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-hour 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 Humanities, Arts, & Social Science graduate program. The Graduate Individual Minor must be approved by the student’s graduate committee and by the Humanities, Arts, & Social Science Division.

Program Description

As the 21st century unfolds, we face major challenges in energy, natural resources, and the environment. The Division of Humanities, Arts, and Social Sciences offers a graduate degree to help professionals solve these challenges: M.S.in Natural Resources and Energy Policy (NREP).

The multidisciplinary NREP degree provides engineers, social and physical scientists, and others interested in energy and natural resources (especially water) with a range of social science skills and knowledge. Open to new graduates as well as mid-career professionals, NREP teaches critical 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 electives, and internships students acquire in-depth knowledge of political risk analysis and mitigation, community outreach and social responsibility, international development, and local and global policy making. The degree targets the following jobs: analysts at energy and financial analytics companies; policy, government affairs, risk management, community development, and similar positions in energy, mining, and other 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.

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.

NREP degree that requires 30 credit hours: 18 in the core and 12 in electives. Full-time students can complete the degree in 3 semesters (including summer).

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 semester hours 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. The GRE is required for most applicants. GRE are waived for current MINES students and (with the NREP Director’s approval) can be waived for those with 5+ years of relevant experience. GMAT scores may be used in lieu of the GRE.
3. 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.

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.

NREP is a professional degree that requires 30 credit hours: 18 in the core and 12 in electives. Students are encouraged to pursue internships which may count toward elective credits. Transfer students may apply up to 6 credit hours for courses that meet our requirements.

**Required Courses**

- **HASS593** NATURAL RESOURCES & ENERGY POLICY: THEORIES AND PRACTICE 3.0
- **PEGN530** ENVIRONMENTAL LAW AND SUSTAINABILITY 3.0
- **MNGN590** MECHANICAL EXCAVATION IN MINING 3.0
- **HASS552** CORRUPTION AND DEVELOPMENT 3.0
- **HASS550** POLITICAL RISK ASSESSMENT 3.0
- **ELECT** QUANTITATIVE METHODS ELECTIVE 3.0

Total Semester Hrs 18.0

Approved Quantitative Methods course list:

- **EBGN590** ECONOMETRICS I 3.0
- **MATH530** STATISTICAL METHODS I 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 (meaning uninterrupted registration from the time the student earns a Mines undergraduate degree to the time the student begins a Mines graduate degree) may double count up to six hours of credits which were used in fulfilling the requirements of their undergraduate degree at Mines, towards their graduate program. Any courses that count towards the graduate degree requirements as either “Required Coursework” or “Elective Coursework” may be used for the purposes of double counting at the discretion of the advisor (MS Non-Thesis) or thesis committee (MS Thesis or Ph.D.). These courses must have been passed with a “B-” or better and meet all other University, Department, Division, and Program requirements for graduate credit.

**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**

- **HASS593** NATURAL RESOURCES & ENERGY POLICY: THEORIES AND PRACTICE 3.0
- **HASS558** NATURAL RESOURCES AND DEVELOPMENT 3.0
- **HASS591** ENERGY POLITICS 3.0
- **HASS592** ENERGY AND SECURITY POLICY 3.0

**Energy and Environmental Studies**

- **HASS521** ENVIRONMENTAL PHILOSOPHY 3.0
- **HASS525** ENVIRONMENTAL COMMUNICATION 3.0
- **HASS587** ENVIRONMENTAL POLITICS AND POLICY 3.0
- **HASS588** GLOBAL WATER POLITICS AND POLICY 3.0
- **HASS591** ENERGY POLITICS 3.0
- **HASS592** ENERGY AND SECURITY POLICY 3.0
- **CEEN573** RECLAMATION OF DISTURBED LANDS 3.0
- **CEEN574** SOLID WASTE MINIMIZATION AND RECYCLING 3.0
- **CEEN575** HAZARDOUS WASTE SITE REMEDIATION 3.0
- **CEEN576** POLLUTION PREVENTION: FUNDAMENTALS AND PRACTICE 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
- **EBGN532** PRIMARY FUELS 3.0
- **GEOL514** BUSINESS OF ECONOMIC GEOLOGY 3.0
- **MATH530** STATISTICAL METHODS I 3.0

Courses approved for Quantitative Methods may also be taken as electives.

