Energy and Resources

UC Berkeley's Energy and Resources Group (ERG) confers an interdisciplinary Undergraduate Minor in Energy and Resources and a Summer Minor/Certificate in Sustainability, as well as graduate M.A., M.S. and Ph.D. degrees.

Energy and Resources Group research and courses emphasize knowledge of the environmental consequences of resource use; analytical tools that promote efficiency, conservation, affordability, and equity in energy and resource use; and understanding of the social and institutional contexts in which resource and environmental problems arise, and in which creative and ethical solutions can be sustained. It is this synthesis of basic science, practical problem-solving, and constructive social critique that defines ERG.

Visit the Energy and Resources Group website (http://erg.berkeley.edu/) for more information about our undergraduate minors and graduate programs.

Energy and Resources Minor

The Minor in Energy and Resources offers undergraduates basic knowledge and skills to address issues arising from the interaction of social, economic, political, technical, and environmental factors shaping our world.

Students in the minor gain an understanding of:

- Technology, Development, and Society
- Consumption, Resource Use, and Equity
- Global Change Science and Economics
- Governance Challenges

Students in any major may add the Energy and Resources minor, which is composed of two core and three elective upper-division courses. Students in the minor benefit from previous preparation in mathematics and science.

Summer Sustainability Minor

Whatever direction your studies take you, the Energy and Resources Summer Minor / Certificate in Sustainability will equip you with tools to tackle some of the most pressing issues facing the world today. This program offers a practical and relevant interdisciplinary approach at the intersection of environmental, economic, social, political, and cultural issues.

Students in the interdisciplinary Summer Minor in Sustainability will learn about:

- The science, engineering, economics, and policy of renewable energy
- Biodiversity, environmental degradation, and the science behind climate change
- The business and economics of environmental sustainability
- Environmental change and social justice

The Summer Minor / Certificate in Sustainability is open to matriculated UC Berkeley undergraduates, students from other institutions, and the general public. Upon completion, UC Berkeley undergraduates receive a Minor in Sustainability, while other participants receive a Certificate in Sustainability from UC Berkeley. Visit the Energy and Resources Group website (http://erg.berkeley.edu/) for more information.

The Energy and Resources Minor

Students who have a strong interest in an area of study outside their major often decide to complete a minor program. These programs have set requirements.

General Guidelines

1. All courses taken to fulfill the minor requirements below must be taken for graded credit, except for courses taken in Spring 2020, Summer 2020, Fall 2020, Spring 2021, or Summer 2021, when students will be allowed to take courses Pass/No Pass.
2. A minimum grade point average (GPA) of 2.0 is required for courses used to fulfill the minor requirements.
3. All courses for the minor must be completed with a grade of C- or better.
4. No more than one upper division course may be used to simultaneously fulfill requirements for a student's major and minor programs.
5. At least four upper division courses must be taken at UC Berkeley.

Declaring the Minor

Students interested in pursuing the Energy and Resources minor should submit an Intent to Declare the Minor form (https://forms.gle/6u271FweG71rhU2M9/) during the semester in which upper division minor coursework is started. For information on how to submit your intent to pursue the minor, courses that fulfill the minor, how common lower division prerequisites may be completed, and how to declare the minor once completed, please visit the ERG website (http://erg.berkeley.edu/academics/program/#undergrad).

Students must complete the Minor Declaration Form (https://nature.berkeley.edu/sites/default/files/Minor%20Declaration%20Form.pdf) before the first day of instruction of their final semester.

Requirements FOR THE eNERGY AND rESOURCES mINOR

Students have or will develop strong foundations in math, physics, chemistry, and biology.

There are no lower division courses required for the Energy and Resources Minor; however in some cases lower division coursework is required in order to be enrolled in the upper division courses.

