

# Humanities, Arts, and Social Sciences

---

## Degree Offered

- Master of Science in Natural Resources and Energy Policy (Non-Thesis)

## Certificates Offered

- Graduate Certificate in Natural Resources and Energy Policy

## Minors Offered

- Minor - A 12 credit minor for graduate students pursuing degrees in other Mines academic units. Please contact either a Humanities, Arts, & Social Sciences faculty member with whom you are interested in working or the director of the NREP program. The Graduate Individual Minor must be approved by the student's graduate committee and by the NREP Director.

## Program Description

The M.S. in Natural Resources and Energy Policy (NREP), based in the Department of Humanities, Arts, and Social Sciences, is a multidisciplinary degree that trains graduates in solving global challenges related to energy, water, natural resources, and the environment. NREP provides graduates with a range of social science skills and knowledge. Open to all undergraduate degrees and new graduates as well as early- and mid-career professionals, NREP teaches qualitative and quantitative skills to respond to domestic and global challenges related to energy, natural resources and resource management. The program is research and writing-intensive with a strong focus on verbal and written communication. The classes are small seminars that allow faculty to meet individual interests and backgrounds.

Through core courses and electives from across campus, and as well as internships, students acquire in-depth knowledge of political risk analysis and mitigation, community outreach and social responsibility, international development, and domestic and global policy making. NREP targets the following jobs: analysts at energy and financial analytics companies; policy, government affairs, public affairs, risk management, community development, and similar positions in engineering companies; local, state, and federal government positions related to energy and resources; and non-profit organizations (advocacy, trade associations, etc.) working on energy, environment, or natural resources, especially water.

Drawing on Mines' international reputation, the faculty's extensive contacts, courses focused on problem-solving, and our well-placed Board of Advisors, graduates get jobs in industry, government, and non-governmental organizations. Students with undergraduate training in engineering may choose to work as engineers with a new awareness of social contexts, thus paving the way to new jobs and promotions, or choose a new career path such as in social responsibility, government relations, or advocacy. Those with social science or humanities training will find doors open to them in a wide range of energy and natural resources jobs.

This is a non-thesis program, requiring 30 credit-hours of coursework: 15 credit-hours in the core, and 15 hours of electives. For the electives, at least 9 credit hours must be courses offered by HASS. As

a full-time student, it generally takes 1.5 years (3 semesters, including summer) to complete the program.

## Combined Undergraduate/Graduate Degree Programs

Mines students may earn the master's degree as part of Mines' Combined Undergraduate/Graduate program. Students participating in the combined degree program may double count up to 6 credits of 400-level course work from their undergraduate course work.

Please note that Mines students interested in pursuing a Combined Undergraduate/Graduate program are encouraged to make an initial contact with the NREP Director after the first semester of their sophomore year for counseling on application procedures, admissions standards, and degree completion requirements.

See "Combined Undergraduate/Graduate Degree Programs" elsewhere in this bulletin for further details.

## Admission Requirements

The requirements for admission into Humanities, Arts, & Social Sciences Graduate Programs are as follows:

1. An undergraduate degree (engineering, social sciences, and others accepted) with a cumulative grade point average (GPA) at or above 3.0 (4.0 scale) or be a Mines undergraduate with a minimum GPA of 3.0 in the Humanities, Arts & Social Sciences course work.
2. For students whose native language is not English, Mines requires a minimum TOEFL score of 79 internet-based test (iBT) or 550 paper-based test (PBT). Tests must have been taken within the past two years to be accepted. *If you have completed a university degree program in the United States or in an English-speaking country within the previous two years, you do NOT have to submit TOEFL scores.*

## Program Requirements

### Master of Science in Natural Resources & Energy Policy (Non-Thesis)

The multidisciplinary NREP degree aims to train engineers and social scientists in the critical skills needed to respond to domestic and global challenges related to natural resources and energy issues in the 21st century. The program trains students in quantitative and qualitative methods as well as enhancing their skills to critically analyze natural resource, environment, and energy issues and to implement complex solutions in diverse social and political settings. Students engage in research- and writing-intensive assignments with a strong focus on verbal and written communication skills.

