



ER Credit 6: Sustainability-Focused Courses

Total Stanford Courses Offered, 2010-2011: 8,646

Sustainability-Focused Courses: 173

List of Sustainability-Focused Courses:

AA 116N: Electric Automobiles and Aircraft (EE 25Q)

Transportation accounts for nearly one-third of American energy use and greenhouse gas emissions and three-quarters of American oil consumption. It has crucial impacts on climate change, air pollution, resource depletion, and national security. Students wishing to address these issues will need to reconsider how we move, finding sustainable transportation solutions. This course will provide an introduction to the issue, covering the past and present of transportation and its impacts; examining alternative fuel proposals; and digging deeper into the most promising option: battery electric vehicles. Energy requirements of air, ground, and maritime transportation; des... [more description for AA 116N »](#)

Terms: Win | **Units:** 3 | **UG Reqs:** GER:DBEngrAppSci | **Grading:** Letter (ABCD/NP)

AFRICAAM 110: "The Environment" In Context: Race, Ethnicity, and Environmental Conceptions (CSRE 110, EARTHSYS 110, HUMBIO 118R, PSYCH 136)

Interrogate marginalized and dominant conceptions of land, nature, wilderness, and environment in U.S. American society, through the lens of race and ethnicity. Explore historical/current events and social policies shaping and revealing the way varied U.S. racial and ethnic groups conceive of the environment and their relationship to it. Understand how marginalizing some of these perspectives and peoples contributes to disparities in access to healthy environments and why this matters. Theorize about how best to achieve environmental justice and sustainability considering these diverse perspectives and experiences. Interdisciplinary. Weekly lecture series, with weekly dis... [more description for AFRICAAM 110 »](#)

Terms: Win | **Units:** 1-3 | **Grading:** Letter or Credit/No Credit

AFRICAAM 204F: The Modern Tradition of Non-Violent Resistance (CSRE 104F, HISTORY 204F)

During the twentieth century, peasants and menial laborers who comprised the majority of humanity launched liberation movements to secure citizenship rights. Mohandas K. Gandhi, Martin Luther King, Jr., and Nelson

Mandela are among the leaders whose ideas continue to influence contemporary movements for global peace with social justice in a sustainable environment.

Terms: Aut | Units: 5 | Grading: Letter (ABCD/NP)

AMSTUD 130: Introduction to Environmental Humanities: Cultures of Nature in the American West (MTL 130)

What do we mean when we use the terms "nature" and "culture"? This course examines these two complex ideas in the context of the nineteenth, twentieth, and twenty-first century American West. Topics include Los Angeles as a lived space and its place in the national spatial imaginary, urban environmental movements, mining cultures, toxics legacies, geographies of social difference, animal studies, and biodiversity and Native American DNA databases. The approach is interdisciplinary, and includes environmental history, cultural geography, critical race studies, literature, and documentary film methodologies and texts.

Terms: Spr | Units: 3-5 | UG Reqs: GER:DBHum | Grading: Letter or Credit/No Credit

ANTHRO 1: Introduction to Cultural and Social Anthropology (ANTHRO 201)

Crosscultural anthropological perspectives on human behavior, including cultural transmission, social organization, sex and gender, culture change, technology, war, ritual, and related topics. Case studies illustrating the principles of the cultural process. Films.

Terms: Win, Sum | Units: 5 | UG Reqs: GER:DBSocSci, GER:ECGlobalCom | Grading: Letter (ABCD/NP)

ANTHRO 115A: Environmental Crises and State Collapse: Lessons from the Past (HUMBIO 115)

The effects and consequences of long-term human interaction with the environment. How and why past societies adapted, or failed to adapt, to changing environmental conditions and relevance to current environmental problems. Demographic, archaeological, and environmental data assessed using case studies from around the world since the late Pleistocene. Development of agriculture, societal collapse, sustainability, and policy response. Prerequisite: Human Biology core or equivalent or consent of instructor.

Terms: Aut | Units: 3 | Grading: Letter or Credit/No Credit

ANTHRO 117A: Conservation Medicine in Practice (HUMBIO 117)

Examination of the interconnectedness of the environment and human and animal health. Investigation of the 'One World-One Health' paradigm, by examining issues such as climate change and human health, ecological perturbation and infectious diseases, and the importance of new conceptual approaches to combat disease emergence and spread. Seminars, from experts working in government, NGOs, public health, medicine and

academia, will emphasize the importance of inter-disciplinary approaches (medicine, epidemiology, anthropology, ecology, environmental science) in understanding health scenarios, and also upon the importance of using science and policy to improve public health.

Terms: Spr | **Units:** 4 | **Grading:** Letter or Credit/No Credit

ANTHRO 118: Heritage, Environment, and Sovereignty in Hawaii (EARTHSYS 118)

This course explores the cultural, political economic, and environmental status of contemporary Hawaiians. What sorts of sustainable economic and environmental systems did Hawaiians use in prehistory? How was colonization of the Hawaiian Islands informed and shaped by American economic interests and the nascent imperialism of the early 20th century? How was sovereignty and Native Hawaiian identity been shaped by these forces? How has tourism and the leisure industry affected the natural environment? This course uses archaeological methods, ethnohistorical sources, and historical analysis in an exploration of contemporary Hawaiian social economic and political life.

Terms: Aut | **Units:** 4 | **Grading:** Letter (ABCD/NP)

ANTHRO 147: Nature, Culture, Heritage (ANTHRO 247)

Seminar. Shared histories of natural and cultural heritage and their subsequent trajectories into the present. How thought about archaeological sites and natural landscapes have undergone transformations due to factors including indigenous rights, green politics, and international tourism. The development of key ideas including conservation, wilderness, sustainability, indigenous knowledge, non-renewability and diversity. Case studies draw on cultural and natural sites from Africa, the Americas and Australia.

Terms: Win | **Units:** 5 | **Grading:** Letter (ABCD/NP)

ANTHRO 162: Indigenous Peoples and Environmental Problems (ANTHRO 262)

The social and cultural consequences of contemporary environmental problems. The impact of market economies, development efforts, and conservation projects on indigenous peoples, emphasizing Latin America. The role of indigenous grass roots organizations in combating environmental destruction and degradation of homeland areas.

Terms: Spr | **Units:** 3-5 | **UG Reqs:** GER:DBHum, GER:ECGlobalCom | **Grading:** Letter (ABCD/NP)

ANTHRO 166: Political Ecology of Tropical Land Use: Conservation, Natural Resource Extraction, and Agribusiness (ANTHRO 266)

Seminar. The state, private sector, development agencies, and NGOs in development and conservation of tropical land use. Focus is on the socioeconomic and political drivers of resource extraction and agricultural production. Case studies used to examine the local-to-global context from many disciplines. Are maps and analyses used for gain, visibility, accountability, or contested terrain? How are power dynamics, land use history, state-private

sector collusion, and neoliberal policies valued? What are the local and extra-local responses?

Terms: Win | Units: 3 | Grading: Satisfactory/No Credit

ANTHRO 168A: Risky Environments: The Nature of Disaster (ANTHRO 268A)

This seminar explores topics including environmental movements and countercultures, human agency and geoengineering ecotourism, and indigenous perspectives of changing climates to query how humans view nature in terms of stability, instability, risk and disaster in the 21st century. Case studies draw upon a broad range of geographical regions including the Arctic, Iceland, Australia, and the Americas. Discussions will draw upon film portrayals and interviews with researchers in addition to readings.

Terms: Win | Units: 5 | Grading: Letter (ABCD/NP)

ANTHRO 169A: New Citizenship: Grassroots Movements for Social Justice in the U.S. (CHICANST 168, CSRE 168, FEMST 140H)

Focus is on the contributions of immigrants and communities of color to the meaning of citizenship in the U.S. Citizenship, more than only a legal status, is a dynamic cultural field in which people claim equal rights while demanding respect for differences. Academic studies of citizenship examined in dialogue with the theory and practice of activists and movements. Engagement with immigrant organizing and community-based research is a central emphasis.

Terms: Win | Units: 5 | Grading: Letter (ABCD/NP)

ANTHRO 173: Human Dimensions of Global Environmental Change: Resilience, Vulnerability, and Environmental Justice (HUMBIO 111)

The complexity of social and political issues surrounding global environmental change. Emphasis is on synergies precipitated by human-induced climatic change. Case studies and scenarios to explore the vulnerability and resilience in households, communities, regions, and nationstates most affected by extreme weather conditions. Their concerns, livelihood changes, and diverse responses of rural smallholders, indigenous communities, the state, and local and regional migrants. Central theme is environmental justice.

Terms: Spr | Units: 3 | Grading: Letter (ABCD/NP)

ANTHRO 177: Environmental Change and Emerging Infectious Diseases (ANTHRO 277, HUMBIO 114)

The changing epidemiological environment. How human-induced environmental changes, such as global warming, deforestation and land-use conversion, urbanization, international commerce, and human migration, are altering the ecology of infectious disease transmission, and promoting their re-emergence as a global public health threat.

Case studies of malaria, cholera, hantavirus, plague, and HIV.

Terms: Aut | Units: 3-5 | UG Reqs: GER:DBSocSci | Grading: Letter or Credit/No Credit

ANTHRO 18: Peopling of the Globe: Changing Patterns of Land Use and Consumption Over the Last 50,000 Years (ARCHLGY 12, EARTHSYS 21)

Fossil, genetic and archaeological evidence suggest that modern humans began to disperse out of Africa about 50,000 years ago. Subsequently, humans have colonized every major landmass on earth. This class introduces students to the data and issues regarding human dispersal, migration and colonization of continents and islands around the world. We explore problems related to the timing and cause of colonizing events, and investigate questions about changing patterns of land use, demography and consumption. Students are introduced to critical relationships between prehistoric population changes and our contemporary environmental crisis.

Terms: Aut | Units: 3-5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

ANTHRO 302: Theory and History of Evolution and Ecology

Evolutionary and ecological theory from the 19th century to present. Theory and concepts from evolution and ecology, emphasizing an-thropological applications. Evolutionary theories of human behavior, culture, and societies. Ecological theory behind carrying capacity, sustainable yield, and population growth. Emphasis is on tools of analysis and formulating research questions in anthropology today. Upper division undergrads require consent of instructor.

Terms: Win | Units: 5 | Grading: Letter (ABCD/NP)

ANTHRO 305: Research Methods in Ecological Anthropology

The course prepare students for the methodological and practical aspects of doing ecologically oriented, quantitative anthropological field research. The primary goal is to explore what it means to ask anthropological questions in a systematic way. We will focus on understanding what can constitute an interesting question, how to frame a question in way that facilitates investigation, and how to design methods to begin investigating a question. In turn, the course will provide a format to refine research projects in preparation for doing more extensive fieldwork.