Many of the Energy and Resources minor upper division courses have prerequisites such as: MATH 1A-MATH 1B or MATH 16A-MATH 16B; PHYSICS 7A-PHYSICS 7B or PHYSICS 8A-PHYSICS 8B; CHEM 1A or CHEM 4A; and BIOLOGY 1B

Upper division requirements (five courses):		
Two core courses:		
One of:		
ENE,RES C100/ PUB POL C184	Energy and Society	4
ENE,RES W100	Energy and Society	4
AND:		

ENE,RES 102	Quantitative Aspects of Global Environmental Problems	4
AND:		
Three upper division electives, approved by the ERG faculty (see below):		
At least one course must be in the social sciences.		
At least one course must be in the natural sciences or engineering.		
At least one of the three upper division electives must be from the ERG department.		

Electives

The choice of electives should be made with two goals in mind: exploring the range of approaches available to address energy and resource issues and complementing the student's major. The latter can be achieved by adding relevant depth in closely related areas or by exploring methods and approaches that contrast with the tools and knowledge base employed in the major. Students are encouraged to discuss their program with the Energy and Resources minor advisor (https://nature.berkeley.edu/advising/minors/energy-resources/).

The following courses have been approved, but students should contact the Energy and Resources minor advisor to request approval of alternate courses. At least four upper division courses must be taken at Berkeley.

To complete the minor, students must have taken 3 electives. At least one must be a social science elective, and at least one must be a natural science & engineering elective. The third elective may be from any category.

Social science electives		
ENE,RES/ESPM C124	Gender and Environment	4
ENE,RES C160/ ESPM C176	CLIMATE JUSTICE	4
ENE,RES 174W	Water and Sanitation Justice	3
ENE,RES/ ENVECON C176	Climate Change Economics	4
ENE,RES 190B	Energy and Environmental Issues (Gender and the Environment)	4
ENVECON C101/ ECON C125	Environmental Economics	4
ENVECON/ ECON C102	Natural Resource Economics	4
ENVECON C132/ ECON C184	International Environmental Economics	4
ENVECON 141	Agricultural and Environmental Policy	4
ENVECON 145	Health and Environmental Economic Policy	4
ENVECON 147	The Economics of the Clean Energy Transition	4
ENVECON C151/ ECON C171	Development Economics	4
ENVECON 153	Population, Environment, and Development	3
ENVECON 162	Economics of Water Resources	3
ENVECON C176	Climate Change Economics	4
ESPM 102D	Climate and Energy Policy	4
ESPM C124	Gender and Environment	4
ESPM 155AC	Sociology and Political Ecology of Agro-Food Systems	4
ESPM 163AC	Environmental Justice: Race, Class, Equity, and the Environment	4
ESPM 168	Political Ecology	4
ESPM 169	International Environmental Politics	4
GEOG 138	Global Environmental Politics	4
ISF 100F	Theorizing Modern Capitalism: Controversies and Interpretations	4
Natural science & engineering electives		
ENE,RES 101	Ecology and Society	3
ENE,RES 131	Data, Environment and Society	4
CIV ENG 100	Elementary Fluid Mechanics	4
CIV ENG C103N/ ESPM C130/ GEOG C136	Terrestrial Hydrology	4
CIV ENG 105	Design for Global Transformation	3
CIV ENG 107	Climate Change Mitigation	3
CIV ENG 110	Water Systems of the Future	3
CIV ENG 111	Environmental Engineering	3
CIV ENG 112	Water & Wastewater Systems Design and Operation	3
CIV ENG 113	Ecological Engineering for Water Quality Improvement	3
CIV ENG 115	Water Chemistry	3
CIV ENG/ESPM C172	Remote Sensing of the Environment	4
CIV ENG 173	Groundwater and Seepage	3
CIV ENG 186	Design of Internet-of-Things for Smart Cities	3
CIV ENG 295	Data Science for Energy	3
EL ENG 137A	Introduction to Electric Power Systems	4
EL ENG 137B	Introduction to Electric Power Systems	4
EPS 117	Geomorphology	4
EPS C183/ ESPM C170	Carbon Cycle Dynamics	3
ESPM/LD ARCH C110A	Ecological Analysis	4
ESPM 111	Ecosystem Ecology	4
ESPM 112	Microbial Ecology	3
ESPM 116B	Grassland and Woodland Ecology	4
ESPM 120	Science of Soils	3
ESPM C128	Chemistry of Soils	3
ESPM/EPS C129	Biometeorology	3
ESPM C130	Terrestrial Hydrology	4
ESPM 130A	Forest Hydrology	4
ESPM 131	Soil Microbiology and Biogeochemistry	4
ESPM 140	General Entomology	4
ESPM 152	Global Change Biology	3
ESPM/INTEGBI C153	Ecology	3
ESPM C170/ EPS C183	Carbon Cycle Dynamics	3
ESPM/CIV ENG C172	Remote Sensing of the Environment	4
ESPM 174A	Applied Time Series Analysis for Ecology and Environmental Sciences	3