Graduates will gain in-depth knowledge of political risk analysis and mitigation, laws and regulations related to the extractive industries and the environment, principles of social responsibility, tools for community outreach and problem-solving, anti-corruption policies, and the politics and processes behind local, national, and global policymaking.

Designed for both early and mid-career professionals, the degree targets the following jobs: policy, government affairs, risk management, community development, social responsibility, and similar positions in energy, environment, and mining companies; local, state, and federal government positions related to energy and resources; and non-profit organizations (advocacy, trade associations, etc.) working on energy and natural resources issues.

This is a non-thesis program, requiring 30 credit-hours of coursework: 15 credit-hours in the core, and 15 hours of electives. For the electives, at least 9 credit hours must be courses offered by HASS. As a full-time student, it generally takes 1.5 years (3 semesters, including summer) to complete the program.

#### Required Courses

HASS593	NATURAL RESOURCES & ENERGY POLICY: THEORIES AND PRACTICE	3.0
PEGN530	ENVIRONMENTAL LAW AND SUSTAINABILITY	3.0
HASS550	POLITICAL RISK ASSESSMENT	3.0
MNGN571	ENERGY, NATURAL RESOURCES, AND SOCIETY	3.0
ELECT	QUANTITATIVE METHODS ELECTIVE	3.0
<b>Total Semester Hrs</b>		<b>15.0</b>

Approved Quantitative Methods course list:

EBGN590	ECONOMETRICS I	3.0
MATH530	INTRODUCTION TO STATISTICAL METHODS	3.0
MNGN565	MINE RISK MANAGEMENT	3.0
GEGN532	GEOLOGICAL DATA ANALYSIS	3.0
GEGN575	APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS	3.0

- With the NREP Graduate Director's approval, students may also take an online graduate-level course.

### Mines' Combined Undergraduate / Graduate Degree Program

Students enrolled in Mines' combined undergraduate/graduate program may double count up to six credits of graduate coursework to fulfill requirements of both their undergraduate and graduate degree programs. These courses must have been passed with "B-" or better, not be substitutes for required coursework, and meet all other University, Department, and Program requirements for graduate credit.

Students are advised to consult with their undergraduate and graduate advisors for appropriate courses to double count upon admission to the combined program.

#### Approved Electives by Areas of Interest

4 courses (12 credit hours); at least 6 credit hours in HASS. Students may apply up to two 400-level courses (6 credit hours) in areas consistent with the degree and with the Graduate Director's approval. Other electives may be approved on a case-by-case basis.

Students are encouraged to focus on one of the following areas of interest and/or to get a Minor in a related discipline, such as Environmental Engineering or Mining. Some courses have prerequisites or are primarily for engineers in those fields; students should check with the professor before taking the course.

### International Development and Global Issues

HASS535	INTERNATIONAL DEVELOPMENT	3.0
HASS591	ENERGY POLITICS	3.0
HASS560	GEOPOLITICS OF NATURAL RESOURCES	3.0

### Energy and Environmental Studies

HASS521	ENVIRONMENTAL PHILOSOPHY	3.0
HASS525	ENVIRONMENTAL COMMUNICATION	3.0
HASS568	ENVIRONMENTAL JUSTICE	3.0
HASS587	ENVIRONMENTAL POLITICS AND POLICY	3.0
HASS588	GLOBAL WATER POLITICS AND POLICY	3.0
HASS591	ENERGY POLITICS	3.0
CEEN573	RECLAMATION OF DISTURBED LANDS	3.0
CEEN574	SOLID WASTE MINIMIZATION AND RECYCLING	3.0
CEEN575	HAZARDOUS WASTE SITE REMEDIATION	3.0
CEEN595	ANALYSIS OF ENVIRONMENTAL IMPACT	3.0
EBGN570	ENVIRONMENTAL ECONOMICS	3.0

### Mining

CEEN556	MINING AND THE ENVIRONMENT	3.0
CEEN573	RECLAMATION OF DISTURBED LANDS	3.0
MNGN501	REGULATORY MINING LAWS AND CONTRACTS	3.0
MNGN503	MINING TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT	3.0
MNGN510	FUNDAMENTALS OF MINING AND MINERAL RESOURCE DEVELOPMENT	3.0
MNGN540	CLEAN COAL TECHNOLOGY	3.0