Terms: Aut | Units: 5 | Grading: Letter or Credit/No Credit

ANTHRO 31: Ecology, Evolution, and Human Health (ANTHRO 331A)

Ecology, Evolution, and Human Health Human ecology, environments, adaptation and plasticity, and their relationship to health and well-being considered in the broad comparative context. Topics include human population history, subsistence ecology, demography, reproductive decision making, urbanization, migration, infectious disease, the physiology of stress and the inflammatory response, social capital and social networks,

nutrition, nutritional deficiencies, growth, and social inequalities. No prior course work in ecological or medical anthropology required.

Terms: Spr | Units: 3-5 | UG Reqs: GER:DBSocSci, GER:ECGlobalCom | Grading: Letter or Credit/No Credit

ANTHRO 338A: Biohumanities: Continental Philosophy and the Human and Social Sciences (FRENGEN 338)

This course will consider theoretical topics that arose in post-war continental philosophy (for example, Deleuze's ontology, Foucault's biopolitics, and Latour's collective of humans and non-humans) and which have served as a basis for recent attempts to reconcile the human and social sciences with the natural sciences around so-called 'big picture questions' (ecological crisis, biotechnological progress) and around such bridging concepts as human and non-human agency, assemblage, emergence, force, habitus and mimicry. Focusing on case studies drawn from archaeology, anthropology, history, literature, film and bio-art, the course will try to indicate what sort of topics, ... [more description for ANTHRO 338A >](#)

Terms: Spr | Units: 5 | Grading: Letter (ABCD/NP)

ANTHRO 364: EcoGroup: Current Topics in Ecological, Evolutionary, and Environmental Anthropology

Seminar; restricted to graduate students. Topics vary with instructor. How to ask appropriate questions, how to derive research hypotheses from theory, how to design methodologies for testing hypotheses, and how to present results by reading and critiquing key contemporary papers in the field. Ph.D. students enrolling in this course to fulfill the department review course requirement must enroll in 5 units. Graduate students enrolling in this course to participate in a topical forum may enroll in 2 units. Course may be repeated for 2 units. Prerequisites: by consent of instructor.

Terms: Aut | Units: 5 | Repeatable for credit | Grading: Letter (ABCD/NP)

ANTHRO 364A: EcoGroup: Current Topics in Ecological, Evolutionary, and Environmental Anthropology Workshop

Seminar; restricted to graduate students. Topics vary with instructor. How to ask appropriate questions, how to derive research hypotheses from theory, how to design methodologies for testing hypotheses, and how to present results by reading and critiquing key contemporary papers in the field. Ph.D. students enrolling in this course to fulfill the department review course requirement must enroll in 5 units. Graduate students enrolling in this course to participate in a topical forum may enroll in 2 units. Course may be repeated for 2 units. Prerequisites: by consent of instructor.

Terms: Aut | Units: 2-4 | Grading: Letter or Credit/No Credit

ANTHRO 90C: Theory of Ecological and Environmental Anthropology (HUMBIO 118)

Dynamics of culturally inherited human behavior and its relationship to social and physical environments. Topics include a history of ecological approaches in anthropology, subsistence ecology, sharing, risk management, territoriality, warfare, and resource conservation and management. Case studies from Australia, Melanesia, Africa, and S. America.

Terms: Win | **Units:** 5 | **UG Reqs:** GER:DBSocSci | **Grading:** Letter or Credit/No Credit

APPPHYS 219: Solid State Physics and the Energy Challenge

Technology issues for a secure energy future; role of solid state physics in energy technologies. Topics include the physics principles behind future technologies related to solar energy and solar cells, solid state lighting, superconductivity, solid state fuel cells and batteries, electrical energy storage, materials under extreme condition, nanomaterials.

Terms: Win, alternate years, not given next year | **Units:** 3 | **Grading:** Letter or Credit/No Credit

APPPHYS 79N: Energy Options for the 21st Century

Preference to freshmen. Choices for meeting the future energy needs of the U.S. and the world. Basic physics of energy sources, technologies that might be employed, and related public policy issues. Trade-offs and societal impacts of different energy sources. Policy options for making rational choices for a sustainable world energy economy.

Terms: Aut | **Units:** 3 | **UG Reqs:** GER:DBEngrAppSci | **Grading:** Letter or Credit/No Credit

ARCHLGY 119: ENVIRONMENTAL ARCHAEOLOGY

This course has two main objectives: first, to introduce undergraduates to methods of environmental archaeology; second, to review some key cases of past human actions affecting the environment and of human responses to environmental change. The course reviews the main methods of paleoclimatic reconstruction, soil analysis and geomorphology, archaeobotany and zooarchaeology. In terms of the discussion of key cases, the course emphasizes both human actions affecting the environment and human responses to environmental change.

Terms: Win | **Units:** 5 | **Grading:** Letter or Credit/No Credit

ARTHIST 431: Landscape and Power

This seminar explores American landscape art from its origins in Hudson River School painting to the Land Art movement of the late twentieth century. Images of nature are read as narratives of individual and national identity. Topics include gender and the landscape; nation building and the frontier; politics and parks; the landscape as anti-art; poetry and the environment. Students will work with images from the superb collection of

American landscape art at the de Young Museum in Golden Gate Park.

Terms: Aut | Units: 5 | Grading: Letter (ABCD/NP)

ARTSTUDI 153: Ecology of Materials

Studio-based sculpture course. Materials used in sculpture and environmental concerns surrounding them. Artists concerned with environmental impact and the interconnection of art with other fields. The impact of material and technique upon form and content; understanding the physical and expressive possibilities of diverse materials. Conceptual and technical considerations. Group discussions, critiques, readings, video presentations, a field trip to a local artist-in-residence program, and visiting lecturers. (lower level)

Terms: Aut | Units: 4 | Grading: Letter or Credit/No Credit

BIO 101: Ecology

The principles of ecology. Topics: interactions of organisms with their environment, dynamics of populations, species interactions, structure and dynamics of ecological communities, biodiversity. Satisfies Central Menu Area 4. Prerequisite: 43, or consent of instructor. Recommended: statistics.

Terms: Aut | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIO 10SC: Natural History, Marine Biology, and Research

Monterey Bay is home to the nation's largest marine sanctuary and also home to Stanford's Hopkins Marine Station. This course, which is based at Hopkins, explores the spectacular biology of Monterey Bay and the artistic and political history of the region. The course focuses on issues of conservation, sanctuary, and stewardship of the oceans and coastal lands. We will meet with conservationists, filmmakers, artists, authors, environmentalists, politicians, land-use planners, and lawyers, as well as scientists and educators, to learn what is being done to appreciate, protect, and study the coastline and near-shore waters at local and national levels. We will take a look at... [more description for BIO 10SC »](#)

Terms: Aut | Units: 2 | Grading: Letter or Credit/No Credit

BIO 116: Ecology of the Hawaiian Islands (EARTHSYS 116)

Terrestrial and marine ecology and conservation biology of the Hawaiian Archipelago. Taught in the field in Hawaii as part of quarter-long sequence of courses including Earth Sciences and Anthropology. Topics include ecological succession, plant-soil interactions, conservation biology, biological invasions and ecosystem consequences, and coral reef ecology. Restricted to students accepted into the Earth Systems of Hawaii Program.

Terms: Aut, alternate years, not given next year | Units: 4 | UG Reqs: GER:DBNatSci | Grading: Letter

(ABCD/NP)

BIO 117: Biology and Global Change (EARTHSYS 111, EESS 111)

The biological causes and consequences of anthropogenic and natural changes in the atmosphere, oceans, and terrestrial and freshwater ecosystems. Topics: glacial cycles and marine circulation, greenhouse gases and climate change, tropical deforestation and species extinctions, and human population growth and resource use.

Prerequisite: Biology or Human Biology core or graduate standing.

Terms: Win | **Units:** 4 | **UG Reqs:** GER:DBNatSci | **Grading:** Letter or Credit/No Credit

BIO 125: Ecosystems of California

The diversity and functioning of California ecosystems through time and how human beings have impacted and managed them. Prerequisite: 43, HUMBIO 2A, or EARTHSYS 10.

Terms: Spr | **Units:** 3 | **UG Reqs:** GER:DBNatSci | **Grading:** Letter or Credit/No Credit

BIO 144: Conservation Biology (HUMBIO 112)

Principles and application of the science of preserving biological diversity. Topics: sources of endangerment of diversity; the Endangered Species Act; conservation concepts and techniques at the population, community, and landscape levels; reserve design and management; conflict mediation. 4 units if taken with a service learning component. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: BIO 101, or BIO 43 or HUMBIO 2A with consent of instructor.

Terms: Win | **Units:** 3-4 | **UG Reqs:** GER:DBNatSci | **Grading:** Letter or Credit/No Credit

BIO 322: Communication Challenges for Today's Thorniest Environmental Problems

The traditional scientific behavior of "deciding, announcing and then defending" has failed us. Review of common miss-steps in the communication of a conservation and environmental issues; four of today's thorniest issues: climate change, unsustainable use of water, declining ecosystem services, and over-fishing. For each problem, articulate "solutions"; examine who needs convincing and how to communicate solutions. Communication venues include web-materials, blogs, talks, written reports. Written report and oral presentation.

Terms: Win | **Units:** 1-3 | **Grading:** Letter or Credit/No Credit

BIO 33N: Conservation Science and Practice

Preference to freshmen. Interdisciplinary. The science and art of conservation today. The forces that are driving change in Earth's atmosphere, lands, waters, and variety of life forms. Which broad dimensions of the biosphere, and which elements of ecosystems, most merit protection? The prospects for, and challenges in, making

conservation economically attractive and commonplace. Field trip; project.

Terms: Spr | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

BIO 43: Plant Biology, Evolution, and Ecology

Principles of evolution: macro- and microevolution and population genetics. Ecology: the principles underlying the exchanges of mass and energy between organisms and their environments; population, community, and ecosystem ecology; populations, evolution, and global change. Equivalent to BIOHOPK 43. Prerequisites: CHEM 31X (or 31A,B), 33; MATH 19, 20, 21 or 41, 42. Recommended: CHEM 35.

Terms: Spr | Units: 5 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIOHOPK 163H: Oceanic Biology (BIOHOPK 263H)

(Graduate students register for 263H.) How the physics and chemistry of the oceanic environment affect marine plants and animals. Topics: seawater and ocean circulation, separation of light and nutrients in the two-layered ocean, oceanic food webs and trophic interactions, oceanic environments, biogeography, and global change. Lectures, discussion, and field trips. Satisfies Central Menu Area 4 for Bio majors. Recommended: PHYSICS 21 or 51, CHEM 31, Biology core, or consent of instructor.