**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 12 credit-hour program affiliated with the MS in NREP.

To earn the certificate, students must take four of the six required courses for the Master's program:

- **HASS593** NATURAL RESOURCES & ENERGY POLICY: THEORIES AND PRACTICE 3.0
Courses

HASS521. ENVIRONMENTAL PHILOSOPHY AND POLICY. 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.

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.

HASS542. NATURAL RESOURCES AND WAR IN AFRICA. 3.0 Semester Hrs.
Equivalent with LAIS542,
Examines the relationship between natural resources and wars in Africa. It begins by discussing the complexity of Africa with its several many languages, peoples, and geographic distinctions. Among the most vexing challenges for Africa is the fact that the continent possesses such wealth and yet still struggles with endemic warfare, which is hypothetically caused by greed and competition over resource rents. Readings are multidisciplinary and draw from policy studies, economics, and political science. Students will acquire an understanding of different theoretical approaches from the social sciences to explain the relationship between abundant natural resources and war in Africa. The course helps students apply the different theories to specific cases and productive sectors. 3 hours lecture and discussion; 3 semester hours.

HASS545. INTERNATIONAL POLITICAL ECONOMY. 3.0 Semester Hrs.
Equivalent with LAIS545,
Introduces students to the field of International Political Economy (IPE). IPE scholars examine the intersection between economics and politics, with a focus on interactions between states, organizations, and individuals around the world. Students will become familiar with the three main schools of thought on IPE: Realism (mercantilism), Liberalism, and Historical Structuralism (including Marxism and feminism) and will evaluate substantive issues such as the role of international organizations (the World Trade Organization, the World Bank, and the International Monetary Fund), the monetary and trading systems, regional development, international development, foreign aid, debt crises, multinational corporations, and globalization. 3 hours seminar; 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.

HASS552. CORRUPTION AND DEVELOPMENT. 3.0 Semester Hrs.
Equivalent with LAIS552,
Addresses the problem of corruption and its impact on development. Readings are multidisciplinary and include policy studies, economics, and political science. Students will acquire an understanding of what constitutes corruption, how it negatively affects development, and what they, as engineers in a variety of professional circumstances, might do in circumstances in which bribe paying or taking might occur. 3 hours lecture and discussion; 3 semester hours.

HASS555. NATURAL RESOURCES AND DEVELOPMENT. 3.0 Semester Hrs.
Equivalent with LAIS555,
Examines the relationship between natural resources and development. It begins by discussing theories of development and how those theories account for specific choices among resource abundant countries. From the theoretical readings, students examine sector specific topics in particular cases. These subjects include oil and natural gas in African and Central Asian countries; hard rock mining in West Africa and East Asia; gemstone mining in Southern and West Africa; contracting in the extractive industries; and corporate social responsibility. Readings are multidisciplinary and draw from policy studies, economics, and political science to provide students an understanding of different theoretical approaches from the social sciences to explain the relationship between abundant natural resources and development. 3 hours lecture and discussion; 3 semester hours.

HASS560. GLOBAL GEOPOLITICS. 3.0 Semester Hrs.
Equivalent with LAIS560,
Examines geopolitical theories and how they help us explain and understand contemporary developments in the world. Empirical evidence from case studies help students develop a deeper understanding of the interconnections between the political, economic, social, cultural and geographic dimensions of governmental policies and corporate decisions. Prerequisites: any two IPE courses at the 300-level, or one IPE course at the 400 level. 3 hours lecture and discussion; 3 semester hours.
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 technoscientific 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.

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?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.
(I) 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.

HASS592. ENERGY AND SECURITY POLICY. 3.0 Semester Hrs.
(II) Energy and Security Policy is a graduate course that applies a social science lens to understanding the intersections between national and international security concerns and energy. In this course, we will examine these intersections through a case study approach that includes directed readings, such as books and peer-reviewed journal articles, that incorporate student-led discussions and research projects. By exploring various energy security scenarios, such as restricted access to oil and gas, graduate students will gain a comprehensive understanding of the energy-security nexus and the role governments and policies play in enhancing or limiting security. 3 hours lecture, 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 LAI707.
(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.