### Business, Economics, and Energy Analytics

EBGN509	MATHEMATICAL ECONOMICS	3.0
EBGN510	NATURAL RESOURCE ECONOMICS	3.0
EBGN530	ECONOMICS OF INTERNATIONAL ENERGY MARKETS	3.0
EBGN594	TIME-SERIES ECONOMETRICS	3.0
EBGN632	PRIMARY FUELS	3.0
GEOL514	BUSINESS OF ECONOMIC GEOLOGY	3.0
MATH530	INTRODUCTION TO STATISTICAL METHODS	3.0

Courses approved for Quantitative Methods may also be taken as electives

### Program Requirements

#### Graduate Certificate in Natural Resources and Energy Policy

Designed to be completed in a single semester, or over two semesters for part-time students, the Certificate in Natural Resources & Energy Policy (NREP) is a 9 credit program affiliated with the MS in NREP.

To earn the certificate, students must take two of the five required courses for the Master's program plus an elective to be approved by the NREP Director:

HASS593	NATURAL RESOURCES & ENERGY POLICY: THEORIES AND PRACTICE	3.0
PEGN530	ENVIRONMENTAL LAW AND SUSTAINABILITY	3.0
MNGN571	ENERGY, NATURAL RESOURCES, AND SOCIETY	3.0

HASS550	POLITICAL RISK ASSESSMENT	3.0
QUANT	QUANTITATIVE METHODS ELECTIVE	

Approved Quantitative Methods list:

EBGN590	ECONOMETRICS I	3.0
MATH530	INTRODUCTION TO STATISTICAL METHODS	3.0
MNGN565	MINE RISK MANAGEMENT	3.0
GEGN532	GEOLOGICAL DATA ANALYSIS	3.0
GEGN575	APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS	3.0

## Courses

### **HASS521. ENVIRONMENTAL PHILOSOPHY. 3.0 Semester Hrs.**

Equivalent with LAIS521,

Analyzes environmental ethics and philosophy including the relation of philosophical perspectives to policy decision making. Critically examines often unstated ethical and/or philosophical assumptions about the environment and how these may complicate and occasionally undermine productive policies. Policies that may be considered include environmental protection, economic development, and energy production and use. 3 hours seminar; 3 semester hours.

### **HASS523. ADVANCED SCIENCE COMMUNICATION. 3.0 Semester Hrs.**

Equivalent with LAIS523,

This course will examine historical and contemporary case studies in which science communication (or miscommunication) played key roles in shaping policy outcomes and/or public perceptions. Examples of cases might include the recent controversies over hacked climate science emails, nuclear power plant siting controversies, or discussions of ethics in classic environmental cases, such as the Dioxin pollution case. Students will study, analyze, and write about science communication and policy theories related to scientific uncertainty; the role of the scientist as communicator; and media ethics. Students will also be exposed to a number of strategies for managing their encounters with the media, as well as tools for assessing their communication responsibilities and capacities. 3 hours seminar; 3 semester hours.

### **HASS525. ENVIRONMENTAL COMMUNICATION. 3.0 Semester Hrs.**

Equivalent with LAIS525,

(I, II, S) This course explores the ways that messages about the environment and environmentalism are communicated in the mass media, fine arts, and popular culture. The course will introduce students to key readings in environmental communication, media studies, and cultural studies in order to understand the many ways in which the images, messages, and politics of environmentalism and the natural world are constructed and contested by diverse audiences. Students will critically analyze their roles as science and/or technology communicators in the context of environmental issues, and will apply their skills to creating communications projects for diverse audiences. 3 lecture hours, 3 semester hours.

### **HASS526. INTERCULTURAL COMMUNICATION. 3.0 Semester Hrs.**

The course examines intercultural communication theory and practice. In particular, the course provides students with a window into how intercultural (mis)communication cases arise, evolve, and are resolved. Students investigate communication cases and issues across a broad range of cultural divides, such as national, gender, social class, and racial/ethnic cultures. Some case studies are situated in engineering and applied science contexts.