Terms: Win | Units: 4 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIOHOPK 173H: Marine Conservation Biology (BIOHOPK 273H)

(Graduate students register for 273H.) The science of preserving marine diversity. Goal is to introduce students to major conservation issues associated with marine ecosystems. Topics include decline of open ocean fisheries, salmon conservation, bycatch issues in fisheries, use of marine reserves, marine invasions, marine pollution, and global warming. Includes five lecturers from other universities who specialize in marine conservation.

Terms: Spr | Units: 1-3 | Repeatable for credit | Grading: Letter or Credit/No Credit

BIOHOPK 182H: Stanford at Sea (BIOHOPK 323H, EARTHSYS 323, EESS 323)

(Graduate students register for 323H.) Five weeks of marine science including oceanography, marine physiology, policy, maritime studies, conservation, and nautical science at Hopkins Marine Station, followed by five weeks at sea aboard a sailing research vessel in the Pacific Ocean. Shore component comprised of three multidisciplinary courses meeting daily and continuing aboard ship. Students develop an independent research project plan while ashore, and carry out the research at sea. In collaboration with the Sea Education Association of Woods Hole, MA. Only 6 units may count towards the Biology major.

Terms: Spr, alternate years, not given next year | Units: 16 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

BIOHOPK 185H: Ecology and Conservation of Kelp Forest Communities (BIOHOPK 285H)

Eight week course. Daily lectures, labs, and scuba dives focused on kelp forest communities. Physical environment, identification, and natural history of resident organisms; ecological processes that maintain biodiversity and community organization; field methods, data analysis, and research diving techniques. Field research component contribute to ongoing studies associated with Hopkins Marine Life Observatory. Training meets requirements for Stanford scientific diver certification. Satisfies Central Menu Area 4 for Bio majors. Prerequisites: BIO 42 and 43, or BIO 42 and BIOHOPK 43, or consent of instructor; and advanced scuba certification and scuba equipment.

Terms: Sum | **Units:** 10-12 | **Grading:** Letter (ABCD/NP)

BIOHOPK 43: Plant Biology, Evolution, and Ecology

Introduction to biology in a marine context. Principles of plant biology: physiology, structure, diversity. Principles of evolution: macro and microevolution, population genetics. Ecology: the principles governing the distribution and abundance of organisms; population, community, and ecosystem ecology. Equivalent to BIO 43. Corequisite: BIOHOPK 44Y.

Terms: Spr | **Units:** 5 | **UG Reqs:** GER:DBNatSci | **Grading:** Letter or Credit/No Credit

CEE 100: Managing Sustainable Building Projects

Managing the life cycle of buildings from the owner, designer, and contractor perspectives emphasizing sustainability goals; methods to define, communicate, coordinate, and manage multidisciplinary project objectives including scope, quality, life cycle cost and value, schedule, safety, energy, and social concerns; roles, responsibilities, and risks for project participants; virtual design and construction methods for product, organization, and process modeling; lifecycle assessment methods; individual writing assignment related to a real world project.

Terms: Spr | **Units:** 4 | **UG Reqs:** GER:DBEngrAppSci | **Grading:** Letter (ABCD/NP)

CEE 109: Creating a Green Student Workforce to Help Implement Stanford's Sustainability Vision (EARTHSYS 109)

Examination of program-based local actions that promote resource resource conservation and an educational environment for sustainability. Examination of building-level actions that contribute to conservation, lower utility costs, and generate understanding of sustainability consistent with Stanford's commitment to sustainability as a core value. Overview of operational sustainability including energy, water, buildings, waste, and food systems. Practical training to enable students to become sustainability coordinators for their dorms or academic units.

Terms: Win | Units: 2 | Grading: Satisfactory/No Credit

CEE 115: Goals and Methods of Sustainable Building Projects (CEE 215)

(Graduate students register for 215.) Goals related to sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and economic and social sustainability. Methods to integrate these goals and enhance the economic, ecological, and equitable value of building projects. Industry and academic rating systems, project case studies, guest lecturers, and group project.

Terms: Spr | Units: 3 | Grading: Letter (ABCD/NP)

CEE 124: Sustainable Development Studio

(Graduate students register for 224A.) Project-based. Sustainable design, development, use and evolution of buildings; connections of building systems to broader resource systems. Areas include architecture, structure, materials, energy, water, air, landscape, and food. Projects use a cradle-to-cradle approach focusing on technical and biological nutrient cycles and information and knowledge generation and organization. May be repeated for credit.

Terms: Aut, Win, Spr | Units: 1-5 | Repeatable for credit | Grading: Letter or Credit/No Credit

CEE 129: Climate Change Adaptation for Seaports: Engineering and Policy for a Sustainable Future (CEE 229)

Interdisciplinary. Exploration of impacts of climate change on coastal ports and harbors around the world. The research team will utilize a broad range of tools to assess the engineering, construction, and policy responses necessary to protect ports and harbors from significant sea-level rise and storm surge. Collaborations with national and international experts. Consideration of economic, social and environmental implications. Independent and team projects will contribute to ongoing research. Guest speakers, case studies and field trips.

www.groupspaces.com/seaports2100. Recommended: CEE 129S/229S seminar series.

Terms: Aut, Win, Spr | Units: 3 | Repeatable for credit | Grading: Letter or Credit/No Credit

CEE 136: Green Architecture (CEE 236)

Preference to Architectural Design and CEE majors; others by consent of instructor. An architectural design studio exploring green design and green design processes. Initial sessions develop a working definition of sustainable design and strategies for greening the built environment in preparation for design studio work. Enrollment limited to 14. Prerequisites: 31 or 31Q, and 110 and 130.

Terms: Aut | Units: 4 | UG Reqs: GER:DBEngrAppSci | Grading: Letter (ABCD/NP)

CEE 142A: Negotiating Sustainable Development (CEE 242A, ENVRES 242)

How to be effective at achieving sustainability by learning the skills required to negotiate differences between stakeholders who advocate for their own interests. How ecological, social, and economic interests can be effectively balanced and managed. How to be effective actors in the sustainability movement, and use frameworks to solve complex, multiparty processes. Case study analysis of domestic and international issues. Students negotiate on behalf of different interest groups in a variety of arenas including energy, climate, land use, and the built environment. One Saturday all day field trip. No prerequisites.

Terms: Win | Units: 3 | Grading: Letter or Credit/No Credit

CEE 165C: Water Resources Management (CEE 265C)

Focus is on the basic principles of surface and ground water resources management in the context of water scarcity and hydrologic uncertainty. Topics include reservoir, river basin, and aquifer management, conjunctive use of surface and ground water, wastewater reuse, and demand management. Considers technical, economic, social, and political elements of water management. Open to undergraduates (juniors and seniors) as CEE 165C.

Terms: Sum | Units: 3 | Repeatable for credit | Grading: Letter or Credit/No Credit

CEE 171: Environmental Planning Methods

For juniors and seniors. Use of microeconomics and mathematical optimization theory in the design of environmental regulatory programs; tradeoffs between equity and efficiency in designing regulations; techniques for predicting adverse effects in environmental impact assessments; information disclosure requirements; and voluntary compliance of firms with international regulating norms. Prerequisites: MATH 51. Recommended: 70.

Terms: Win | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

CEE 172: Air Quality Management

Quantitative introduction to the engineering methods used to study and seek solutions to current air quality problems. Topics: global atmospheric changes, urban sources of air pollution, indoor air quality problems, design and efficiencies of pollution control devices, and engineering strategies for managing air quality. Prerequisites: 70, MATH 51.

Terms: Win | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

CEE 172P: Distributed Generation and Grid Integration of Renewables (CEE 272P)

Renewable generation technologies and their use in the electric power system. Conventional electricity generation systems and the historical development of renewables. Development and operation of the electric power system for high penetrations of renewables and demand side participation. Wind energy and wind farms. Design of wind

turbines. Photovoltaic systems (grid connected), micro-hydro and marine renewables (wave and tidal stream devices). Analysis of the electric power system and the integration of renewable energy generators.

Terms: Win | **Units:** 3-4 | **Grading:** Letter or Credit/No Credit

CEE 172S: Technology and business strategies to reduce greenhouse gas emissions (CEE 272S)

This course will introduce the main concepts of greenhouse gas (GHG) emissions measurement and management, and it will explore the main mitigation options for reducing emissions or sequestering carbon dioxide. It will address technical aspects of GHG mitigation via energy efficiency and demand-side management, energy in high-technology industry, distributed power and co-generation, the role of renewable energy in GHG management, carbon sequestration in forestry, agriculture, and geological formations. The course explores policy options, carbon trading and business strategies for GHG mitigation.

Terms: Spr | **Units:** 1-3 | **Grading:** Letter or Credit/No Credit

CEE 173A: Energy Resources (CEE 207A, EARTHSYS 103)

Comprehensive overview of fossil and renewable energy resources and energy efficiency. Topics covered for each resource: resource abundance, location, recovery, conversion, consumption, end-uses, environmental impacts, economics, policy, and technology. Applied lectures in specific energy sectors: buildings, transportation, the electricity industry, and energy in the developing world. Required field trips to local energy facilities. Optional discussion section for extra unit.

Terms: Aut | **Units:** 4-5 | **UG Reqs:** GER:DBEngrAppSci | **Grading:** Letter or Credit/No Credit

CEE 175A: California Coast: Science, Policy, and Law (CEE 275A, EARTHSYS 175, EARTHSYS 275)

Same as LAW 514. Interdisciplinary. The legal, science, and policy dimensions of managing California's coastal resources. Coastal land use and marine resource decision making. The physics, chemistry, and biology of the coastal zone, tools for exploring data from the coastal ocean, and the institutional framework that shapes public and private decision making. Field work: how experts from different disciplines work to resolve coastal policy questions. Primarily for graduate students; upper-level undergraduates may enroll with permission of instructor. Students will be expected to participate in at least three mandatory field trips.

Terms: Spr | **Units:** 3-4 | **Grading:** Letter or Credit/No Credit

CEE 176A: Energy Efficient Buildings

Analysis and design. Thermal analysis of building envelope, heating and cooling requirements, HVAC, and building

integrated PV systems. Emphasis is on residential passive solar design and solar water heating. Lab.

Terms: Win | Units: 3-4 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

CEE 176B: Electric Power: Renewables and Efficiency

Renewable and efficient electric power systems emphasizing analysis and sizing of photovoltaic arrays and wind turbines. Basic electric power generation, transmission and distribution, distributed generation, combined heat and power, fuel cells. End use demand, including lighting and motors. Lab.

Terms: Spr | Units: 3-4 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

CEE 177S: Design for a Sustainable World (CEE 277S)

Technology-based problems faced by developing communities worldwide. Student groups partner with organizations abroad to work on concept, feasibility, design, implementation, and evaluation phases of various projects. Past projects include a water and health initiative, a green school design, seismic safety, and medical device. Admission based on written application and interview. See <http://esw.stanford.edu> for application. (Staff)

Terms: Spr | Units: 1-5 | Repeatable for credit | Grading: Letter or Credit/No Credit

CEE 179C: Environmental Engineering Design

Application of engineering fundamentals including environmental engineering, hydrology, and engineering economy to a design problem. Enrollment limited; preference to seniors in Civil and Environmental Engineering.

