

APPLIED CLIMATE SCIENCE

Description

Website: <http://snr.unl.edu/undergrad/majors/acs> (<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 applied climate science (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 credit hours 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 Nebraska freshman scholarships automatically makes you eligible for SNR scholarships. For more information, visit <http://snr.unl.edu>. The University of Nebraska–Lincoln 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 sciences, and 2 units of world language. Students must also meet performance requirements: a 3.0 cumulative high school grade point average OR an ACT composite of 20 or higher, writing portion not required OR a score of 1040 or higher on the SAT Critical Reading and Math sections 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.

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 the University of Nebraska–Lincoln, or within the first calendar year at Nebraska, whichever takes longer, excluding foreign languages. Students have up to 60 credit hours to remove world language deficiencies. College-level coursework taken to remove deficiencies may be used to meet degree requirements in CASNR.

Deficiencies in the required entrance subjects can be removed by the 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 catalog. The individual major/degree program listings of classes ensures that a student will meet the minimum curriculum requirements of the College.

World Languages/Language Requirement

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

Experiential Learning

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

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. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

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 (withdrew), 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> (<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. Some degree programs have a higher cumulative grade point average required for graduation. Please check the degree program on its graduation cumulative grade point average.

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 (60) is the maximum number of hours the University will accept on transfer from a two-year college. Ninety (90) is the maximum number of hours the University 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 the University of Nebraska–Lincoln 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 the University of Nebraska–Lincoln.

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 the requirements for a bachelor of science degree in CASNR. Cooperative

programs result in a single degree from either the University of Nebraska–Lincoln 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 coursework. 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 the University of Nebraska–Lincoln, 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
- Nebraska Indian Community College
- 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 the University of Nebraska–Lincoln 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 provide transcripts and complete the Application for Degree form via MyRED. Students without MyRED access may apply for graduation in person at Husker Hub in the Canfield Administration Building, or by mail. Students should discuss these degree programs with their academic advisor.

Cooperative Degree Programs

Academic credit from the University and a cooperating institution are applied towards a four-year degree from either the University of Nebraska–Lincoln (University degree-granting program) or the cooperating institution (non-University degree-granting program). All have approved programs of study.

UNL Degree-Granting Programs

A University of Nebraska–Lincoln 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 and a 3+1 program leading to a bachelor of science in Applied Science.

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. Transfer programs are available for students pursuing degree programs leading to a bachelor of science degree.

Non University of Nebraska–Lincoln Degree-Granting Programs

CASNR cooperates with other institutions to provide coursework 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 the University 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 coursework at Chadron State College and one year of specialized range science coursework (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 University of Nebraska–Lincoln credits. At least 18 of the 30 credit hours must be in courses offered through CASNR¹ (>299) including the appropriate ACE 10 degree requirement or an approved ACE 10 substitution offered through another Nebraska 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 the University of Nebraska–Lincoln and participate in prior-approved education abroad programs. The University of Nebraska–Lincoln 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 online through the University of Nebraska–Lincoln. 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 online 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
305 Brace Labs
Lincoln, NE 68588-0109
402-472-4681

<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 coursework under the 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 ace.unl.edu (<https://ace.unl.edu/>).

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.

Catalog Rule

Students must fulfill the requirements stated in the catalog for the academic year in which they are first admitted to the University of Nebraska–Lincoln or when they were first admitted to a Joint Academic Transfer Program. Students transferring from a community college, but without admission to a Joint Academic Transfer Program, 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. 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 Agricultural Sciences and Natural Resources. Students must complete all degree requirements from a single catalog year. The catalog which a student follows for degree requirements may not be more than 10 years old at the time of graduation.

Learning Outcomes

Graduates of applied climate science will be able to:

1. Explain the principles of Earth's climate system (i.e., the interaction involving the sun, hydrosphere, atmosphere, lithosphere, cryosphere, and biosphere), including both natural and man-made processes.
2. Apply spatial, statistical, or computer programming skills to analyze climatological data in order to conduct research to make informed and responsible decisions with regard to actions that may affect the climate.
3. Evaluate the credibility of scientific information from scientific studies and publications to address climate-related issues.
4. Communicate about climate and climate change to diverse audiences using multi-media presentations and written scientific reports.
5. (For Pre-Law Option) Demonstrate an understanding of the fundamentals in legal research, analysis, writing briefs, and oral arguments in preparation to address societal needs for laws and regulations enacted or to be enacted due to future climate variability and change and their potential impacts.