### **HASS527. RISK COMMUNICATION. 3.0 Semester Hrs.**

How do people perceive risk, as well as make decisions and communicate under conditions of uncertainty and risk? This course explores multiple perspectives on that overarching question. Although risk perception, risk management, and risk communication are three major course components, they are not treated separately but in terms of how they interrelate. Case studies include engineers and applied scientists coping with complex forms of uncertainty and risk, communicating in organizational and public sphere contexts with multiple audiences via the press and directly to the public, stockholders, co-workers, local communities, and more. In addition, students will critically reflect on the social consequences of living with risk in our contemporary moment.

### **HASS535. INTERNATIONAL DEVELOPMENT. 3.0 Semester Hrs.**

Equivalent with LAIS535,

(I, II, S) Explores the political economy of current and recent-historical development strategies, models, efforts, and issues in various world regions. The class will focus on Africa, Asia, Eurasia, Latin America, or the Middle East, depending on the semester. Development is understood to be a nonlinear, complex set of processes involving political, economic, social, cultural, and environmental factors whose ultimate goal is to improve the quality of life for individuals. Students will explore the roles of governments, companies, organizations, and individuals. Exact topics to be covered will vary with current events and the specific region; topics might include income inequality, the role of national and private energy companies, the impact of globalization, the role of development aid, and concepts of good governance. Students may take the course up to three times, covering different regions. 3 hours lecture; 3 semester hours.

### **HASS541. AFRICAN DEVELOPMENT. 3.0 Semester Hrs.**

Equivalent with LAIS541,

Provides a broad overview of the political economy of Africa. Its goal is to give students an understanding of the possibilities of African development and the impediments that currently block its economic growth. Despite substantial natural resources, mineral reserves, and human capital, most African countries remain mired in poverty. The struggles that have arisen on the continent have fostered thinking about the curse of natural resources where countries with oil or diamonds are beset with political instability and warfare. Readings give first an introduction to the continent followed by a focus on the specific issues that confront African development today. 3 hours lecture and discussion; 3 semester hours.

### **HASS550. POLITICAL RISK ASSESSMENT. 3.0 Semester Hrs.**

Equivalent with LAIS550,

Uses social science analytical tools and readings as well as indices prepared by organizations, such as the World Bank and the International Monetary Fund, to create assessments of the political, social, economic, environmental and security risks that multinational corporations may face as they expand operations around the world. Students will develop detailed political risk reports for specific countries that teams collectively select. Prerequisite: HASS 545 and IPE Minor. 3 hours seminar; 3 semester hours.

### **HASS560. GEOPOLITICS OF NATURAL RESOURCES. 3.0 Semester Hrs.**

Equivalent with LAIS560,

This seminar examines geopolitical competition between great and aspiring powers for influence, control over land and natural resources, critical geo-strategic trade routes, or even infrastructure. Using empirical evidence from case studies, students develop a deeper understanding of the interconnections between the political, economic, social, cultural and geographic dimensions of foreign policies, as well as issues of war and peace.

**HASS565. SCIENCE, TECHNOLOGY, AND SOCIETY. 3.0 Semester Hrs.**

Equivalent with LAIS565,

Provides an introduction to foundational concepts, themes, and questions developed within the interdisciplinary field of science and technology studies (STS). Readings address anthropological understandings of laboratory practice, sociological perspectives on the settling of techno-scientific controversies, historical insights on the development of scientific institutions, philosophical stances on the interactions between technology and humans, and relationships between science and democracy. Students complete several writing assignments, present material from readings and research, and help to facilitate discussion. 3 hours lecture and discussion; 3 semester hours.

**HASS568. ENVIRONMENTAL JUSTICE. 3.0 Semester Hrs.**

This course explores the history of the environmental justice movement, current and emerging environmental justice issues, and the application of environmental justice concepts and theories to environmental decision-making. Course content and activities are designed to enrich student understanding of how environmental injustice is produced (locally, regionally, and globally), how environmental justice issues are measured and analyzed, and how environmentally just outcomes can be achieved.