Terms: Spr | Units: 5 | Grading: Letter (ABCD/NP)

CEE 226E: Advanced Topics in Integrated, Energy-Efficient Building Design

Innovative methods and systems for the integrated design and evaluation of energy efficient buildings. Guest practitioners and researchers in energy efficient buildings. Student initiated final project.

Terms: Spr | Units: 2 | Grading: Letter or Credit/No Credit

CEE 228C: Design and Construction for Sustainability in Extreme Environments

Course focuses on multi-disciplinary conceptual design of self-sustaining facilities in remote, extreme environments. Through this learn-by-doing course, students will apply an integrated sustainable design methodology for facility planning and operations. Research into environmental design criteria, opportunities, and constraints to logically guide facility form, shape, systems, and operational requirements. Additional independent study unit available for participation in process experiment. Guest lectures, discussion section, class project. Graduate only.

Terms: Spr | Units: 2 | Grading: Letter (ABCD/NP)

CEE 265A: Sustainable Water Resources Development

Alternative criteria for judging the sustainability of projects. Application of criteria to evaluate sustainability of water resources projects in several countries. Case studies illustrate the role of political, social, economic, and environmental factors in decision making. Influence of international aid agencies and NGOs on water projects. Evaluation of benefit-cost analysis and environmental impact assessment as techniques for enhancing the sustainability of future projects. Limited enrollment. Prerequisite: graduate standing in Environmental and Water Studies, or consent of instructor.

Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

CEE 273S: Chemical Transformation of Environmental Organic Compounds

This course provides an introduction to the chemistry of organic compounds focusing on chemical transformation and the application of this knowledge to understand and predict the fate of environmentally relevant organic chemicals. The course will cover fundamental rules that govern chemical transformations of organic compounds and will familiarize students with the major physical/chemical factors influencing the kinetics of organic reactions in nature. Prerequisites: CEE 270

Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

CEE 370A: Environmental Research

Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.

Terms: Aut | Units: 5-6 | Repeatable for credit | Grading: Satisfactory/No Credit

CEE 370B: Environmental Research

Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.

Terms: Win | Units: 5-6 | Repeatable for credit | Grading: Satisfactory/No Credit

CEE 370C: Environmental Research

Introductory research experience for first-year Ph.D. students in the Environmental Engineering and Science program. 15-18 hours/week on research over three quarters. 370A requires written literature survey on a research topic; 370B requires oral presentation on experimental techniques and research progress; 370C requires written or oral presentation of preliminary doctoral research proposal. Students must obtain a faculty sponsor.

Terms: Spr | Units: 5-6 | Repeatable for credit | Grading: Satisfactory/No Credit

CEE 371: Frontiers in Environmental Research

How to evaluate environmental research.

Terms: Aut, Win, Spr | Units: 1-2 | Grading: Satisfactory/No Credit

CEE 70: Environmental Science and Technology

Introduction to environmental quality and the technical background necessary for understanding environmental issues, controlling environmental degradation, and preserving air and water quality. Material balance concepts for tracking substances in the environmental and engineering systems.

Terms: Aut | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

CHEM 25N: Science in the News

Preference to freshmen. Possible topics include: diseases such as avian flu, HIV, and malaria; environmental issues such as climate change, atmospheric pollution, and human population; energy sources in the future; evolution; stem cell research; nanotechnology; and drug development. Focus is on the scientific basis for these topics as a basis for intelligent discussion of societal and political implications. Sources include the popular media and scientific media for the nonspecialist, especially those available on the web.

Terms: Aut | Units: 3 | Grading: Letter (ABCD/NP)

CHEMENG 35N: Renewable Energy for a Sustainable World

Preference to freshmen. An overall world energy assessment, projections, and technologies. How to assess good and bad potential impacts of leading renewable energy candidates: benefit versus impact ratio using quantitative cradle-to-grave approach. Technologies suitable for near-term application in developing economic systems. Governmental policies, governmental versus private sector investments, raw materials supply issues, and impact of cultural influences on technology choices and speed of implementation.

Terms: Aut | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

CHEMENG 60Q: Environmental Regulation and Policy

Preference to sophomores. How environmental policy is formulated in the U.S. How and what type of scientific

research is incorporated into decisions. How to determine acceptable risk, the public's right to know of chemical hazards, waste disposal and clean manufacturing, brownfield redevelopment, and new source review regulations. The proper use of science and engineering including media presentation and misrepresentation, public scientific and technical literacy, and emotional reactions. Alternative models to formulation of environmental policy. Political and economic forces, and stakeholder discussions.

Terms: Aut | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter (ABCD/NP)

CLASSGEN 123: Urban Sustainability: Long-Term Archaeological Perspectives (CLASSGEN 223, URBANST 115)

Comparative and archaeological view of urban design and sustainability. How fast changing cities challenge human relationships with nature. Innovation and change, growth, industrial development, the consumption of goods and materials. Five millennia of city life including Near Eastern city states, Graeco-Roman antiquity, the Indus Valley, and the Americas.

Terms: Spr | Units: 3-5 | Grading: Letter or Credit/No Credit

COMM 177C: Specialized Writing and Reporting: Environmental Journalism (COMM 277C, ENVRES 277C)

(Graduate students register for COMM / ENVRES 277C.) Practical, collaborative, writing-intensive course in environmental journalism. Science and journalism students learn how to identify and write engaging stories about environmental issues and science, how to assess the quality and relevance of environmental news, how to cover the environment and science beats effectively, and how to build bridges between the worlds of journalism and science. Limited enrollment: preference to journalism students and students in the natural and environmental sciences. Prerequisite: 104 or consent of instructor.

Terms: Spr | Units: 4-5 | Grading: Letter or Credit/No Credit

COMPLIT 158: Ecology in Philosophy and Literature

This course explore how literary and philosophical writers examine and represent the "natural" world. Key questions: What is nature, and where do humans fit in the natural world? How do humans differ from other animals? Do these differences make us superior beings? What are our ethical responsibilities towards nonhuman beings? How has the technology of writing, television, and computers affected our relationship to nature? Readings include: deep ecologists, eco-feminists, Descartes, Thoreau, Darwin, Conrad, Heidegger, Edward, Abbey, and Bill McKibben.

Terms: Spr | Units: 3-5 | Grading: Letter (ABCD/NP)

CSRE 109A: Federal Indian Law (NATIVEAM 109A)

Cases, legislation, comparative justice models, and historical and cultural material. The interlocking relationships of tribal, federal, and state governments. Emphasis is on economic development, religious freedom, and environmental justice issues in Indian country.

Terms: Aut | Units: 5 | Grading: Letter (ABCD/NP)

EARTHSCI 117: Earth Sciences of the Hawaiian Islands (EARTHSYS 117, EESS 117)

Progression from volcanic processes through rock weathering and soil-ecosystem development to landscape evolution. The course starts with an investigation of volcanic processes, including the volcano structure, origin of magmas, physical-chemical factors of eruptions. Factors controlling rock weathering and soil development, including depth and nutrient levels impacting plant ecosystems, are explored next. Geomorphic processes of landscape evolution including erosion rates, tectonic/volcanic activity, and hillslope stability conclude the course. Methods for monitoring and predicting eruptions, defining spatial changes in landform, landform stability, soil production ... [more description for EARTHSCI 117 »](#)

Terms: Aut, alternate years, not given next year | Units: 4 | Grading: Letter (ABCD/NP)

EARTHSCI 180: Introduction to Earth & Environmental Science Research Design

How do you plan a research project? This course is an introduction to the types of choices involved in: bounding the scope of your topic, placing your project in context, planning your methods, and communicating your ideas in a proposal. Three-fold course emphasis: 1) What do earth and environmental scientists actually do? Learn diverse methods of conducting research. 2) What are the differences among "interdisciplinary", "multi-disciplinary", and "disciplinary" approaches to a problem? When/why might you choose one approach over another? 3) Practical skill development: project planning, proposal writing, identifying relevant scientific literature... [more description for EARTHSCI 180 »](#)

Terms: Win | Units: 3 | Grading: Satisfactory/No Credit

EARTHSYS 10: Introduction to Earth Systems

For non-majors and prospective Earth Systems majors. Multidisciplinary approach using the principles of geology, biology, engineering, and economics to describe how the Earth operates as an interconnected, integrated system. Goal is to understand global change on all time scales. Focus is on sciences, technological principles, and sociopolitical approaches applied to solid earth, oceans, water, energy, and food and population. Case studies: environmental degradation, loss of biodiversity, and resource sustainability.

Terms: Aut | Units: 4 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

EARTHSYS 100: Environmental and Geological Field Studies in the Rocky Mountains

(EESS 101, GES 101)

Three-week, field-based program in the Greater Yellowstone/Teton and Wind River Mountains of Wyoming. Field-based exercises covering topics including: basics of structural geology and petrology; glacial geology; western cordillera geology; paleoclimatology; chemical weathering; aqueous geochemistry; and environmental issues such as acid mine drainage and changing land-use patterns.

Terms: Aut | **Units:** 3 | **Grading:** Satisfactory/No Credit

EARTHSYS 101: Energy and the Environment (ENERGY 101)

Energy use in modern society and the consequences of current and future energy use patterns. Case studies illustrate resource estimation, engineering analysis of energy systems, and options for managing carbon emissions. Focus is on energy definitions, use patterns, resource estimation, pollution. Recommended: MATH 21 or 42, ENGR 30.

Terms: Win | **Units:** 3 | **UG Reqs:** GER:DBEngrAppSci | **Grading:** Letter or Credit/No Credit

EARTHSYS 102: Renewable Energy Sources and Greener Energy Processes (ENERGY 102)

The energy sources that power society are rooted in fossil energy although energy from the core of the Earth and the sun is almost inexhaustible; but the rate at which energy can be drawn from them with today's technology is limited. The renewable energy resource base, its conversion to useful forms, and practical methods of energy storage. Geothermal, wind, solar, biomass, and tidal energies; resource extraction and its consequences. Recommended: 101, MATH 21 or 42.

Terms: Spr | **Units:** 3 | **UG Reqs:** GER:DBEngrAppSci | **Grading:** Letter or Credit/No Credit

EARTHSYS 105: Food and Community: New Visions for a Sustainable Future (EESS 105)

Service and research focused on providing healthy and environmentally friendly food for the under served in our community. Hands-on collaboration with the Stanford Glean student group, the Stanford Community Garden, and San Francisco nonprofits. Coverage of the broad spectrum from garden development to food dispersal to the needy. Design and implementation of projects that address an aspect of food and social justice, such as urban farming in low-income communities and sustainable food networks for the elderly. Service Learning Course (certified by Haas Center).

