

# 2009-2010 Course Catalog

The University Of Montana

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## CLIMATE CHANGE STUDIES

**Steven Running, Director**

Climate Change Studies is an inter-disciplinary program open to all majors. The program educates students in three areas of the climate change issue: science, society, and solutions. Coursework in the minor provides a foundation that enables students to engage the scientific, societal, and political dimensions of global climate change. Further, the focus on solutions with its orientation toward applied learning will help students develop critical thinking and problem solving skills. Participating students will enhance their major field of study. They will be better prepared to enter a broad range of professions and graduate programs where they can meet the emerging challenges and opportunities arising from climate change. Climate Change Studies is a joint program between the College of Forestry and Conservation, College of Arts and Sciences, and College of Technology.

### Requirements for a Minor

To earn a minor in Climate Change Studies, students must successfully complete 21.0 credits: a 3.0 credit interdisciplinary introductory course (CCS 203) and 6.0 credits in each of the three areas listed below.

Course # and Description	Credits
CCS 203 Climate Change: Science & Society	3
Six credits from the following: Climate Change Science Courses	Credits
CCS/GEO 108N Climate Change - Past and Future	3
CCS/ERTH 303N Weather and Climate	3
CCS/GEO 382 (UG) Global Change	3
CCS/FOR/BIO/GEO 408 Global Biogeochemical Cycles	3
CCS/GEO 448 (UG) Snow, Ice and Climate	3
Six credits from the following: Climate Change Science Courses	Credits
CCS/PSC 324 Sustainable Climate Policies: China and the USA	3
CCS/COMM/EVST 379 Communication, Consumption and Climate	3

CCS/RSCN 449 Climate Change Ethics and Policy	3	
CCS/ECNS 445 International Environmental Economics and Climate Change	3	
Six credits from the following climate change solutions courses, with at least one course taken in category A, which requires practical application		Credits
Climate Change Solutions Courses:		
Category A		
CCS/NRG 290 Energy Internship	2	
CCS 398 Climate Change Internship	2-4	
CCS 391 Climate Change Practicum	2-4	
CCS/EVST 485 Environmental Citizenship	3	
Category B		
CCS/NRG 102 Intro to Energy Systems II	3	
CCS/BUS 160S Issues in Sustainability	3	
CCS/NRG 191 Energy Practicum	2	
CCS/CAR 235T Building Energy Conservation	3	
CCS/NRG 242 Solar & Wind Systems	3	

## Courses

U CCS 102 Introduction to Energy Systems II, 3 cr. Offered spring. Same as NRG 102. Prereq., NRG 101 or consent of instructor. A survey of renewable energy systems and technologies. Addresses physical and technical aspects of wind, solar, geothermal, hydro, tidal, biological, and wave energy systems. Consideration is given to engineering, economic, social, environmental, and political factors that determine implementation and sustainability.

U CCS 108N Climate Change - Past and Future, 3 cr. Offered autumn. Same as GEO 108N. The geoscience perspective on the earth's climate system. Climate processes and feedbacks, climate history from early earth to the ice ages, present and future changes due to natural processes and human activities.

U CCS 160S Issues in Sustainability, 3 cr. Offered autumn and spring. Same as BUS 160S. Literature-intensive course exposes the student to a variety of essays addressing the balance of economic development with the principles of sustainability and social equity. Introduction to sustainability concepts, natural systems/cycles and environmental economics. U CCS 191 Energy Practicum, 2 cr. Offered summer. Same as NRG 191. Prereq., consent of instructor. practicum provides students with a supervised field experience. Students will gain hands-on experience with energy

specific technologies. This opportunity increases students' occupational awareness and professionalism.

U CCS 203 Climate Change: Science and Society, 3 cr. Offered autumn. Foundational course on the scientific and social dimensions of global climate change with the goal of providing students with a basic understanding of the fundamental scientific, social, political and technological issues arising from rapid climatic change.

U CCS 235 Building Energy Conservation, 3 cr. Offered spring. Same as CAR 235. Study of the analysis techniques for reduction of energy consumption and energy management, including energy accounting and energy auditing. Residential and commercial building energy efficiency opportunities are covered. Other topics include motors, pumps, green building, purchasing energy supplies, and careers in energy efficiency.

U CCS 242 Solar and Wind Systems, 3 cr. Offered autumn. Same as NRG 242. Introduction to the fundamentals of solar and wind energy for the design and installation of solar and wind systems. Includes an overview of the physics and chemistry of the resource and the technology, and will prepare students for a career in renewable energy or for installing a renewable energy system on their own home.

U CCS 298 Energy Internship, 2 cr. Offered spring. Same as NRG 298. Prereq., consent of instructor. Students complete a field experience at an energy-related site or in an energy-related industry. A series of career development seminars and activities related to the field experience are completed in parallel.

U CCS 303N Weather and Climate, 3cr. Offered autumn. Same as EARTH 303N. Prereq., GEOG 102N or consent of instructor. Origin, composition, structure, and dynamics of the atmosphere, gas and radiation laws, energy budget and balance, weather elements and North American weather systems.

