

CLIMATE SCIENCE

Climate impacts global environmental and ecological systems, human health, water availability, agricultural systems and food security, human migrations, and economic systems. Future climate change is projected to further worsen food insecurity, water scarcity, human migrations, and global conflict.

This major is designed to give the students a solid foundation on how the climate system works and competency in areas of data analysis, planning and mitigation, and science communication. Students will take core courses in climate science and complementary areas and select at least one focus area for additional specialization. Focus areas includes: advanced climate science; data visualization; design and planning for sustainability; food, agriculture and biodiversity; policy and human behavior; and science communication.

Student Learning Outcomes:

Graduates of the Climate Science degree will have the skills and knowledge to:

1. Understand scientific principles and their application to scientific inquiry and to societal concerns relating to climate science.
2. Demonstrate a broad understanding of the climate system, how it works on multiple timescales, and the utility of tools, such as models, and their strengths and limitations in the context of climate science.
3. Demonstrate a broad understanding of climate issues and policies.
4. Think critically about the range of climate information, data, and literature coming from a variety of sources and distill application-relevant knowledge.
5. Demonstrate proficiency in data analysis and problem-solving of relevant climate systems, issues, and challenges.
6. Understand societal concerns related to climate change to develop and/or promote practical and applied research within the climate change research community.
7. Work with diverse teams whose members have a range of professional and disciplinary skills relevant to climate issues.
8. Work to identify climate-related needs and develop strategies to address these needs.
9. Use systems thinking approaches to better understand/solve climate change issues.
10. Effectively communicate in oral, written, and visual formats.

Climate Science Core Curriculum

CRP 2930	Environmental Planning	3
	or MATE 2200 Globalization and Sustainability	
ECON 3800	Energy, Environmental and Resource Economics	3
GEOL 1000	How the Earth Works	3

	or GEOL 1010 Environmental Geology: Earth in Crisis	
GEOL 1000L	How the Earth Works: Laboratory	1
GEOL 3240	Energy and the Environment	3
GEOL 4150	Paleoclimatology	3
JLMC 3470	Science Communication	3
MTEOR 1400	Climate and Society	3
MTEOR 2060	Introduction to Weather and Climate	3
MTEOR 3600	Ocean-Atmosphere Interactions	3
MTEOR 4040	Global Change	3
Capstone Choice		2
Total Credits		33

Required Supporting Courses

CHEM 1630	College Chemistry	5-6
& 1630L	and Laboratory in College Chemistry *	
	or CHEM 1670 General Chemistry for Engineering Students	
	& 1670L and Laboratory in General Chemistry for Engineering	
	or CHEM 2010 Advanced General Chemistry	
	& 2010L and Laboratory in Advanced General Chemistry	
ECON 1010	Principles of Microeconomics	3
MATH 1600	Survey of Calculus (MATH 1650 required for Advanced Climate Science Pathway)	4
	or MATH 1650 Calculus I	
PHYS 1310	General Physics I	5
& 1310L	and General Physics I Laboratory	
	or PHYS 2310 Introduction to Classical Physics I	
	& 2310L and Introduction to Classical Physics I Laboratory	
STAT 3050	Engineering Statistics	3
	or STAT 1010 Principles of Statistics	
	or STAT 1040 Introduction to Statistics	
Total Credits		20-21

* Students with previously earned credit for CHEM 1770 and CHEM 1770L may use it to meet this requirement.

Pathway Requirement

Students must complete one specialized pathway. All pathways require at least 15 credits; students choosing the Advanced Climate Science Pathway will complete 20 credits. All pathways require 9 credits at the 3000-level or higher. Students are encouraged to carefully review course prerequisites when planning course selections in their chosen pathways.

- Advanced Climate Science
- Data Visualization
- Design and Planning for Sustainability

- Food, Agriculture and Biodiversity
- Policy and Human Behavior
- Science Communication

Advanced Climate Science

Advanced Climate Science requires MATH 1660; PHYS 1320 or PHYS 2320; plus 12 credits from the choices listed. The pathway requires 9 credits at the 3000-level or higher.