ESPM/ EPS C180/ CIV ENG C106	Air Pollution	3
ESPM/INTEGBI C216	Freshwater Ecology	3
GEOG C136/ CIV ENG C103N/ ESPM C130	Terrestrial Hydrology	4
GEOG 140A	Physical Landscapes: Process and Form	4
INTEGBI/ESPM C153	Ecology	3
INTEGBI 157LF	Ecosystems of California	4
INTEGBI/ESPM C216	Freshwater Ecology	3
Other electives		
ENE,RES 170	Environmental Classics	3
ENE,RES 171	California Water	3
ENE,RES 190	Seminar in Energy and Resources Issues (Elective area varies based on topic)	3
ENE,RES C192	Business, Sustainability, and Society	3
ANTHRO C119A/ ESPM C162A	Inequality and the Body: Health, Medicine, Society and Environment	4
ARCH 140	Energy and Environment	4
CHM ENG C295Z/ CHEM C236/ EPS C295Z	Energy Solutions: Carbon Capture and Sequestration	3
CHEM C236/ EPS C295Z/CHM ENG C295Z	Energy Solutions: Carbon Capture and Sequestration	3
CIV ENG 175	Geotechnical and Geoenvironmental Engineering	3
CIV ENG 176	Environmental Geotechnics	3
CIV ENG 190	Special Topics in Civil and Environmental Engineering (Elective area varies based on topic)	1-4
CIV ENG 191	Civil and Environmental Engineering Systems Analysis	3
CIV ENG 206	Water Resources Management	3
CY PLAN 119	Planning for Sustainability	4
ENV DES 102	Climate Change and City Planning: Adaptation and Resilience	3
ENV DES 106	Sustainable Environmental Design Workshop	4
EPS C295Z/ CHEM C236/ CHM ENG C295Z	Energy Solutions: Carbon Capture and Sequestration	3
ESPM 118	Agricultural Ecology	4
ESPM C133/ GEOG C135	Course Not Available	3
ESPM 157	Data Science in Global Change Ecology	4
ESPM 160AC	American Environmental and Cultural History	4
ESPM 161	Environmental Philosophy and Ethics	4
ESPM 162	Bioethics and Society	4
ESPM C162A/ ANTHRO C119A	Inequality and the Body: Health, Medicine, Society and Environment (Formerly ESPM 162A)	4
ESPM 177A	Sustainable Water and Food Security	4
GEOG 107	Course Not Available	3
GEOG 108	Course Not Available	3
GEOG 114	Thinking Globally, Acting Regionally: Geographies of Climate Change	3
GEOG 130	Food and the Environment	4
GEOG 147	Communicating Climate Science	3
GEOG 149B	Course Not Available	3
GEOG 157	Decolonizing Nature: Race, Empire and the Environment	4
MEC ENG 146	Energy Conversion Principles	3
UGBA 192P	Sustainable Business Consulting Projects	3
UGBA C192R	Business, Sustainability, and Society (Also offered as ENE,RES C192)	3
UGBA 193B	Energy & Civilization	4

Summer Minor and Certificate in Sustainability

Whatever direction your studies take you, the Summer Minor or Certificate in Sustainability will equip you with tools to tackle some of the most pressing issues facing the world today.