Major Requirements

Core Requirements

CASNR Integrated Course and ACE 8

| | | |
|----------|---|---|
| SCIL 101 | Science and Decision-Making for a Complex World (ACE 8) | 3 |
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Natural Sciences

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|------------------------|-----------------------|---|
| NRES 220 | Principles of Ecology | 3 |
| SOIL 153 / PLAS 153 | Soil Resources | 4 |

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|--------------------------------------|-------------------------------|---|
| WATS 281 / GEOG 281 / NRES 281 | Introduction to Water Science | 3 |
|--------------------------------------|-------------------------------|---|

Select one geographic information science course of the following: 3-4

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|------------------------|---|--|
| NRES 218 | Introduction to Geospatial Technologies | |
| NRES 418 / GEOG 418 | Introduction to Remote Sensing | |

Select one CASNR approved life sciences (ACE 4) sequence of the following: 4

| | | |
|-------------------------|---|--|
| PLAS 131 & PLAS 132 | Plant Science and Agronomic Plant Science Laboratory | |
| BIOS 101 & BIOS 101L | General Biology and General Biology Laboratory | |
| LIFE 120 & LIFE 120L | Fundamentals of Biology I and Fundamentals of Biology I laboratory | |

Physical Sciences

| | | |
|--------------------------|---|---|
| CHEM 109A & CHEM 109L | General Chemistry I and General Chemistry I Laboratory | 4 |
| PHYS 211 | General Physics I | 4 |

Mathematics and Statistics (ACE 3)

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|--------------|--|---|
| CSCE 155N | Computer Science I: Engineering and Science Focus ¹ | 3 |
| or CSCE 155T | Computer Science I: Informatics Focus | |
| or METR 153 | Introduction to Scientific Programming in Atmospheric Science | |
| MATH 106 | Calculus I | 5 |
| MATH 107 | Calculus II | 4 |
| STAT 218 | Introduction to Statistics | 3 |
| or STAT 380 | Statistics and Applications | |

Communication

Select one written communication (ACE 1) course from 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 from the following: 3

| | | |
|----------|---|--|
| ALEC 102 | Interpersonal Skills for Leadership | |
| COMM 101 | Communication in the 21st Century | |
| COMM 209 | Public Speaking | |
| COMM 210 | Communicating in Small Groups | |
| COMM 215 | Visual Communication | |
| COMM 283 | Interpersonal Communication | |
| COMM 286 | Business and Professional Communication | |
| JGEN 300 | Technical Communication II | |
| MRKT 257 | Sales Communication | |
| NRES 301 | Environmental Communication Skills | |
| TMFD 121 | Visual Communication with Animation | |

Economics, Humanities and Social Sciences

Select one of the following: (ACE 6) 3

| | | |
|----------|--|--|
| AECN 141 | Introduction to the Economics of Agriculture | |
| ECON 200 | Economic Essentials and Issues | |
| ECON 211 | Principles of Macroeconomics | |
| ECON 212 | Principles of Microeconomics | |

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

Total Core Requirements ²

Total Credit Hours 61-62

¹ This course is waived for students in the Pre-Law Option.

² 62-63 credit hours for Pre-Law Option students.

Specific Degree Requirements

| | | |
|--|--|---|
| METR 100 | Weather and Climate | 4 |
| METR 205 | Introduction to Atmospheric Science | 4 |
| NRES 370 / METR 370 | Applied Climatology | 3 |
| NRES 104 or NRES 208 | Climate in Crisis Climate Literacy in Natural Resources | 3 |
| NRES 408 / GEOG 408 / METR 408 / PLAS 408 / WATS 408 | Microclimate: The Biological Environment | 3 |
| NRES 452 / GEOG 450 / METR 450 / PLAS 450 | Climate and Society | 3 |

| | | |
|--|---|--------------|
| NRES 469 / AGST 469 / GEOG 469 / METR 469 / PLAS 407 | Bio-Atmospheric Instrumentation | 3 |
| NRES 478 / METR 478 | Regional Climatology | 3 |
| Select one of the following: | | 3 |
| METR 270 | Global warming: Science, Impacts, Solutions | |
| METR 475 | Physical Climatology | |
| METR 479 / BSEN 479 / NRES 479 / WATS 479 | Hydroclimatology | |
| METR 483 / NRES 467 | Global Climate Change | |
| METR 487 | Earth's Climate: Past, Present, Future or POLS 332 Climate Change: Policy and Politics | |
| Capstone Course (ACE 10): any CASNR ACE 10 course | | 3 |
| Selected in consultation with academic advisor. | | |
| Applied Climate Science Specialization | | 22-23 |
| Consult with an advisor on courses for the specialization. | | |
| Total Credit Hours | | 54-55 |

Pre-Law Option

The Pre-Law Option allows students to participate in the University of Nebraska College of Law 3-3 Program, in which they receive their bachelors degree in applied climate science and their Juris Doctor degree in six years rather than the traditional seven. During the first three years, students complete coursework in the applied climate science program. Students complete their final year in residence at the College of Law. Students use the credit hours awarded in the first year at the College of Law to complete their undergraduate degree requirements.