MATH 1660	Calculus II	4
PHYS 1320	General Physics II	4
	or PHYS 2320 Introduction to Classical Physics II	
12 credits from the following:		
AGRON 4050	Soil-Plant-Animal-Atmosphere Physics	3
AGRON 4060	World Climates	3
GEOL 4020	Watershed Hydrology	3
GEOL 4110	Hydrogeology	4
GEOL 4520	Intro GIS for Geoscientists (or other advanced GIS course such as GEOL 4880)	3
GEOL 4680	Applied Geostatistics for Geoscientists	3
GEOL 4740	Glacial and Quaternary Geology	3
GEOL 4790	Surficial Processes	3
GEOL 4830	Environmental Biogeochemistry	3
GEOL 4890	Survey of Remote Sensing Technologies	3
MTEOR 2270	Computational Meteorology I (or other computer programming course such as GEOL 5590)	3
MTEOR 3010	General Meteorology	4
MTEOR 3410	Atmospheric Physics I	3
MTEOR 4080X	Numerical Weather and Climate Prediction	3
MTEOR 4520	Climate Modeling	3

Data Visualization

Data Visualization requires 15 credits from the choices listed. The pathway requires 9 credits at the 3000-level or higher.

ARCH 4390	Computational Design Theory	3
ARTIS 2120	Studio Fundamentals: Digital Media	3
ARTIS 3080	Computer Modeling, Rendering and Virtual Photography	3
ARTIS 4080	Principles of 3D Animation	3
ARTIS 4700X	Data, Code, and Form	3
ARTIS 4730	Video Art	3
ARTIS 4750	Interactive Art	3
CRP 2510	Fundamentals of Geographic Information Systems	3
CRP 3510	Intermediate Geographic Information Systems	3
CRP 4490	Geodesign: Planning for Sustainable Futures	3
CRP 4560	GIS Programming and Automation	3

GEOL 4520	Intro GIS for Geoscientists	3
GEOL 4880	Raster GIS for Geoscientists	3
LA 2110	Digital Design Methods for Landscape Architecture	3
LA 4540	Fundamentals of Remote Sensing and Spatial Analysis	3
LA 4590	Digital Design Methods for Landscape Architecture	3
STAT 3320	Visual Communication of Quantitative Information	3

Design and Planning for Sustainability

Design and Planning for Sustainability requires 15 credits from the choices listed. The pathway requires 9 credits at the 3000-level or higher.

ARCH 4510	Whole Building Energy Performance Modeling	3
ARCH 5580	Sustainability and Green Architecture	3
CRP 2510	Fundamentals of Geographic Information Systems	3
CRP 2910	World Cities and Globalization	3
CRP 2930	Environmental Planning	3
CRP 3010	Urban Analytical Methods	4
CRP 3510	Intermediate Geographic Information Systems	3
CRP 3830	Theory of the Planning Process	3
CRP 4450	Transportation Policy and Planning	3
CRP 4490	Geodesign: Planning for Sustainable Futures	3
CRP 4490	Geodesign: Planning for Sustainable Futures	3
CRP 4570	Geogames for Civic Engagement	3
CRP 4600	Social Justice and Planning	3
CRP 4840	Sustainable Communities	3
CRP 4920	Planning Law, Administration and Implementation	3
GEOL 4520	Intro GIS for Geoscientists	3
GEOL 4880	Raster GIS for Geoscientists	3
LA 2700	Foundations in Natural Resource Policy and History	3

Food, Agriculture and Biodiversity

Food, Agriculture and Biodiversity requires 15 credits from the choices listed. The pathway requires 9 credits at the 3000-level or higher.

AECL 2310	Principles of Wildlife & Fisheries Conservation	3
BIOL 4710	Introductory Conservation Biology	3
AGRON 1800	Global Agriculture in a Changing World	3
AGRON 1810	Introduction to Crop Science	3
AGRON 1820	Introduction to Soil Science	3
AGRON 3160	Crop Structure-Function Relationships	3
AGRON 3170	Principles of Weed Science	3
AGRON 3340	Forage Crop Management	3
AGRON 3420	World Food Issues: Past and Present	3

AGRON 4050	Soil-Plant-Animal-Atmosphere Physics	3
AGRON 4060	World Climates	3
BIOL 2040	Biodiversity	2
BIOL 2110	Principles of Biology I	3
BIOL 3120	Ecology	4
BIOL 3550	Plants and People	3
BIOL 3660	Plant Systematics	4
BIOL 3700	GIS for Ecology and Environmental Science	3
or NREM 4460	Integrating GPS and GIS for Natural Resource Management	3
ENT 3700	Insect Biology	3
or AECL 3660	Natural History of Iowa Vertebrates	
or BIOL 3540	Animal Behavior	
ENT 3740	Insects and Our Health	3
ENT 4710	Insect Ecology	3
GLOBE 3040	Socio-Economic Global Resource Systems	3
GLOBE 3600	Global Health	3
HORT 3420	Landscape Plant Installation, Establishment, and Management	3
HORT 4750	Urban Forestry	3
NREM 3010	Natural Resource Ecology and Soils	4
NREM 3110	Field Ecology in Montana	4
NREM 3900	Fire Ecology and Management	3
NREM 4520	Ecosystem Management: Integrating Ecology, Society, and Policy	3

Policy and Human Behavior

Policy and Human Behavior requires POLS 2830 plus 12 credits from the choices listed. The pathway requires 9 credits at the 3000-level or higher.