Terms: Aut, Spr | **Units:** 3-5 | **Repeatable for credit** | **Grading:** Satisfactory/No Credit

EARTHSYS 12SC: Environmental and Geological Field Studies in the Rocky

Mountains (EESS 12SC, GES 12SC)

The ecologically and geologically diverse Rocky Mountain area is being strongly impacted by changing land use patterns, global and regional environmental change, and societal demands for energy and natural resources. This three-week field program emphasizes coupled environmental and geological problems in the Rocky Mountains, covering a broad range of topics including the geologic origin of the American West from three billion years ago to the present; paleoclimatology and the glacial history of this mountainous region; the long- and short-term carbon cycle and global climate change; and environmental issues in the American West related to changing land-use patterns and i... [more description for EARTHSYS 12SC »](#)

Terms: Aut | Units: 2 | Grading: Letter (ABCD/NP)

EARTHSYS 18: Promoting Sustainability Behavior Change at Stanford

Stanford Green Living Council training course. Effective strategies for enacting sustainable behavior change on campus. Community-based social marketing, psychology, sociology, and design. Behavior change intervention project targeting a specific sustainable behavior. Lectures online.

Terms: Aut | Units: 2 | Grading: Satisfactory/No Credit

EARTHSYS 180B: Principles and Practices of Sustainable Agriculture (EESS 180B)

Field-based training in ecologically sound agricultural practices at the Stanford Community Farm. Weekly lessons, field work, and group projects. Field trips to educational farms in the area. Topics include: soils, composting, irrigation techniques, IPM, basic plant anatomy and physiology, weeds, greenhouse management, and marketing.

Terms: Aut, Spr | Units: 3-4 | Repeatable for credit | Grading: Letter (ABCD/NP)

EARTHSYS 188: Social and Environmental Tradeoffs in Climate Decision-Making (EARTHSYS 288)

How can we ensure that measures taken to mitigate global climate change don't create larger social and environmental problems? What metrics should be used to compare potential climate solutions beyond cost and technical feasibility, and how should these metrics be weighed against each other? How can modeling efforts and stakeholder engagement be best integrated into climate decision making? What information are we still missing to make fully informed decisions between technologies and policies? Exploration of these questions, alongside other issues related to potential negative externalities of emerging climate solutions. Evaluation of energy, land use, and geoengine... [more description for EARTHSYS 188 »](#)

Terms: Spr | Units: 1-2 | Grading: Letter or Credit/No Credit

EARTHSYS 297: Directed Individual Study in Earth Systems

Under supervision of an Earth Systems faculty member on a subject of mutual interest.

Terms: Aut, Win, Spr, Sum | **Units:** 1-9 | **Repeatable for credit** | **Grading:** Letter or Credit/No Credit

EARTHSYS 43Q: Environmental Problems (GES 43Q)

Preference to sophomores. Components of multidisciplinary environmental problems and ethical questions associated with decision making in the regulatory arena. Students lead discussions on environmental issues such as groundwater contamination from point and nonpoint sources, cumulative watershed effects related to timber and mining practices, acid rain, and subsurface disposal of nuclear waste.

Terms: Win | **Units:** 3 | **UG Reqs:** GER:DBNatSci | **Grading:** Letter (ABCD/NP)

EARTHSYS 57Q: Climate Change from the Past to the Future (EESS 57Q)

Preference to sophomores. Numeric models to predict how climate responds to increase of greenhouse gases. Paleoclimate during times in Earth's history when greenhouse gas concentrations were elevated with respect to current concentrations. Predicted scenarios of climate models and how these models compare to known hyperthermal events in Earth history. Interactions and feedbacks among biosphere, hydrosphere, atmosphere, and lithosphere. Topics include long- and short-term carbon cycle, coupled biogeochemical cycles affected by and controlling climate change, and how the biosphere responds to climate change. Possible remediation strategies.

Terms: Win | **Units:** 3 | **Grading:** Letter or Credit/No Credit

EASTASN 117: Health and Healthcare Systems in East Asia (EASTASN 217)

China, Japan, and both Koreas. Healthcare economics as applied to East Asian health policy, including economic development, population aging, infectious disease outbreaks (SARS, avian flu), social health insurance, health service delivery, payment incentives, competition, workforce policy, pharmaceutical industry, and regulation. No prior knowledge of economics or healthcare required.

Terms: Win | **Units:** 3-5 | **Grading:** Letter or Credit/No Credit

ECON 106: World Food Economy

The interrelationships among food, populations, resources, and economic development. The role of agricultural and rural development in achieving economic and social progress in low-income nations. Emphasis is on public sector decision making as it relates to food policy.

Terms: Win | **Units:** 5 | **Grading:** Letter or Credit/No Credit

ECON 155: Environmental Economics and Policy

Economic sources of environmental problems and alternative policies for dealing with them (technology standards,

emissions taxes, and marketable pollution permits). Evaluation of policies addressing regional air pollution, global climate change, water allocation in the western U.S., and the use of renewable resources. Connections between population growth, economic output, environmental quality, and human welfare. Prerequisite: ECON 50.

Terms: Win | **Units:** 5 | **UG Reqs:** GER:DBNatSci | **Grading:** Letter or Credit/No Credit

ECON 156: Marine Resource Economics and Policy (EARTHSYS 156)

Economic, political, and institutional frameworks for understanding the causes and potential solutions to marine resource problems. Marine policy formation, implementation and evaluation. Applications include: offshore energy production, managing fisheries, marine spatial planning, protecting biodiversity, and ocean recreation.

Prerequisite: Econ 1A

Terms: Spr | **Units:** 5 | **Grading:** Letter or Credit/No Credit

ECON 17N: Energy, the Environment, and the Economy

Preference to freshmen. The relationship between environmental quality and production and consumption of energy. Can environmentally-friendly energy production and consumption compete with conventional sources? How to estimate and compare environmental impact costs of nonrenewable sources such as fossil fuels and nuclear power versus renewable sources such as solar and wind power. Implicit subsidies in conventional energy sources and the environmental costs of these subsidies. Regulatory and legal barriers to more environmentally friendly energy sources.

Terms: Spr | **Units:** 2 | **Grading:** Letter (ABCD/NP)

ECON 18N: Industrial Revolution: History, Ethics & Consequences of Mod. Economic Development (HISTORY 35N)

Explores the enduring controversies surrounding the transformation of the British economy in the 18th century. Using iron, coal, steam, and cotton as examples, we will explore the historical and economic debates about its reach, speed, and relationship to other aspects of British and world history. Topics include: the social, political, environmental, and cultural consequences in Britain and the expanding British empire as well as an ethical assessment of the Industrial Revolution and the lessons it has offered for the theory and practice of economic development ever since. Readings will include historical and economic literature as well as contemporary accounts.

Terms: Spr | **Units:** 5 | **UG Reqs:** GER:DBSocSci | **Grading:** Letter (ABCD/NP)

ECON 20SI: Sustainability from the Economic Perspective

In spite of its apparent universal popularity, environmental sustainability is a concept that is impossible to define objectively. Nevertheless, many aspects of economic activity reduce the quality of environmental services

available to consumers. The local and global pollutants that result from the production and consumption of fossil fuels is perhaps the most highly publicized example of this phenomenon. However, virtually all aspects of modern economic activity degrade some aspect of available environmental services. Consequently, a major challenge to increasing the share of the world's population with a modern standard of living is the need to balance the adverse impa... [more description for ECON 20SI »](#)

Terms: Win | Units: 1-2 | Grading: Satisfactory/No Credit

ECON 250: Environmental Economics

Applications of modern applied methods to issues of environmental policy. Topics include: environmental policy under uncertainty, environmental quality and health, the economics of alternative fuels, valuation of environmental amenities, models of consumer choice and demand for green products, behavioral aspects of choice, the economics of energy efficiency, commodity markets and recent developments in financial markets and regulation.

Terms: Win | Units: 2-5 | Grading: Letter or Credit/No Credit

EDUC 332X: Theory and Practice of Environmental Education

Foundational understanding of the history, theoretical underpinnings, and practice of environmental education as a tool for addressing today's pressing environmental issues. The purpose, design, and implementation of environmental education in formal and nonformal settings with youth and adult audiences. Field trip and community-based project offer opportunities for experiencing and engaging with environmental education initiatives.

Terms: Spr | Units: 3 | Grading: Letter (ABCD/NP)

EDUC 357X: Science and Environmental Education in Informal Contexts

There are ever-expanding opportunities to learn science in contexts outside the formal classroom, in settings such as zoos, museums, and science centers. How are issues around science and the environment presented in these contexts, how do people behave and learn in these contexts, and what messages do they take away? This course will cover the learning theories and empirical research that has been conducted in these settings. Case studies of nearby science centers will add an experiential dimension.

Terms: Win | Units: 3-4 | Grading: Letter or Credit/No Credit

ENERGY 104: Transition to sustainable energy systems

This course explores the transition to a sustainable energy system at large scales (national and global), and over long time periods (decades). Explores the drivers of global energy demand and the fundamentals of technologies that can meet this demand sustainably. Focuses on constraints affecting large-scale deployment of technologies,

as well as inertial factors affecting this transition. Problems will involve modeling global energy demand, deployment rates for sustainable technologies, technological learning and economics of technical change. Prerequisites: ENERGY 101, 102.

Terms: Spr | Units: 3 | Grading: Letter (ABCD/NP)

ENERGY 153: Carbon Capture and Sequestration (ENERGY 253)

CO₂ separation from syngas and flue gas for gasification and combustion processes. Transportation of CO₂ in pipelines and sequestration in deep underground geological formations. Pipeline specifications, monitoring, safety engineering, and costs for long distance transport of CO₂. Comparison of options for geological sequestration in oil and gas reservoirs, deep unmineable coal beds, and saline aquifers. Life cycle analysis.

Terms: Aut | Units: 3-4 | Grading: Letter (ABCD/NP)

ENVRES 200: Sustaining Action: Research, Analysis and Writing for the Public

Preference to graduate students and senior undergraduates in environmental, natural and social sciences, engineering, journalism. Students help produce and publish SAGE, an eco advice column, by choosing, researching, and answering questions about sustainable living submitted by Stanford alumni. Prerequisite: admission by application, available from instructor, thayden@stanford.edu, and due 9/15/10.

Terms: Aut, Spr | Units: 3 | Grading: Letter or Credit/No Credit

ENVRES 277C: Specialized Writing and Reporting: Environmental Journalism (COMM 177C, COMM 277C)

(Graduate students register for COMM / ENVRES 277C.) Practical, collaborative, writing-intensive course in environmental journalism. Science and journalism students learn how to identify and write engaging stories about environmental issues and science, how to assess the quality and relevance of environmental news, how to cover the environment and science beats effectively, and how to build bridges between the worlds of journalism and science. Limited enrollment: preference to journalism students and students in the natural and environmental sciences. Prerequisite: 104 or consent of instructor.