The following requirements must be met when applying to the 3-3 Program at the College of Law:

1. Has an LSAT score of at least 156;
2. Has a cumulative undergraduate GPA of 3.6 or higher as calculated by the Law School Admission Council;
3. Will have successfully completed at least 75% of the course credits required for his or her undergraduate degree, along with all other requirements of his or her undergraduate degree program, by the date of matriculation at the College of Law. Course credits may include no more than 6 credit hours of Pass/No Pass coursework;
4. Has submitted on time the materials required of all applicants to the College of Law, including a completed application, satisfactory letters of recommendation, a personal statement, and records of the required course credits;
5. Has not been on academic probation at any undergraduate institution;
6. Has provided the College of Law with a letter from the relevant Dean, or other administrator of equivalent authority, of the applicant's undergraduate institution stating that the applicant has completed all institutional requirements for participation in the 3-3 Law College Program and that the institution will grant the applicant an

undergraduate degree upon the applicant's successful completion of the first year College of Law coursework.

If the above requirements are satisfied, the applicant will automatically be accepted into the 3-3 Law Program unless there is information concerning the applicant that reflects adversely on the applicant's character and fitness, including criminal citations, pending criminal charges, or criminal convictions. In such cases, the application will be individually reviewed by the College of Law Admissions Committee.

If the student chooses to withdraw from the pre-law option, the student must complete CSCE 155, NRES 469, NRES 454, and specialization and elective courses for a total of 120 credit hours or more to earn a bachelor of science in applied climate science.

Specific Degree Requirements

| | | |
|--|---|-----------|
| METR 100 | Weather and Climate | 4 |
| METR 205 | Introduction to Atmospheric Science | 4 |
| NRES 370 / METR 370 | Applied Climatology | 3 |
| NRES 408 / GEOG 408 / METR 408 / PLAS 408 / WATS 408 | Microclimate: The Biological Environment | 3 |
| NRES 452 / GEOG 450 / METR 450 / PLAS 450 | Climate and Society | 3 |
| NRES 478 / METR 478 | Regional Climatology | 3 |
| Capstone course (ACE 10): any CASNR ACE 10 course (Selected in consultation with academic advisor.) | | 3 |
| Select one of the following: | | 3 |
| METR 270 | Global warming: Science, Impacts, Solutions | |
| METR 475 | Physical Climatology | |
| METR 479 / BSEN 479 / NRES 479 / WATS 479 | Hydroclimatology | |
| METR 483 / NRES 467 | Global Climate Change | |
| METR 487 | Earth's Climate: Past, Present, Future | |
| Credit Hours Subtotal: | | 26 |
| Total Credit Hours | | 26 |

Pre-Law: (Year 4 Applied Climate Science/Year 1 College of Law

| | | |
|----------------------|--|---|
| LAW 501 | Contracts I | 5 |
| LAW 503 | Torts I | 4 |
| LAW 505 | Property I | 5 |
| LAW 508 | Criminal Law | 3 |
| LAW 513 & LAW 514 | Legal Analysis, Writing and Research (LAWR) and Legal Analysis, Writing and Research (LAWR) | 6 |
| LAW 516 | Civil Procedure I | 4 |

| | | |
|---------------------------|---|-----------|
| LAW 518 | International Perspectives in U.S. Legal System: Practicing Law in a Global Legal Environment | 3 |
| Credit Hours Subtotal: | | 30 |
| Total Credit Hours | | 30 |

Requirements for Minor Offered by Department

Applied Climate Science Minor

Required Courses

| | | |
|---|--|-----------|
| NRES 104 | Climate in Crisis | 3 |
| or METR 100 | Weather and Climate | |
| or METR 180 | Climate Change, Energy, and the Environment | |
| NRES 208 | Climate Literacy in Natural Resources | 3 |
| NRES 370 / METR 370 | Applied Climatology | 3 |
| Select 6 hours from the following: | | 6 |
| ENSC 110 | Energy in Perspective | |
| ENSC 220 | Introduction to Energy Systems | |
| ENSC 230 | Energy and the Environment: Economics and Policy | |
| GEOL 125 | Frontiers in Antarctic Geosciences | |
| METR 180 | Climate Change, Energy, and the Environment | |
| POLS 332 | Climate Change: Policy and Politics | |
| Select one of the following: | | 3 |
| NRES 452 / GEOG 450 / METR 450 / PLAS 450 | Climate and Society | |
| NRES 478 / METR 478 | Regional Climatology | |
| METR 479 / BSEN 479 / NRES 479 / WATS 479 | Hydroclimatology | |
| 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.