The summer minor and certificate program in sustainability is open to matriculated UC Berkeley undergraduates and visiting summer-only students. Upon completion, UC Berkeley undergraduates receive a Minor in Sustainability; summer-only students receive a Certificate in Sustainability from UC Berkeley. More information can be found here (https://erg.berkeley.edu/academics/sustainability/).

CURRICULUM:

The Sustainability Minor or Certificate focuses on environmental sustainability. Students gain an understanding of the social science and history of environmental thought and movements; the science, engineering, policy, and economics of environmental change; renewable energy; biodiversity and environmental degradation; the business and economics of sustainability, and environmental justice.

Scholarship funds are available to eligible UC Berkeley students who complete the Summer Minor in Sustainability. (https://erg.berkeley.edu/academics/sustainability/) To maintain eligibility for the scholarship, a student may take no more than one of the required courses during a fall or spring semester.

A minimum of 15 units of coursework is required, which can be completed during one or two summers. Students must complete either Energy and Society ENE,RES W100 / ENE,RES C100 or Climate Change Economics ENE,RES C176 in addition to choosing electives from the list of approved courses below.

UC Berkeley undergraduates may elect to take either Energy and Society ENE,RES C100 or Climate Change Economics ENE,RES C176 during the summer or the fall terms.

All other elective courses will be offered during the summer only and are unique to summer. The courses Energy and Society and Water and Sanitation Justice are offered in a web-based format during the summer and can be taken remotely.

All courses taken for the minor must be taken for a Letter Grade (C- or better), with the exception of courses taken in Fall 2020 and Summer 2021 when courses could be taken for Pass/ No Pass.

Core Course (select one)

ENE,RES C100	Energy and Society	4
ENE,RES W100	Energy and Society	4
ENE,RES C200	Energy and Society	4
ENE,RES W200	Energy and Society	4
ENE,RES C176	Climate Change Economics	4

Electives (select four)

Please consult with the Minor Advisor for a complete list of currently available and approved electives.

ENE,RES W100	Energy and Society	4
ENE,RES 101	Ecology and Society	3
ENE,RES 170	Environmental Classics	3
ENE,RES 171	California Water	3
ENE,RES 174W	Water and Sanitation Justice	3
ENE,RES C176	Climate Change Economics	4
ENE,RES C192	Business, Sustainability, and Society	3

Energy and Resources

ENE,RES 24 Freshman Seminar 1 Unit

Terms offered: Fall 2015, Spring 2012, Spring 2011
The Freshman Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Freshman Seminars are offered in all campus departments, and topics may vary from department to department and semester to semester.
Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final Exam To be decided by the instructor when the class is offered.

ENE,RES 39A Freshman and Sophomore Seminar: Complex Systems, Information Theory, and Big Data 2 Units

Terms offered: Fall 2016
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.
Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final Exam To be decided by the instructor when the class is offered.

Instructor: John Harte

ENE,RES 98 Directed Group Study for Lower Division Students 1 - 4 Units

Terms offered: Fall 2017, Fall 2016, Spring 2016
Lectures and small group discussions focusing on topics of interest that vary from semester to semester.
Rules & Requirements

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit under special circumstances: Course may be repeated with consent of department.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

ENE,RES 99 Supervised Independent Studies for Freshmen and Sophomores 1 - 4 Units

Terms offered: Spring 2023, Spring 2022, Fall 2021
Supervised research on specific topics related to energy and resources.
Rules & Requirements

Prerequisites: Consent of faculty adviser directing research; lower division standing (3.3 GPA or better)

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

ENE,RES C100 Energy and Society 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Energy sources, uses, and impacts: an introduction to the technology, politics, economics, and environmental effects of energy in contemporary society. Energy and well-being; energy in international perspective, origins, and character of energy crisis.
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer:
8 weeks - 6 hours of lecture and 1.5 hours of discussion per week
10 weeks - 6 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Kammen