Terms: Spr | Units: 4-5 | Grading: Letter or Credit/No Credit

ENVRES 290: Capstone Project Seminar in Environment and Resources

Required for E-IPER Joint M.S. students; optional for E-IPER Ph.D. students. Propose, conduct and publicly present final individual or team projects demonstrating the integration of professional (M.B.A., J.D., or M.D.) and M.S. in Environment and Resources degrees. Presentation and submission of final product required.

Terms: Aut, Win, Spr | Units: 1-3 | Repeatable for credit | Grading: Satisfactory/No Credit

ENVRES 310: Environmental Forum Seminar

Required core course for first year E-IPER Ph.D. students and all Joint M.S. students, other than Joint M.B.A./M.S. students; optional for joint M.B.A./M.S. students and other graduate students with consent of instructor. Conceptual frameworks, analytical approaches, validity of conclusions from an interdisciplinary perspective. Participants attend various environmentally-focused seminars on campus selected by faculty and students, followed by student-facilitated discussions.

Terms: Aut | Units: 1-2 | Grading: Letter (ABCD/NP)

ENVRES 315: Environmental Research Design Seminar

Required core course for first year E-IPER Ph.D. students; optional for Joint M.S. students; other graduate students with instructor's permission. Series of faculty presentations and student-led discussions on interdisciplinary research design as exemplars of the research design theories discussed in ENVRES 320. Designing Environmental Research. Topics parallel the ENVRES 320 syllabus. Corequisite: ENVRES 320.

Terms: Win | Units: 1-2 | Grading: Letter (ABCD/NP)

ENVRES 320: Designing Environmental Research

Required core course restricted to first year E-IPER Ph.D. students. Research design options for environmentally related research. Major philosophies of knowledge and how they relate to research objectives and design choices. Evaluation of strengths and weaknesses of alternative research designs, emphasizing methods, data, and argument. Development of individual research design proposals, including description and justification understandable to a non-specialist.

Terms: Win | Units: 3-4 | Grading: Letter (ABCD/NP)

ENVRES 330: Research Approaches for Environmental Problem Solving

Required core course for first year E-IPER Ph.D. students. How to develop and implement interdisciplinary research in environment and resources. Assignments include development of research questions, a preliminary literature review, and a summer funding proposal. Course is structured on peer critique and student presentations of work in progress. Corequisite: ENVRES 398 with a faculty member chosen to explore a possible dissertation topic.

Terms: Spr | Units: 3 | Grading: Letter (ABCD/NP)

ENVRES 339: Advanced Environmental Science for Managers and Policy Makers

(Same as LAW 619 and OIT 339.) Fundamental science of ecosystems, climate and energy. Spreadsheet modeling, optimization, and Monte Carlo simulation applied to resource management and environmental policy. Accelerated version of ENVRES 338 for students with background in modeling. Allocates more class time to environmental/energy science and implications for management and policy, and less class time to fundamentals of modeling/optimization/simulation. This course is open only to students in the E-IPER Ph.D. program or Joint M.S. in Environment and Resources program. ENVRES 339 does not assume knowledge of environmental science or proficiency in quantitative analysis... [more description for ENVRES 339 »](#)

Terms: Win | Units: 4 | Grading: Letter or Credit/No Credit

ETHICSOC 178M: Environmental Justice (ETHICSOC 278M, PHIL 178M, PHIL 278M, POLISCI 134L)

Explores the normative questions that arise in environmental policy debates, including arguments over pollution permit markets, conservation regulations, and global warming mitigation efforts. What are the morally relevant ways in which the environment is different from other economic resources? How should the environment be valued? What are our obligations to conserve for future generations? How should the burdens of conservation be distributed? Engages with a variety of philosophical traditions including utilitarianism, deep ecology, liberalism, and communitarianism.

Terms: Win | Units: 3-5 | UG Reqs: GER:ECEthicReas | Grading: Letter (ABCD/NP)

GES 39N: Forensic Geoscience: Stanford CSI

Preference to freshmen. Geological principles, materials, and techniques indispensable to modern criminal investigations. Basic earth materials, their origin and variability, and how they can be used as evidence in criminal cases and investigations such as artifact provenance and environmental pollution. Sources include case-based, simulated forensic exercises and the local environments of the Stanford campus and greater Bay Area. Local field trips; research presentation and paper.

Terms: Aut | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

GSBGEN 339: Environmental Innovation, Sustainability and Entrepreneurship

This course focuses on environmental innovations and entrepreneurship. The main driver of these innovations is an increasing awareness by businesses and policy makers that the scope and scale of economic activity is altering the dynamics of natural systems in historically unprecedented ways. The increased demand for energy and the concerns about greenhouse gas emissions is one area where sustainability considerations and business innovation opportunities intersect. Changes in water and land use, chemically benign production materials, and green products are additional areas where opportunities for innovative change have emerged in recent years. Many companies are transform... [more description for GSBGEN 339 »](#)

Units: 4 | Grading: GSB Letter Graded

GSBGEN 533: Sustainability as Market Strategy

The increasing social emphasis on sustainability creates both dilemmas and opportunities for firms. Recognizing that sustainability means a focus on not just the environment, but also on broader issues of social responsibility, we will examine the ways in which some companies are developing a sustainability strategy. We will also consider the way in which companies are profiting from such a strategy with an eye toward understanding the conditions under which such a strategy can generate profits for firms. We will also focus on the way in which many companies are partnering with non-governmental organizations to develop business strategies that focus not only on profits, b... [more description for GSBGEN 533 »](#)

Units: 2 | Grading: GSB Pass/Fail

GSBGEN 536: Business Models for Sustainable Energy

Transforming the global energy system to reduce climate change impacts, ensure security of supply, and foster economic development of the world's poorest regions depends on the ability of commercial players to deliver the needed energy at scale. Technological innovation is a necessary but not sufficient condition for this to occur. The complex institutional frameworks that regulate energy markets in the United States and around the world will play a major role in determining the financial viability of firms in the energy sector. In this course we survey the institutional contexts for energy enterprises of all types and consider what kinds of business models work in each s... [more description for GSBGEN 536 »](#)

Units: 2 | Grading: GSB Student Option LTR/PF

HISTORY 103D: Human Society and Environmental Change (EARTHSYS 112, EESS 112)

Interdisciplinary approaches to understanding human-environment interactions with a focus on economics, policy, culture, history, and the role of the state. Prerequisite: ECON 1A

Terms: Aut | Units: 4 | Grading: Letter or Credit/No Credit

HISTORY 243J: Climate Change in the West: A History of the Future (EARTHSYS 143J)

Global warming is changing the American West. But this region is no stranger to environmental change and human adaptation to harsh environments. How can history create more clear thinking about the current crisis and choices for the future? The long history of climate change in the West, as well as current warming, through scientific research, historical sources, environmental histories, and visions for the future, including plans for mitigation and

adaption, scientific predictions, and science fiction.

Terms: Spr | Units: 5 | Grading: Letter (ABCD/NP)

HISTORY 62S: Food Ways: The Politics, Culture, and Ecology of Food in American History

What did people eat, why did they eat it, and what were the consequences? This question will be asked of many periods and places in American history. Explores the way historians use many types of evidence and analysis in writing history. Focus on primary sources and interpretations. Topics include the cultural, political, and environmental meanings and consequences of food.

Terms: Win, offered once only | Units: 5 | Grading: Letter (ABCD/NP)

HUMBIO 121E: Ethnicity and Medicine (FAMMED 244)

Weekly lecture series. Linguistic, social class, and cultural factors that impact patient care. Culturally sensitive health care services and contemporary research issues involving minority and underserved populations. Topics include health care inequities and medical practices of African Americans, Asians, Latinos, Native Americans, immigrants, and refugees in both urban and rural settings. Only students taking the course for 3 units may earn a letter grade.

Terms: Spr | Units: 1-3 | Grading: Medical Option (Med-Ltr-CR/NC)

HUMBIO 125: Current Controversies in Women's Health (OBGYN 256)

Interdisciplinary. Focus is on the U.S. Topics include: health research; bioethical, legal, and policy issues; scientific and cultural perspectives; social influences; environmental and lifestyle effects on health; and issues related to special populations. Guest lecturers; student debates. Prerequisite: Human Biology core or equivalent, or consent of instructor.

Terms: Spr | Units: 2-3 | UG Reqs: GER:ECGender | Grading: Medical Option (Med-Ltr-CR/NC)

HUMBIO 126: Promoting Health Over the Life Course: Multidisciplinary Perspectives

Disease prevention and health promotion topics pertinent to different stages of the life span emphasizing healthy lifestyle and reducing risk factors in both individuals and communities. Focus is on scientific investigation, the application of behavioral science to risk reduction strategies, and the importance of health promotion as a social and economic imperative. Topics include: epidemiology of chronic diseases; social determinants of health, behavior change; obesity, nutrition, and stress; young adult, mid-life and aging health issues; health care delivery and public health system; workplace wellness programs; and environmental and international issues. Prerequisite: ... [more description for HUMBIO 126 »](#)

Terms: Aut | Units: 3 | Grading: Letter or Credit/No Credit

HUMBIO 129: Critical Issues in International Women's Health (FEMST 129)

Women's lives, from childhood through adolescence, reproductive years, and aging. Economic, social, and human rights factors, and the importance of women's capacities to have good health and manage their lives in the face of societal pressures and obstacles. Emphasis is on life or death issues of women's health that depend on their capacity to negotiate or feel empowered, including maternal mortality, violence, HIV/AIDS, reproductive health, and sex trafficking. Organizations addressing these issues. A requirement of this class is participation in public blogs. Prerequisites: Human Biology core or equivalent or consent of instructor.

Terms: Aut, Win | Units: 4 | UG Reqs: GER:ECGender | Grading: Letter (ABCD/NP)

HUMBIO 18SC: Conservation and Development Dilemmas in the Amazon (ANTHRO 11SC)

This course explores the human dimensions of conservation efforts under way in the Amazon Basin of South America. It has two specific goals: (1) to introduce the human ecology of Amazonia, and (2) to assess the prospects for joint efforts at biodiversity conservation and community development. We will draw on case studies to investigate such topics as the causes and consequences of deforestation, the social impact of parks and protected areas, and the potential for "Integrated Conservation and Development Projects" (ICDPs) such as extractive reserves, natural forest management, biodiversity prospecting, and community-based ecotourism. The course views Amazonia as a micro... [more description for HUMBIO 18SC »](#)

Terms: Aut | Units: 2 | Grading: Letter (ABCD/NP)

HUMBIO 4B: Environmental and Health Policy Analysis

Connections among the life sciences, social sciences, public health, and public policy. The economic, social, and institutional factors that underlie environmental degradation, the incidence of disease, and inequalities in health status and access to health care. Public policies to address these problems. Topics include pollution regulation, climate change policy, biodiversity protection, health care reform, health disparities, and women's health policy

Terms: Spr | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

HUMBIO 82Q: The Omnivore's Dilemma - Or Is It?