**HASS584. US WATER POLITICS AND POLICY. 3.0 Semester Hrs.**

(I) The story of water in the American West is one of engineering and applied science inextricably intertwined with a "Gordian knot" of law and policy, changing social and cultural values, and increasingly unpredictable hydrology. This course will familiarize students with the complexities of contemporary water governance, using the Colorado River system as its central case study. The Colorado River makes for an excellent point of departure because it is one of the most dammed, diverted, legislated, litigated, and loved rivers in the world and because we literally use it up; the river has seldom reached the sea since the 1960s. Indeed, the challenges that face the Colorado River's 40 million stakeholders today have less to do with applying law and engineering to developing water resources, and much more to do with figuring out how to share an over-appropriated resource while mitigating the social and ecological consequences of past choices. Our primary goal in the course will be to learn concepts of adaptive governance that provide a constructive and framework for analyzing and addressing such challenges. 3 hours lecture; 3 semester hours.

**HASS586. SCIENCE AND TECHNOLOGY POLICY. 3.0 Semester Hrs.**

Equivalent with LAIS586,

Examines current issues relating to science and technology policy in the United States and, as appropriate, in other countries. 3 hours lecture and discussion; 3 semester hours.

**HASS587. ENVIRONMENTAL POLITICS AND POLICY. 3.0 Semester Hrs.**

Equivalent with LAIS587,

Explores environmental policies and the political and governmental processes that produce them. Group discussion and independent research on specific environmental issues. Primary but not exclusive focus on the U.S. 3 hours lecture and discussion; 3 semester hours.

**HASS588. GLOBAL WATER POLITICS AND POLICY. 3.0 Semester Hrs.**

Equivalent with LAIS588,

(II) This interdisciplinary seminar course analyzes how droughts, floods, water management, global trading system, and climate change affect the hydrological and food systems that are critically important for economic prosperity and political stability. It addresses water policy at scales that range from community level to global governance regimes. It uses relevant analytical perspectives of, for example, psychology, political economy, development studies, and institutional approaches in economic geography to help students understand how certain transboundary water conflicts have emerged, their national and regional implications, and policies and institutions that can be used to resolve them. 3 hours lecture; 3 semester hours.

**HASS590. ENERGY AND SOCIETY. 3.0 Semester Hrs.**

Equivalent with LAIS590,

(II) The course begins with a brief introduction to global energy production and conservation, focusing on particular case studies that highlight the relationship among energy, society, and community in different contexts. The course examines energy successes and failures wherein communities, governments, and/or energy companies come together to promote socially just and economically viable forms of energy production/conservation. The course also explores conflicts driven by energy development. These case studies are supplemented by the expertise of guest speakers from industry, government, NGOs, and elsewhere. Areas of focus include questioning the forward momentum of energy production, its social and environmental impact, including how it distributes power, resources and risks across different social groups and communities. 3 hours seminar; 3 semester hours.

**HASS591. ENERGY POLITICS. 3.0 Semester Hrs.**

(I) We will use political science approaches, theories, and methods to investigate the global, regional, state, and local politics of renewable and non-renewable energy, spanning all uses: transportation, heating and cooling, and electricity. We will look at the politics behind energy in a subset of countries to be chosen by the class, such as China, Brazil, India, Austria, Spain, Venezuela, and Germany. We will then focus on energy in Colorado (and possibly a few other US states), conducting primary research on the stakeholders and the relevant political outcomes for non-renewables and renewables, making comparisons between the two groups. We will work with energy companies, non-governmental organizations, university and research entities, government representatives, and local activists. 3 lecture hours, 3 semester hours.

**HASS593. NATURAL RESOURCES & ENERGY POLICY: THEORIES AND PRACTICE. 3.0 Semester Hrs.**

(I) This course introduces students to the policy-making process, drawing on a variety of theoretical approaches, geographic locations (within the US and in other countries), and resources and energy issues. Coordinated by the NREP Graduate Director, speakers will be from HASS, Economics and Business, Petroleum Engineering, Mining, and other departments with policy expertise, as well as from others who influence and create public and private policy. In the second half of the course, students will conduct original research projects that focus on natural resources and energy, applying theoretical frameworks they have learned from the speakers. 3 lecture hours, 3 semester hours.

**HASS598. SPECIAL TOPICS. 6.0 Semester Hrs.**

(I, II, S) Pilot course or special topics course. Topics chosen from special interests of instructor(s) and student(s). Usually the course is offered only once, but no more than twice for the same course content. Prerequisite: none. Variable credit: 0 to 6 credit hours. Repeatable for credit under different titles.

