the requirements stated in the bulletin for the academic year in which they are first admitted to UNL or when they were first admitted to a Joint Academic Transfer Program. In consultation with advisors, a student may choose to follow a subsequent bulletin for any academic year in which they are admitted to and enrolled as a degree-seeking student at UNL in the College of Agricultural Sciences and Natural Resources. Students must complete all degree requirements from a single bulletin year. The bulletin which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

**Learning Outcomes**
Majors in applied climate science will be able to:

1. Demonstrate a working knowledge of the impacts of climate variability on human and natural systems.
2. Describe how human and natural systems may respond to climate variability and a changing climate.
3. Explain potential impacts of climate variability and change on a variety of economic and environmental sectors.
4. Understand policy implications of climate in a global, regional, national, and local context.
5. Organize and summarize data and present them verbally and visually in a comprehensive and accurate manner as well as interpret data and draw conclusions that either support or refute hypotheses.
6. Develop reliable information and products to equip decision makers (e.g., government officials, policy makers, business leaders) to plan for and manage a changing climate.
7. Ask pertinent questions about a changing and variable climate and its effects on society and natural systems.
8. Understand and apply information from scholarly and popular sources.
9. Work as an integrated team member to address climate-related issues.
10. Communicate technical scientific information to a broad range of stakeholders and other users of climate information.

**Major Requirements**

**Core Requirements**

**Natural Resources Core**

- SCIL 101 Science and Decision-Making for a Complex World 3

Select one geographic information science course of the following: 3-4
- NRES 312 / GEOG 312 Introduction to Geospatial Information Sciences
- NRES 412 / GEOG 412 Introduction to Geographic Information Systems
- NRES 418 / GEOG 418 Introduction to Remote Sensing

**Natural Sciences**

Select one CASNR approved life sciences (ACE 4) sequences of the following: 4
- BIOS 101 & BIOS 101L General Biology and General Biology Laboratory
- AGRO 131 & AGRO 132 Plant Science and Agronomic Plant Science Laboratory
- SOIL 153 / AGRO 153 / HORT 153 Soil Resources
- NRES 220 / BIOS 220 & NRES 222 / BIOS 222 Principles of Ecology and Ecology Laboratory
- WATS 281 / GEOG 281 / NRES 281 Introduction to Water Science

**Physical Sciences**

- CHEM 109 General Chemistry I 4
- PHYS 211 General Physics I 4

**Mathematics and Statistics (ACE 3)**

- MATH 106 Calculus I 5
- MATH 107 Calculus II 4
- CSCE 155N Computer Science I: Engineering and Science Focus or CSCE 155T Computer Science I: Informatics Focus 3
- STAT 218 Introduction to Statistics 3

**Communication**

Select one written communication (ACE 1) course of the following: 3
- ENGL 150 Writing and Inquiry
- ENGL 151 Writing and Argument
- ENGL 254 Writing and Communities
- JGEN 120 Basic Business Communication
- JGEN 200 Technical Communication I
- JGEN 300 Technical Communication II

Select one oral communication (ACE 2) course of the following: 3
- ALEC 102 Interpersonal Skills for Leadership

**Economics, Humanities and Social Sciences**

Select one of the following: (ACE 6) 3
- ECON 200 Economic Essentials and Issues
- ECON 211 Principles of Macroeconomics
- ECON 212 Principles of Microeconomics
- AECN 141 Introduction to the Economics of Agriculture

Select one ACE course each from ACE outcomes 5, 7, 8, and 9 12

Credit Hours Subtotal: 65

**Specific Major Requirements**

**Applied Climate Science Core Courses**

- METR 100 Weather and Climate 4
- METR 205 Introduction to Atmospheric Science 4
- NRES 370 / METR 370 Basic and Applied Climatology 3
- NRES 408 / AGRO 408 / GEOG 408 / HORT 408 / METR 408 / WATS 408 Microclimate: The Biological Environment 3
- NRES 478 / METR 478 Regional Climatology 3
- METR 470 The Climate System: Analysis and Prediction (ACE 10) 3
- NRES 469 / AGRO 469 / GEOG 469 / HORT 407 / METR 469 / MSYM 469 Bio-Atmospheric Instrumentation 3
- NRES 452 / AGRO 450 / GEOG 450 / NRES 407 / METR 450 Climate and Society 3
- NRES 467 Global Climate Change
- METR 478 Hydroclimatology
- NRES 479 / WATS 479 Earth’s Climate: Past, Present, Future
- METR 475 Physical Climatology

Credit Hours Subtotal: 32

**Specialization Requirements and Electives**
Complete requirements 22-23
Credit Hours Subtotal: 23
Total Credit Hours 120

Tracks/Options/Concentrations/Emphases

Requirements
Students must consult with their advisor to select an option prior to the beginning of their junior year.

NOTE: In addition to these requirements, students can focus on an area of individualized study designed by the student in consultation with an advisor. Possible focus areas include but are not limited to agroecosystems, geospatial techniques, hazard assessment, human dimensions and environmental policy, livestock and wildlife, and water resources. This also includes taking advantage of internship opportunities through NRES 497 Career Experiences in Natural Resource Sciences.

Requirements for Minor Offered by Department

Applied Climate Science Minor

Required Courses

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<td>NRES 208</td>
<td>Applied Climate Sciences</td>
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<tr>
<td>NRES 370 /</td>
<td>Basic and Applied Climatology</td>
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<td>METR 370</td>
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<tr>
<td>METR 487</td>
<td>Earth's Climate: Past, Present, Future</td>
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Select one of the following: 3

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<tr>
<th>Course Code</th>
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<tr>
<td>NRES 452 /</td>
<td>Climate and Society</td>
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Credit Hours Subtotal: 18
Total Credit Hours 18

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.