U CCS 324 Sustainable Climate Policies: China and the USA, 3 cr. Offered spring. Same as PSC 324. Not open to Fr So. Explores historic, current, and future greenhouse-gas (GHG) emissions of the United States and China, reasons why both are the two largest CO<sub>2</sub>emitters, and prevailing national and subnational government policies and nongovernmental actions that affect emissions mitigation and adaptation.

UG CCS 382 Global Change, 3 cr. Offered spring. Same as GEO 382. Prereq., consent of instructor. Lectures, readings, and discussions on geological and geochemical processes that affect global change using recent literature; carbon dioxide buildup, greenhouse effect, ozone depletion, desertification, ice ages, and other global events.

U CCS 391 Climate Change Practicum 2-4 cr. Offered autumn and spring. Prereq., consent of instructor. Provides an opportunity for students to design and implement a capstone project involving creative solutions to climate change. U CCS 379

Communication, Consumption, and Climate 3 cr. Offered spring. Same as COMM 379 and EVST 379. Analyzes consumption as a communication practice, investigates discourses that promote consumption, and illuminates environmental impacts on consumption. U CCS 398 Climate Change Internship 2-4 cr. Offered autumn and spring. Prereq., consent of instructor. Hands-on, "real world" experience working with local, regional, national, or international groups to address climate change.

Students gain supervised, practical work experience with specific projects and organizations; create a network of professional contacts; and have an opportunity to apply ideas and approaches studied in the Climate Change Studies minor. UG

CCS 408 Global Biogeochemical Cycles 3 cr. Offered spring even numbered years. Same as FOR/BIOL/GEO 408. Exploration of how variations in the availability or utilization of critical Earth elements influences the atmosphere, the oceans, and the terrestrial biosphere including the natural and agricultural ecosystems on which we depend. UG CCS 445 International Environmental Economics and Climate Change, 3 cr. Offered every other autumn. Same as ECON 445. Prereq., ECON 111. The economics of various policy approaches towards climate change and other international environmental issues such as trans-boundary pollution problems, international trade and the environmental, and the pollution haven hypothesis.

UG CCS 449 Climate Change Ethics and Policy 3 cr. Offered Fall. Same as EVST 449. This course focuses on the ethical dimensions of climate change policy. It covers the following major topics: (1) climate change, personal and collective responsibilities, (2) ethics, climate change and scientific uncertainty, (3) distributive justice and international climate change negotiations, (4) intergenerational justice and climate change policy. U CCS 485 Environmental Citizenship, 3 cr. Offered spring. Same as EVST485. Open to juniors and seniors only or by permission of instructor. Develops environmental citizenship through student-initiated projects informed by principles of social marketing. UG CCS 488 Snow, Ice and Climate, 3 cr. Offered spring. Same as GEO 488. Prereq., MATH 100. Study of basic physical processes occurring in snow and ice, and how these processes govern the interaction between frozen water and the climate system.

## **Faculty**

### **Science Area**

- Dr. Rebecca Bendick, Assistant Professor, Department of Geosciences
- Dr. Cory Cleveland, Assistant Professor of Soil Science
- Dr. Michael De Grandpre, Professor, Department of Chemistry
- Dr. Sarah Halvorson, Associate Professor and Departmental Chair of Geography
- Dr. Joel Harper, Associate Professor, Department of Geosciences
- Dr. Anna Klene, Associate Professor, Department of Geography
- Dr. Scott Mills, Professor of Wildlife Population Ecology
- Dr. Curtis Noonan, Associate Professor, Department of Biomedical and Pharmaceutical Sciences
- Dr. Steve Running, Regent's Professor of Ecology, Director of Numerical Terradynamics Simulation Group

### **Society Area**

- Dr. Richard Barrett, Emeritus Professor, Department of Economics, State Legislator
- Dr. Len Broberg, Professor, Department of Environmental Studies
- Dr. James Burchfield, Interim Dean and Research Professor, College of Forestry and Conservation
- Dr. Ulrich Kamp, Associate Professor, Department of Geography
- Dr. Derek Kellenberg, Assistant Professor, Department of Economics
- Dr. Peter Koehn, Professor, Department of Political Science

- Dr. Anna Prentiss, Associate Professor, Department of Anthropology
- Dr. Christopher Preston, Associate Professor, Department of Philosophy
- Dr. Rebecca Richards, Professor, Department of Sociology
- Dr. Steve Schwarze, Associate Professor, Department of Communication Studies
- Dr. Dane Scott, Director, Center of Ethics, Associate Professor, Department of Society and Conservation
- Dr. Terry Weidner, Director, Mansfield Center

## **Solutions Area**

- Dr. Georgia Cobbs, Associate Professor, Department of Curriculum and Instruction
- Dr. Brian Kerns, Engineer, Alternative Energy Technology Program
- Dr. Martin Horejsi, Assistant Professor, Department of Curriculum and Instruction
- Nicky Phear, Program Coordinator, Climate Change Studies and Wilderness and Civilization
- Dr. Ashley Preston, Program Director, Energy Technology Program
- Dr. Robin Saha, Assistant Professor, Department of Environmental Studies
- Lisa Swallow, Program Director, Department of Business Technology
- Nadia White, Assistant Professor, School of Journalism
- Dr. Laurie Yung, Director of Wilderness Institute; Research Assistant Professor