Also listed as: PUB POL C184

ENE,RES W100 Energy and Society 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
Energy sources, uses, and impacts: an introduction to the technology, politics, economics, and environmental effects of energy in contemporary society. Energy and well-being; energy in international perspective, origins, and character of energy crisis.
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of web-based lecture and 1 hour of web-based discussion per week

Summer: 8 weeks - 6 hours of web-based lecture and 1.5 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Kammen

Also listed as: PUB POL W184

ENE,RES 101 Ecology and Society 3 Units

Terms offered: Summer 2025 Second 6 Week Session, Summer 2024 Second 6 Week Session, Summer 2023 8 Week Session
This course introduces students to the many ways in which our lives are intertwined with the ecosystems around us. Topics will include ecological limits to growth, climate change and other threats to biodiversity, the value of ecosystem goods and services, the ecology of disease, ecotoxicology, the evolution of cooperation in ecosystems, industrial ecology, and the epistemology of ecology.
Rules & Requirements

Prerequisites: One college level course, or high school Advanced Placement, in either physics or biology; introductory calculus

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer:
6 weeks - 7.5 hours of lecture per week
8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: TBA

ENE,RES 102 Quantitative Aspects of Global Environmental Problems 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Human disruption of biogeochemical and hydrological cycles; causes and consequences of climate change and acid deposition; transport and health impacts of pollutants; loss of species; radioactivity in the environment; and quantitative models to understand these environmental problems.

Objectives & Outcomes

Course Objectives: Application of basic principles of natural science to the analysis of human influence on environmental conditions and processes at continental to global scale. Topics covered include dimensions of the physical world and of human modifications of it; techniques of estimation and back of the envelope calculation; box models of environmental stocks and flows: equilibrium and feedback; chemical equilibria in the environment; nutrient cycles and their disruptions; acid deposition and its consequences; climate change and its consequences; stratospheric ozone depletion; sources, fate and effects of toxic substances in the global environment; radioactivity and radiation; macroecology; carrying capacity and human population growth; biodiversity and its diminution; epidemics.

Student Learning Outcomes: Students will also have gained insight into the multi-disciplinary nature of environmental science, having used physical, chemical, and biological principles to create and solve analytical models.
Students will be familiar with and able to apply a diverse set of quantitative tools for understanding and analyzing environmental problems.

Rules & Requirements

Prerequisites: Upper division standing; calculus (Mathematics 1A-1B or 16A-16B); Physics (7A-7B or 8A-8B), Chemistry (1A or 4A), Biology (1B), or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Kueppers

ENE,RES C124 Gender and Environment 4 Units

Terms offered: Spring 2025, Spring 2024, Fall 2023, Spring 2023
This course examines the centrality of gender and intersectionality in understanding nature-society relations across time and space. During the first half of the semester, students will become familiar with key feminist theoretical approaches to studying environmental problems, including ecofeminism, feminist environmentalism, feminist critiques of science, feminist political ecology, and queer and more-than-human ecologies. In the remainder of the semester, students will apply the theories learned to explore contemporary feminist environmental movements and analyze key topics, such as resource politics, pollution and toxins, environmental and reproductive justice, climate change, and the ethics of care.

Objectives & Outcomes

Student Learning Outcomes: Upon taking this course, students will be able to: 1) explain different approaches to theorizing the gender-environment nexus; and 2) apply theoretical and conceptual tools to engage with, reflect on, and critique contemporary local and global environmental issues from an intersectional feminist perspective.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

Instructor: Chung

Also listed as: ESPM C124

ENE,RES 131 Data, Environment and Society 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
This course will teach students to build, estimate and interpret models that describe phenomena in the broad area of energy and environmental decision-making. Students leave the course as both critical consumers and responsible producers of data-driven analysis. The effort will be divided between (i) learning a suite of data-driven modeling and prediction tools (including linear model selection methods, classification and regression trees and support vector machines) (ii) building programming and computing expertise and (iii) developing capacity to formulate and answer resource allocation questions within energy and environment contexts.