**HASS599. INDEPENDENT STUDY. 0.5-6 Semester Hr.**

(I, II, S) Individual research or special problem projects supervised by a faculty member, also, when a student and instructor agree on a subject matter, content, and credit hours. Prerequisite: ?Independent Study? form must be completed and submitted to the Registrar. Variable credit: 0.5 to 6 credit hours. Repeatable for credit under different topics/ experience and maximums vary by department. Contact the Department for credit limits toward the degree.

**HASS601. ACADEMIC PUBLISHING. 2-3 Semester Hr.**

Equivalent with LAIS601, Students will finish this course with increased knowledge of general and discipline - specific writing conversations as well as the ability to use that knowledge in publishing portions of theses or dissertations. Beyond the research article, students will also have the opportunity to learn more about genres such as conference abstracts, conference presentations, literature reviews, and research funding proposals. Prerequisite: Must have completed one full year (or equivalent) of graduate school course work. Variable credit: 2 or 3 semester hours.

**HASS698. SPECIAL TOPICS. 6.0 Semester Hrs.**

(I, II, S) Pilot course or special topics course. Topics chosen from special interests of instructor(s) and student(s). Usually the course is offered only once, but no more than twice for the same course content. Prerequisite: none. Variable credit: 0 to 6 credit hours. Repeatable for credit under different titles.

**HASS699. INDEPENDENT STUDY. 0.5-6 Semester Hr.**

(I, II, S) Individual research or special problem projects supervised by a faculty member, also, when a student and instructor agree on a subject matter, content, and credit hours. Prerequisite: ?Independent Study? form must be completed and submitted to the Registrar. Variable credit: 0.5 to 6 credit hours. Repeatable for credit under different topics/ experience and maximums vary by department. Contact the Department for credit limits toward the degree.

**HASS707. GRADUATE THESIS / DISSERTATION RESEARCH****CREDIT. 1-15 Semester Hr.**

Equivalent with LAIS707, (I, II, S) GRADUATE THESIS/DISSERTATION RESEARCH CREDIT Research credit hours required for completion of a Masters-level thesis or Doctoral dissertation. Research must be carried out under the direct supervision of the student's faculty advisor. Variable class and semester hours. Repeatable for credit.

**LICM501. PROFESSIONAL ORAL COMMUNICATION. 1.0 Semester Hr.**

A five-week course which teaches the fundamentals of effectively preparing and presenting messages. "Hands-on" course emphasizing short (5- and 10-minute) weekly presentations made in small groups to simulate professional and corporate communications. Students are encouraged to make formal presentations which relate to their academic or professional fields. Extensive instruction in the use of visuals. Presentations are rehearsed in class two days prior to the formal presentations, all of which are video-taped and carefully evaluated. 1 hour lecture/lab; 1 semester hour.

**Professors**

Hussein A. Amery

Elizabeth Van Wie Davis

Jon A. Leydens

Kenneth Osgood,

**Associate Professors**

Adrienne Kroepsch

Tina L. Gianquitto

Kathleen J. Hancock

James D. Straker

**Teaching Professors**

Jonathan Cullison

Derrick Hudson , NREP Graduate Program Director

Paula A. Farca

Cortney Holles

Joseph Horan

Sandy Woodson, Department Head

**Teaching Associate Professors**

Eliza Buhner

Heather Fester, Associate Teaching Professor

Seth Tucker

Shannon Davies Mancus, Associate Department Head

**Teaching Assistant Professors**

Mairead Case

Masakazu Ito

Brianna Wolfe, Assistant Teaching Professor

**Professors Emeriti**

W. John Cieslewicz

T. Graham Hereford

Barbara M. Olds

Eul-Soo Pang

Anton G. Pegis

Thomas Philipose, University Emeritus Professor

Arthur B. Sacks

**Associate Professors Emeriti**

Betty J. Cannon

Kathleen H. Ochs

Laura J. Pang

Karen B. Wiley

**Teaching Professor Emeriti**

James Jesudason

**Teaching Associate Emeriti**

Rose Pass