The omnivore's dilemma- making the right food choices from the vast number possible. The health implications of our food choices. Why we make these choices- the positive and negative influences of the food industry, research in nutritional science, and public health policies and the resulting confusion about what we should eat. Discussion-based class with readings including "In Defense of Food" by M. Pollan and primary reference materials. Introduction to the scientific literature in human nutrition.

Terms: Aut | Units: 3 | Grading: Letter or Credit/No Credit

IHUM 71: Sustainability and Collapse

Contemporary environmental crises such as climate illustrate how all human societies depend in intricate ways on their interactions with natural resources, habitats and other species. Some human societies survive for thousands of years, whereas others collapse after a few decades or centuries. Exploring such cases of survival and collapse requires drawing on the resources of the sciences as well as the humanities, since they usually involve complex interactions of natural resources and limits with social organization and cultural ideas and values. "Sustainability and Collapse" will explore these interactions and the complex issues 21st-century societies face. We will ask ... [more description for IHUM 71 »](#)

Terms: Aut | Units: 4 | UG Reqs: GER:IHUM1 | Grading: Letter (ABCD/NP)

IIS 195: Interschool Honors Program in Environmental Science, Technology, and Policy

Students from the schools of Humanities and Sciences, Engineering, and Earth Sciences analyze important problems in a year-long small group seminar. Combines research methods, oral presentations, preparation of an honors thesis by each student, and where relevant, field study. May be repeated for credit.

Terms: Aut, Win, Spr | Units: 1-9 | Repeatable for credit | Grading: Letter or Credit/No Credit

INTNLREL 170: ENERGY AND CLIMATE

The seminar provides an interdisciplinary introduction to the technology, economics, and international politics of energy and climate. We investigate specific energy technologies and discuss their impact on geopolitics, the environment and mitigating the effects of climate change. What is the role of energy in national security? What will climate change mean for our energy mix? How do developing countries view energy and climate change? What is the proper balance between regulation and free market operation in energy markets?

Terms: Aut | Units: 5 | Grading: Letter (ABCD/NP)

IO 102: Demography: Health, Development, Environment (HUMBIO 119)

Demographic methods and their application to understanding and projecting changes in human infant, child, and adult mortality and health, fertility, population, sex ratios, and demographic transitions. Progress in human development, capabilities, and freedoms. Relationships between population and environment. Prerequisites: numeracy and basic statistics; Biology or Human Biology core; or consent of instructor.

Terms: Spr | Units: 3 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

LAW 350: Corporate Social Responsibility: Global Business, Sustainability, and

Human Rights

Terms: Aut | Units: 3 | Grading: Law Honors/Pass/R credit/Fail

LAW 432: Environmental and Energy Workshop

This workshop seminar will provide students with the opportunity to examine and critique cutting-edge research and work in the field of environment, energy, and natural resources. Although it is open to all students, the seminar is designed especially for those with an interest in the field who wish to stay abreast of current issues, work, and ideas. In each class, an academic expert, policy maker, or practitioner will present their current research or work and engage in a robust discussion.

Terms: Aut | Units: 2-3 | Grading: Law Mixed H/P/R/F or MP/R/F

LAW 437: Water Law

This course studies how society allocates and protects its most crucial natural resource, water. The emphasis is on current legal and policy debates, although the course also examines the history of water development and politics in the United States. Among the many issues considered are: alternative means of responding to the growing worldwide demand for water; the appropriate role for the market and private companies in meeting society's water needs; protection of threatened groundwater resources; environmental limits on water development (including the Endangered Species Act and the "public trust" doctrine); watershed protection and restoration; Indian water rights; in... [more description for LAW 437 »](#)

Terms: Aut | Units: 3 | Grading: Law Honors/Pass/R credit/Fail

LAW 599: Climate Change Workshop

The negotiations of a new global climate change agreement are currently underway and are scheduled to culminate in Copenhagen in December 2009. (It is most likely that serious issues will remain to be settled or to demand implementation design sessions thereafter.) Core negotiating issues are both analytically confused and politically contested. These issues include technology transfer and development, carbon finance and mitigation; deforestation and land use; adaptation and development. The intent of this research workshop is to have Stanford students, working individually or in small groups, prepare papers that will be used as technical support for specific problems th... [more description for LAW 599 »](#)

Terms: Win | Units: 3 | Grading: Law Honors/Pass/R credit/Fail

LAW 603: Environmental Law and Policy

This introductory course focuses on the key federal environmental laws, regulatory structures and environmental policies in the United States. The course begins with a discussion of the property law roots of environmental law and the current primary analytical frameworks of use in understanding environmental law and policy.

Substantively, the course focuses on federal statutes including the Clean Air Act, the Clean Water Act, the Endangered Species Act, the National Environmental Policy Act. A central teaching element of the course is the use of case studies drawn from actual environmental cases and controversies. As a result, substantial student participation is expected... [more description for LAW 603 »](#)

Terms: Spr | Units: 3 | Grading: Law Honors/Pass/R credit/Fail

LAW 605: International Environmental Law

Terms: Spr | Units: 3 | Grading: Law Honors/Pass/R credit/Fail

MATSCI 11SC: Energy Technologies for a Sustainable Future

Wondering what the buzz is about sustainability, renewable energy, and clean fuels? Meeting the world's growing energy needs in a sustainable fashion is one of the most pressing problems of our time. This class will introduce the scope of the energy problem and define some of the options for sustainable energy. We will look into the scientific basis of sustainable energy technologies, such as solar cells, which convert the energy of the sun directly into electricity, and fuel cells, which convert chemical energy directly into electricity. Other topics will include biofuels, i.e., fuel derived from plant matter, and clean fuels such as hydrogen. The course will emphasize t... [more description for MATSCI 11SC »](#)

Terms: Aut | Units: 2 | Grading: Letter (ABCD/NP)

MATSCI 156: Solar Cells, Fuel Cells, and Batteries: Materials for the Energy Solution (MATSCI 256)

Operating principles and applications of emerging technological solutions to the energy demands of the world. The scale of global energy usage and requirements for possible solutions. Basic physics and chemistry of solar cells, fuel cells, and batteries. Performance issues, including economics, from the ideal device to the installed system. The promise of materials research for providing next generation solutions.

Terms: Aut | Units: 3-4 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

ME 206A: Entrepreneurial Design for Extreme Affordability

Project course jointly offered by School of Engineering and Graduate School of Business. Students apply engineering and business skills to design product prototypes, distribution systems, and business plans for entrepreneurial ventures in developing countries for a specified challenge faced by the world's poor. Topics include user empathy, appropriate technology design, rapid prototype engineering and testing, social technology entrepreneurship, business modeling, and project management. Weekly design reviews; final course presentation. Industry and adviser interaction. Limited enrollment via application; see <http://www.stanford.edu/class/me206>.

Terms: Win | Units: 4 | Grading: Letter (ABCD/NP)

ME 206B: Entrepreneurial Design for Extreme Affordability

Part two of two-quarter project course jointly offered by School of Engineering and Graduate School of Business. Second quarter emphasizes prototyping and implementation of specific projects identified in first quarter. Students work in cross-disciplinary project teams. Industry and adviser interaction, weekly design reviews; final course presentation. Prerequisite: 206A. (Jointly offered as GSB OIT333B) Design Institute class; see <http://dschool.stanford.edu>.

Terms: Spr | Units: 4 | Grading: Letter (ABCD/NP)

ME 25N: Global Warming and Climate Change: Fact or Fiction

Preference to freshmen. Scientific arguments concerning debates between the view that anthropogenic activities are not causing global warming versus the view that these activities are responsible for a global warming that results in significant climate change. Consequences of increased demand for energy. Prerequisites: high school physics, chemistry, and biology.

Terms: Win | Units: 3 | Grading: Letter or Credit/No Credit

ME 380: Collaborating with the Future (ENVRES 380)

This project-based d.school class combines Design Thinking Processes, Behavioral Sciences, and elements of Diffusion Theory. Tools and theories introduced in class will be used to structure large-scale transformations that simultaneously create value on environmental, societal, and economic fronts. We encourage students to use this class as a launching pad for real initiatives. Primarily meant for Graduate Students. (Especially qualified/motivated Seniors will be considered). Admission to the class is through an application process which ends on March 3. Please find instructions and applications at <https://dschool.stanford.edu/groups/targettransformations/>.

Terms: Spr | Units: 3-4 | Repeatable for credit | Grading: Letter (ABCD/NP)

MKTG 551: Initiating, Sustaining, and Monetizing Green Marketing

The last few years have seen a dramatic increase in environmental consciousness among customers, especially among the crucial 18-34 demographic. Going green for marketers is no longer a luxury, it is becoming a necessity. How should marketers think about initiating and sustaining green marketing? How can they differentiate themselves from competition, especially with every player wanting to jump onto the green bandwagon? More importantly, how can marketers exploit this rapidly growing trend in terms of monetizing such efforts? Where are such opportunities likely to arise in the future both in terms of technological and marketing innovations? The primary goal of this semin... [more description for MKTG 551 »](#)

Units: 2 | Grading: GSB Letter Graded

MS&E 197: Ethics and Public Policy (PUBLPOL 103B, STS 110)

Ethical issues in science- and technology-related public policy conflicts. Focus is on complex, value-laden policy disputes. Topics: the nature of ethics and morality; rationales for liberty, justice, and human rights; and the use and abuse of these concepts in policy disputes. Case studies from biomedicine, environmental affairs, technical professions, communications, and international relations.

Terms: Win | Units: 5 | UG Reqs: GER:ECEthicReas, GER:DBHum | Grading: Letter (ABCD/NP)

MS&E 243: Energy and Environmental Policy Analysis (ENVRES 243)

Concepts, methods, and applications. Energy/environmental policy issues such as automobile fuel economy regulation, global climate change, research and development policy, and environmental benefit assessment. Group project. Prerequisite: MS&E 241 or ECON 50, 51.

Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

MS&E 264: Sustainable Product Development and Manufacturing

Strategies and techniques for development of sustainable products and manufacturing processes. Topics: strategic decisions in new product development when environmental and resource externalities are accounted for; effect of regulatory requirements on ability of a firm to achieve its business objectives; contributions of sustainable products/processes to the firm's competitive advantage and operational efficiency and to enabling entrepreneurial opportunities; industrial ecology and life cycle analysis techniques in integrating traditional product development requirements with those of the environment and society. Maybe repeatable for credit once.