Rules & Requirements

Prerequisites: Required: Foundations of Data Science (Computer Science C8/Information Systems C8/ Statistics C8) and high school or college calculus Recommended: An introductory computer programming course (Computer Science 61A or Computer Science 88) and Linear Algebra (Mathematics 54, Electrical Engineering and Computer Science 16A, or Statistics 89A)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Callaway

ENE,RES 140 Environmental Justice and Economics 4 Units

Terms offered: Spring 2025
This course covers: one, economic frameworks for understanding environmental justice, and
two, empirical approaches for evaluating environmental justice outcomes. This course emphasizes empirical applications and the assignments involve working with data and evaluating data sources and metadata.

Objectives & Outcomes

Course Objectives: Gain experience working with administrative and observational data

Understand how data sources can be used to evaluate outcomes relevant for environmental justice

Use frameworks from economics to evaluate determinants of environmental inequality

Use tools in statistics to compute environmental justice related metrics from data

Rules & Requirements

Prerequisites: Background in statistics (STAT), data science (DATA) or economics (ECON) is helpful but not required

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Weber

ENE,RES C160 CLIMATE JUSTICE 4 Units

Terms offered: Fall 2023, Fall 2022
Climate change is transforming our world in ways we are only beginning to understand, and in many ways we cannot yet imagine. The emerging theoretical and practical lenses of social and environmental justice (EJ) provide tools with which to examine and understand this new world. Using literature, media, and engaged field experiences, this course brings together the scholarship, scientific and engineering innovation, policy, literature and media, and activism around the interacting themes of climate change and social justice.

Rules & Requirements

Credit Restrictions: Students will receive no credit for ENE,RES C160 after completing ENE,RES 160, or ARCH 153. A deficient grade in ENE,RES C160 may be removed by taking ENE,RES 160, or ARCH 153.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Mills-Novoa

Also listed as: ESPM C176

ENE,RES 170 Environmental Classics 3 Units

Terms offered: Summer 2025 Second 6 Week Session, Summer 2023 8 Week Session, Summer 2022 8 Week Session
What is the history and evolution of environmental thinking and writing in the USA? How have certain 'environmental classics' shaped the way in which we think about nature, society and progress? Why did these become 'classics' and why/how did they influence environmental thought and policy? What is their relevance today? This course includes substantial reading assignments.

Objectives & Outcomes

Course Objectives: This course will use a selection of books and papers from the last 6 decades that have had a profound impact on academic and wider public thinking -- primarily in the USA -- about the environment and society to probe these issues. In class, we will situate the key reading in its historical context and discuss its contributions, critiques and consequences. Through these classics the class will explore: the evolution of environmental thought; the connections between environment, perception and policy; and the links between scientific thought and public perception.

Hours & Format

Summer:
6 weeks - 7.5 hours of seminar per week
8 weeks - 4 hours of seminar per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

ENE,RES 171 California Water 3 Units

Terms offered: Summer 2025 First 6 Week Session, Summer 2024 First 6 Week Session, Summer 2023 First 6 Week Session
The story of water development in California provides compelling examples of water politics, the social and environmental consequences of redistributing water, and the relationships between water uses, energy, and climate.This course provides the historical, scientific, legal, institutional, and economic background needed to understand the social and ecological challenges of providing water for California's growing population, agricultural economy, and other uses - all of which are made more complex by climate change.

Objectives & Outcomes

Course Objectives: Students will grasp the historical, scientific, legal, institutional, and economic background needed to understand the social and ecological challenges of providing water for California's growing population, agricultural economy, and other uses - all of which are made more complex by climate change.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer:
6 weeks - 6 hours of lecture per week
8 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

ENE,RES 174W Water and Sanitation Justice 3 Units

Terms offered: Summer 2025 First 6 Week Session, Summer 2024 First 6 Week Session

This course will explore the many manifestations of water and sanitation justice and injustice on interlocking scales (i.e. local, national, transnational) while illustrating analytical ideas connecting to a range of social processes including claims for human rights, deprivation and exclusion, urbanization and infrastructure development, and privatization of land and water. We will look at various case studies in high-income and low-income countries and use key technical and social concepts to examine rights, equity, and justice with respect to water and sanitation. This course partially satisfies requirements for the ERG Summer Minor/ Certificate in Sustainability.