POLS 2830	Introduction to Environmental Politics and Policies	3
12 credits from the following:		
HIST 3620	Global Environmental History	3
HIST 3630	U. S. Environmental History	3
PHIL 2300	Moral Theory and Practice	3
PHIL 3300	Ethical Theory	3
PHIL 3340	Environmental Ethics	3
POLS 3350	Science, Technology, and Public Policy	3
POLS 3440	Public Policy	3
POLS 4430	Energy Policy	3
POLS 4800	Ethics and Public Policy	3
PSYCH 3180	Judgment and Decision Making	3
MATE 2200	Globalization and Sustainability	3
SOC 3820	Environmental Sociology	3

SOC 3310	Social Class and Inequality	3
SOC 3480	Global Poverty, Resources and Sustainable Development	3

Science Communication

Science Communication requires 15 credits from the choices listed.

The pathway requires 9 credits at the 3000-level or higher.

BPMI 3230	Scientific Illustration Principles and Techniques	3
BPMI 3260	Illustration and Illustration Software	3
BPMI 3270	Illustration as Communication	3
COMST 3270	Persuasion and Social Influence	3
ENGL 3320	Visual Communication of Quantitative Information	3
ENGL 3550	Literature and the Environment	3
ENGL 4770	Seminar in Technical Communication	3
JLMC 2600	Media Controversies in Science and Technology	3
JLMC 4010	Mass Communication Theory	3
JLMC 4740	Communication Technology and Social Change	3
JLMC 4760	World Communication Systems	3
PHIL 2060	Introduction to Logic and Scientific Reasoning	3
PR 2200	Principles of Public Relations	3
PR 3050	Publicity Methods	3
PR 3230X	Strategic Communication in Agriculture and the Environment	3

As majors in the College of Liberal Arts and Sciences, Climate Science students must meet College of Liberal Arts and Sciences (<http://catalog.iastate.edu/collegeofliberalartsandsciences/#iascollegerequirementstext>) and University-wide requirements (<http://catalog.iastate.edu/collegescurricula/>) for graduation in addition to those stated above for the major.

LAS majors require a minimum of 120 credits, including a minimum of 45 credits at the 3000/4000 level. You must also complete the LAS world language requirement.

Communication Proficiency requirement: According to the university-wide Communication Proficiency Grade Requirement (<http://catalog.iastate.edu/academics/#communicationproficiencypolicytext>), students must demonstrate their communication proficiency by earning a grade of C or better in ENGL 2500.

Students in all ISU majors must complete a three-credit course in U.S. diversity and a three-credit course in international perspectives. Check (<http://www.registrar.iastate.edu/courses/div-ip-guide.html>) for a list of approved courses. Discuss with your advisor how the two courses that you select can be applied to your graduation plan.

Climate Science 4-Year Plan

This plan is an example only; students should discuss their graduation plan with their advisor.

Freshman

Fall	Credits Spring	Credits
GEOL 1120	1 GEOL 1130	1
MTEOR 1400	3 MATE 2200	3
GEOL 1000	3 CHEM 1630	4
GEOL 1000L	1 CHEM 1630L	1
STAT 1010	4 MTEOR 2060	3
ENGL 1500	3 Arts and Humanities choice	3
	15	15

Sophomore

Fall	Credits Spring	Credits
ECON 1010	3 GEOL 3240	3
MATH 1600	4 ECON 3800	3
ENGL 2500	3 Arts and Humanities choice	3
LIB 1600	1 Climate Science Pathway choice	3
PHYS 1310	4 U.S. Diversity choice	3
PHYS 1310L	1	
	16	15

Junior

Fall	Credits Spring	Credits
MTEOR 4040	3 MTEOR 3600	3
GEOL 4150	3 JLMC 3470	3
Climate Science Pathway choice (3000+)	3 Climate Science Pathway choice (3000+)	3
Arts and Humanities choice	3 Social Science choice	3
Elective (3000+ level)	3 Elective (3000+ level)	3
	15	15

Senior

Fall	Credits Spring	Credits
Climate Science Pathway choice (3000+)	3 Climate Science Pathway choice	3
Elective (3000+ level)	3 Climate Science Capstone Course	2
Arts and Humanities choice	3 Elective (3000+ level)	3
Elective (3000+ level)	3 Elective (3000+ level)	3

World Language 1010
choice/Elective

3-4 World Language 1020
choice/Elective

3-4

15-16

14-15

Total Credits: 120-122