Terms: Aut | Units: 3-4 | Repeatable for credit | Grading: Letter or Credit/No Credit

MS&E 289: Designing for Sustainable Abundance

Hands-on, team-based, multidisciplinary class, uses radically human-centered approach to tackle sustainability challenges in areas like food and transportation. Teams develop solutions that improve environmental and economic sustainability as well as physical and emotional well-being. Students benefit from close interaction with the teaching team, support from project sponsors, and the varied perspectives of numerous guest speakers. Application required. Limited enrollment. Design Institute class; see <http://dschool.stanford.edu>.

Terms: Win | Units: 3-4 | Grading: Letter (ABCD/NP)

MS&E 295: Energy Policy Analysis

Design and application of formal analytical methods for policy and technology assessments of energy efficiency

and renewable energy options. Emphasis is on integrated use of modeling tools from diverse methodologies and requirements for policy and corporate strategy development. Recommended: background in economics, optimization, and decision analysis.

Terms: Win, alternate years, not given next year | Units: 3 | Grading: Letter or Credit/No Credit

MS&E 296: Sustainable Mobility: Improving Energy Efficiency and Reducing CO2 Emissions from Transport

Issues of sustainable mobility, vehicles, fuels, air pollution, and CO2 emissions from transport. Primarily focused on the U.S. passenger transport system; some attention to freight transport, and to Europe and key developing countries. Tools of analysis primarily spreadsheets, but applications using econometrics encouraged for the class project. Problem sets; project.

Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

MS&E 491: Clean Energy Development

'Clean energy' refers to low-depleting and low-polluting energy, such as solar, wind and biomass. Project course for advanced undergraduate and graduate students with an interest in clean energy and entrepreneurship, and with a commitment to strong analytic and communication skills. Student teams conceive, prepare and present a business plan for a real or realistic clean energy development - an individual project or an entire company - of their choice. Class sessions devoted primarily to information and guidance necessary for student team projects. Mix of presentations, discussions and guest lectures. Grades based on student team performance in developing and presenting a... [more description for MS&E 491 »](#)

Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

MS&E 92Q: International Environmental Policy

Preference to sophomores. Science, economics, and politics of international environmental policy. Current negotiations on global climate change, including actors and potential solutions. Sources include briefing materials used in international negotiations and the U.S. Congress.

Terms: Win | Units: 4 | Grading: Letter or Credit/No Credit

OIT 338: Environmental Science for Managers and Policy Makers

This course satisfies the Management Foundations requirement in Modeling for Optimization and Decision Support (MODS), and is the primary core course for the joint MBA - MS in Environment and Resources. For students who lack an undergraduate degree in science or engineering, OIT 338 is challenging but doable; it does not assume knowledge of environmental science or proficiency in quantitative analysis beyond admission requirements for the MBA program. Students will learn the fundamental science of ecosystems, climate and energy systems, by building

decision-support models for managing these systems. In so doing, students will develop widely-applicable skills in model repr... [more description for OIT 338 »](#)

Units: 4 | Grading: GSB Letter Graded

OIT 339: Environmental Science for Managers and Policy Makers - advanced

Fundamental science of ecosystems, climate and energy. Spreadsheet modeling, optimization, and Monte Carlo simulation applied to resource management and environmental policy. Similar to OIT 338, but allocates more class time to environmental/energy science and implications for management and policy, and less class time to fundamentals of modeling/optimization/simulation.

Units: 4 | Grading: GSB Letter Graded

OSPAUSTL 20: Coastal Resource Management

Problem solving, research, communication, teamwork, and social assessment skills in sustainable coastal zone management. Issues include: ecosystem functions and values at risk under the proposed development in case study; environmental outcomes most desirable for the local stakeholders and how those are defined; features of the human communities and their function as they relate to the management options; tools or mechanisms for a sustainable management outcome. Taught by multidisciplinary team that includes Australian and developing country experts. Two units only counted for Biological Sciences major.

Terms: Aut | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter (ABCD/NP)

OSPBER 62: Shades of Green: Environmental Policy in Germany and the U.S. in Historical Perspective

How political institutions, political culture, and economic structure influence domestic and foreign environmental policies across countries in areas such as climate change, urbanization, and management of finite resources. Impact on cooperative solutions between countries with focus on Germany and the U.S.

Terms: Win | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

OSPCPTWN 53: The South African Environment in Historical Context

Group work to design a research project related to environmental change and conservation in South Africa in the 19th and 20th centuries. Using local archives, libraries, and other collections to identify a historical question, design a research project related to the political, social, cultural, and racial dynamics that have shaped modern S. African policies toward the environment.

Terms: Spr | Units: 5 | Grading: Letter or Credit/No Credit

OSPFLOR 37: Directed Readings in Environmental Management in Europe

Students may choose from the following for independent study projects: policy instruments for environmental quality management; strategies for managing greenhouse gas emissions in the EU; environmental assessment requirements; beyond regulations: voluntary environmental management programs.

Terms: Aut | **Units:** 3-5 | **Grading:** Satisfactory/No Credit

OSPGEN 42: How to Build a Habitable Planet: An Example from the European Alps

Feedback and links between global climate, mountain building, and biological evolution and landscape development of the European Alps. Long and short-term carbon cycle and the role of human perturbation; climate of Europe and influence of global connections on climate change; origin of the glaciers, global cooling and the migration of humans into Europe; policies and strategies employed by EU to mitigate effects of global warming. Students and faculty camp in three different locations. Location: Alps in Switzerland, northern Italy and France.

Terms: Aut | **Units:** 2 | **Grading:** Letter (ABCD/NP)

OSPGEN 43: Turkey at the Crossroads of Energy, Sustainability, and Geography

Current analysis of energy systems and sustainability in Turkey. Energy Resources Engineering analysis of sustainability and use of energy resources. Questions of resources, extraction, transportation, and environmental quality are considered in concert. Comparative study of conventional fossil fuel energy resources versus renewable geothermal and solar energy.

Terms: Aut | **Units:** 2 | **Grading:** Satisfactory/No Credit

OSPPARIS 33: The Economics of Climate Change: Policies in Theory and Practice in the EU and the U.S.

Economic tools for tackling climate change. Analytical bases of existing cap-and-trade schemes. The European greenhouse gas Emission Trading Scheme within the frame of the Kyoto Protocol, and emerging regulatory or voluntary markets in the U.S. Carbon-pricing mechanisms with focus on power and gas markets. Possibilities of linking carbon pricing mechanisms on both sides of the Atlantic and conditions for integrating these markets into an international post-Kyoto agreement.

Terms: Spr | **Units:** 5 | **UG Reqs:** GER:DBSocSci, GER:ECGlobalCom | **Grading:** Letter (ABCD/NP)

PHIL 178M: Environmental Justice (ETHICSOC 178M, ETHICSOC 278M, PHIL 278M, POLISCI 134L)

Explores the normative questions that arise in environmental policy debates, including arguments over pollution

permit markets, conservation regulations, and global warming mitigation efforts. What are the morally relevant ways in which the environment is different from other economic resources? How should the environment be valued? What are our obligations to conserve for future generations? How should the burdens of conservation be distributed? Engages with a variety of philosophical traditions including utilitarianism, deep ecology, liberalism, and communitarianism.

Terms: Win | **Units:** 3-5 | **UG Reqs:** GER:ECEthicReas | **Grading:** Letter (ABCD/NP)

PUBLPOL 121: Policy and Climate Change

Science and economics, including recent findings. History and evolution of local, state, regional, national, and international policy. California's recent landmark climate change bill. Future policy prospects, emphasizing national and international levels.

Terms: Aut | **Units:** 4-5 | **Grading:** Letter or Credit/No Credit

PWR 1CR: Writing & Rhetoric 1: Writing Nature: Discourses in Ecology, Culture, and Technology

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. Inquiry into human relationships with nature and how these influence ethical choices and social justice. Service Learning Course (certified by Haas Center). See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

Terms: Aut | **Units:** 4 | **UG Reqs:** Writing1 | **Grading:** Letter (ABCD/NP)

PWR 1GJS: Writing & Rhetoric 1: Our Warded World: The Rhetoric of Conservation

Rhetorical and contextual analysis of readings; research; and argument. Focus is on development of a substantive research-based argument using multiple sources. Individual conferences with instructor. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

Terms: Win, Spr | **Units:** 4 | **UG Reqs:** Writing1 | **Grading:** Letter (ABCD/NP)

PWR 2CR: Writing & Rhetoric 2: Revolutions in Environmental Rhetoric

Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Examination of the motivations and appeals of environmental arguments, considering underlying assumptions and contexts of time, culture, audience, purpose, and mode of delivery. Participation in Community Writing Project, working with local nonprofit environmental organizations to produce real-world writing, multimedia, and/or speaking projects on these organizations' behalf. Work in the community will form the basis of the major research project. Service Learning Course (certified by Haas Center).

Prerequisite: PWR 1. See h... [more description for PWR 2CR »](#)

Terms: Win, Spr | Units: 4 | UG Reqs: Writing2 | Grading: Letter (ABCD/NP)

PWR 2KM: Writing & Rhetoric 2: A Planet on Edge: The Rhetoric of Sustainable Energy

Prerequisite: PWR 1. Further work in developing skills in argument and research-based writing, with emphasis on both written and oral/multimedia presentation of research. Focus on the rhetoric and ethics of sustainable energy, investigating both the alarmism and optimism which fuel this debate. See

http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.

Terms: Aut, Win | Units: 4 | UG Reqs: Writing2 | Grading: Letter (ABCD/NP)

SIW 133: How a "Green" Idea Becomes Law: Current State of US Environmental Law & Policy

Terms: Win | Units: 5 | Grading: Letter or Credit/No Credit

SIW 137: Energy and Environment: Technology, Economics and Policy

Terms: Win | Units: 5 | Grading: Letter or Credit/No Credit

SIW 140: Health and Environmental Policy Speaker Series

Terms: Win | Units: 2 | Grading: Credit/No Credit

SIW 198J: Environment and Energy Policy

Units: 5 | Grading: Letter (ABCD/NP)

SIW 198K: Urban Environmental Issues

Units: 5 | Grading: Letter or Credit/No Credit

SIW 198W: Environmental Education

Units: 5 | Grading: Letter (ABCD/NP)

SIW 198X: International Environmental Policy

Units: 5 | Grading: Letter (ABCD/NP)

URBANST 164: Sustainable Cities

Focus is on the prospects for urban sustainability, including social, economic and environmental dimensions. Course examines the main problems facing urban areas, how they are assessed, and the policies and programs that try to address them. Topics include sustainability indicators, demographic trends and migration, income distribution, green building, urban sprawl, ecological footprint, air and water quality, climate change, and sustainable energy and transportation policies.

Terms: Spr | Units: 4-5 | Repeatable for credit | Grading: Letter or Credit/No Credit