Objectives & Outcomes

Course Objectives: This course will acquaint you with theoretical and practical knowledge about water and sanitation justice.

Student Learning Outcomes: Analyze water and sanitation through a variety of disciplinary perspectives: Arts, Engineering, Humanities, and in the social sciences of Sociology, Geography, Environmental Studies, Politics, Economics, Anthropology
Compare issues at local to global scales
Explain key issues of water and sanitation justice
Explain water and sanitation policy and governance historical examples, locally and globally
Identify factors influencing water and sanitation justice and injustice
Seriously consider strategies for addressing water and sanitation injustice
Understand impacts of water and sanitation injustice on quality of life

Rules & Requirements

Credit Restrictions: Students will receive no credit for ENE,RES W174 after completing ENE,RES 174. A deficient grade in ENE,RES W174 may be removed by taking ENE,RES 174.

Hours & Format

Summer:
6 weeks - 3.5 hours of lecture and 8 hours of discussion per week
8 weeks - 2.5 hours of lecture and 6 hours of discussion per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Ray

Formerly known as: Energy and Resources Group W174

ENE,RES 175 Water and Development 4 Units

Terms offered: Spring 2016, Spring 2014, Spring 2013

This course introduces students to water policy in developing countries. It is a course motivated by the fact that over one billion people in developing countries have no access to safe drinking water, three billion do not have sanitation facilities, and many millions of small farmers do not have reliable water supplies to ensure a healthy crop. Readings and discussions will cover: the problems of water access and use in developing countries; the potential for technological, social, and economic solutions to these problems; the role of institutions in access to water and sanitation; and the pitfalls of the assumptions behind some of today's popular "solutions."

Rules & Requirements

Prerequisites: Upper division standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: ERG Faculty

ENE,RES C176 Climate Change Economics 4 Units

Terms offered: Fall 2025, Summer 2025 Second 6 Week Session, Fall 2024

This course is a self-contained introduction to the economics of climate change. Climate change is caused by a large variety of economic activities, and many of its impacts will have economic consequences. Economists have studied climate change for more than two decades, and economic arguments are often powerful in policy decisions. The course will familiarize students with these arguments and equip them with the tools to participate in discussions of climate change policy through an economic lens.

Objectives & Outcomes

Course Objectives: The course will start with a brief review of the science of climate change, discuss scenarios of economic growth and the greenhouse gas emissions caused by economic activities and investigate various emission reduction opportunities and their economic costs. A significant amount of time will be spent on studying the impacts of climate change, their economic evaluation and how adaptation can lower the costs of climate damages.

We will then study various theoretical frameworks economists have developed that answer the question how estimates about the costs and benefits of climate policy can be combined to find “good” climate policies. We then study three more specialized topics that turn out to be of great importance when analyzing climate change policy: first, how do we compare costs and benefits of generations that live many centuries apart? Second, how do we design climate policy when our projections of both the costs and the benefits of climate policy are highly uncertain? And third, how can equity considerations be accounted for in an economic assessment of climate change policy? The course will close with a look at international cooperation on climate policy and why it has been so difficult to agree on effective treatises that implement climate change policy.

Student Learning Outcomes: Students will also have gained insight into the practical aspects of modeling the economics of climate change by building a simple integrated assessment model in Excel. They will be able to use that model to do simple analysis of climate change policy themselves.

Students will be familiar with the tools economists use to analyze climate change policy. They will have studied empirical estimates of the costs and benefits of climate policy and have an understanding of the analytical issues that drive research on the economics of climate change.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer:
6 weeks - 9 hours of lecture and 6 hours of laboratory per week
8 weeks - 6 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Anthoff

Also listed as: ENVECON C176/IAS C176

ENE,RES 180 Ecological Economics in Historical Context 3 Units

Terms offered: Fall 2016

Economists through history have explored economic and environmental interactions, physical limits to growth, what constitutes the good life, and how economic justice can be assured. Yet economists continue to use measures and models that simplify these issues and promote bad outcomes. Ecological economics responds to this tension between the desire for simplicity and the multiple perspectives needed to understand complexity in order to move toward sustainable, fulfilling, and just economies.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer:
6 weeks - 7.5 hours of lecture per week
8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

ENE,RES 190 Seminar in Energy and Resources Issues 3 Units

Terms offered: Summer 2020 8 Week Session, Spring 2019, Summer 2018 Second 6 Week Session

Critical, cross disciplinary analysis of specific issues or general problems of how people interact with environmental and resource systems. More than one section may be given each semester on different topics depending on faculty and student interest.

Rules & Requirements

Prerequisites: Upper division standing and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of lecture per week

Summer:
6 weeks - 7.5 hours of lecture per week
8 weeks - 2-6 hours of lecture per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

ENE,RES 190B Energy and Environmental Issues 4 Units

Terms offered: Spring 2022, Spring 2021
Critical, data-driven analysis of specific issues or general problems of how people interact with environmental and resource systems. This course will teach students to build, estimate and interpret models that describe phenomena in the broad area of energy and environmental decision-making. More than one section may be given each semester on different topics depending on faculty and student interest.
Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes. Students may enroll in multiple sections of this course within the same semester.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

ENE,RES 190C Energy and Environmental Issues 4 Units

Terms offered: Fall 2020, Fall 2018
Critical, data-driven analysis of specific issues or general problems of how people interact with environmental and resource systems. This course will teach students to build, estimate and interpret models that describe phenomena in the broad area of energy and environmental decision-making. More than one section may be given each semester on different topics depending on faculty and student interest.
Rules & Requirements

Prerequisites: 1. Foundations of Comp Sci: COMPSCI C8 or STAT C8 or INFO C8: Foundations of Data Science 2. Computing: COMPSCI 61A: The Structure and Interpretation of Computer Programs or COMPSCI 88: Computational Structures in Data Science 3. Math: MATH 54: Linear Algebra and Differential Equations or ELENG 16A: Designing Information Devices and Systems I or STAT 89A: Linear Algebra for Data Science

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

ENE,RES C192 Business, Sustainability, and Society 3 Units

Terms offered: Summer 2025 Second 6 Week Session, Summer 2024 Second 6 Week Session, Summer 2022 8 Week Session, Summer 2021 8 Week Session
As corporations have grown in influence, concerns over their impact on people and the planet have also grown, pushing sustainability, corporate social responsibility, and the wider impact of business into the spotlight. This course focuses on business ethics, supply chains, resource constraints, labor issues, innovation, and environmental externalities, as well as the internal challenges, competitive pressures, external stakeholders, and other issues that businesses must consider while trying to act responsibly.
Hours & Format

Summer:
6 weeks - 7.5 hours of lecture per week
8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Letter grade. Final exam required, with common exam group.

Instructor: Rochlin

Also listed as: UGBA C192R

ENE,RES 198 Directed Group Studies for Advanced Undergraduates 1 - 4 Units

Terms offered: Spring 2025, Fall 2020, Fall 2019
Group studies of selected topics.
Rules & Requirements

Prerequisites: Upper division standing, plus particular courses to be specified by instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

ENE,RES 199 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Fall 2025, Fall 2024, Spring 2024
Individual conferences.

Rules & Requirements

Prerequisites: Enrollment restricted by regulations in General Catalog

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer: 8 weeks - 1.5-15 hours of independent study per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

ENE,RES 199S Sponsored Projects for Undergraduate Research (SPUR) 1 - 4 Units

Terms offered: Prior to 2007
The Sponsored Projects for Undergraduate Research (SPUR) program helps students get involved in research projects with world renowned faculty and staff researchers in the Rausser College of Natural Resource

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3-12 hours of independent study per week

Summer: 12 weeks - 5-18 hours of independent study per week

Additional Details

Subject/Course Level: Energy and Resources Group/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Alternative to final exam.