Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

AA 100: Introduction to Aeronautics and Astronautics

The principles of fluid flow, flight, and propulsion; the creation of lift and drag, aerodynamic performance including takeoff, climb, range, and landing performance, structural concepts, propulsion systems, trajectories, and orbits. The history of aeronautics and astronautics. Prerequisites: MATH 41, 42; elementary physics.

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

Instructors: Kroo, I. (PI)

Schedule for AA 100

AA 113N: Structures: Why Things Don't (and Sometimes Do) Fall Down

Preference to freshmen. How structures created by nature or built by human beings keep things up and keep things in. Topics: nature's structures from microorganisms to large vertebrae; buildings from ancient dwellings to modern skyscrapers; spacecraft and airplanes; boats from ancient times to America's Cup sailboats, and how they win or break; sports equipment; and biomedical devices including bone replacements and cardiovascular stents. How composite materials are used to make a structure light and strong.

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

Instructors: Springer, G. (PI)

Schedule for AA 113N

AA 115N: The Global Positioning System: Where on Earth are We, and What Time is It?

Preference to freshmen. Why people want to know where they are: answers include cross-Pacific trips of Polynesians, missile guidance, and distraught callers. How people determine where they are: navigation technology from dead-reckoning, sextants, and satellite navigation (GPS). Hands-on experience. How GPS works; when it does not work; possibilities for improving performance.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter (ABCD/NP)

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)

Instructors: Enge, P. (PI)

Schedule for AA 116N

AA 206: Bio-Aerodynamics

Topics: flapping flight, low Reynolds number aerodynamics, wing design, flocks, swarms, and dynamic soaring. Readings from current and historical literature dealing with theoretical and observational studies. Applications in aircraft design, and simulation-based problem sets. Prerequisite: course in aerodynamics such as 100, 200A, or 241A.

Terms: not given this year | Units: 3 | Grading: Letter (ABCD/NP)

AA 236A: Spacecraft Design

The design of unmanned spacecraft and spacecraft subsystems emphasizing identification of design drivers and current design methods. Topics: spacecraft configuration design, mechanical design, structure and thermal subsystem design, attitude control, electric power, command and telemetry, and design integration and operations.

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

Instructors: Kalman, A. (PI)

Schedule for AA 236A

AA 251: Introduction to the Space Environment

The environment through which space probes and vehicles travel and orbit. Survey of physical phenomena in the sun, solar wind, magnetospheres, ionospheres, and upper atmospheres of objects in the solar system. Introduction to the physical processes governing space plasmas, solar-terrestrial interactions, and ionized and neutral media surrounding the Earth and other solar system bodies. Prerequisite: Introduction to Plasma Physics.

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

Instructors: Close, S. (PI)

Schedule for AA 251

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

AA 253: Product and Systems Development (MS&E 205)

Modern approaches to aerospace design development for life cycle value. Concepts of air and space systems development in a systems context. Stakeholder value issues and requirements through manufacturing and delivery. Processes and practices for functional analysis, concept and architecture development, trades, domain criteria, interfaces, and verification and validation. Reliability, risk, and safety. Value stream analysis, integrated product and process development, key characteristics, and hardware/software integration aimed at information systems. Tools involve quality function deployment, design structure matrices, and decision mechanisms.

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

Instructors: Weiss, S. (PI)

Schedule for AA 253

AA 260: Sustainable Aviation

Quantitative assessment of the impact of aviation on the environment including noise, local, and global emissions, and models used to predict it. Current and future technologies that may allow the air transportation system to meet anticipated growth while reducing or minimizing environmental problems. Atmospheric effects of NOx, CO2, particulates, unburned hydrocarbons, and water vapor deposition at high altitudes and metrics for assessing global climate effects. Noise sources, measurement, and mitigation strategies. Fundamentals of aircraft and engine performance needed to assess current and future concepts. Major national and international policy implications of existin... more description for AA 260 »

Terms: not given this year | Units: 3 | Grading: Letter (ABCD/NP)

AA 272C: Global Positioning Systems

The principles of satellite navigation using GPS. Positioning techniques using code tracking, single and dual frequency, carrier aiding, and use of differential GPS for improved accuracy and integrity. Use of differential carrier techniques for attitude determination and precision position determination. Prerequisite: familiarity with matrix algebra and MatLab (or another mathematical programming language).

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

Instructors: Van Diggelen, F. (PI)

Schedule for AA 272C

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 16N: African Americans and Social Movements (CSRE 16N, SOC 16N)

Theory and research on African Americans' roles in post-Civil Rights, US social movements. Topics include women¿s right, LGBT rights, environmental movement, and contemporary political conservativism.

Terms: Spr | Units: 3 | UG Reqs: GER:DBSocSci | 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)

AFRICAAM 47: History of South Africa (HISTORY 47)

(Same as HISTORY 147. History majors and others taking 5 units, register for 147.) Introduction, focusing particularly on the modern era. Topics include: precolonial African societies; European colonization; the impact of the mineral revolution; the evolution of African and Afrikaner nationalism; the rise and fall of the apartheid state; the politics of post-apartheid transformation; and the AIDS crisis.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

AFRICAST 112: AIDS, Literacy, and Land: Foreign Aid and Development in Africa (AFRICAST 212)
Public policy issues, their roots, and the conflicts they engender. The policy making process: who participates, how, why, and with what results? Innovative approaches to contested policy issues. Foreign roles and their consequences. Case studies such as: a clinic in Uganda that addresses AIDS as a family and community problem; and strategies in Tanzania to increase girls' schooling.
Terms: Win | Units: 5 | UG Reqs: GER:ECGlobalCom | Grading: Letter or Credit/No Credit

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 102A: Ancient Civilizations: Complexity and Collapse (ANTHRO 202A)
How archaeology contributes to understanding prehistoric civilizations. How and why complex social institutions arose, and the conditions and processes behind their collapse. The development of monumental architecture, craft specialization, trade and exchange, and social stratification using examples from the archaeological record. (HEF II, III; DA-B)
Terms: Aut | Units: 3-5 | UG Reqs: GER:DBSocSci, GER:ECGlobalCom | Grading: Letter (ABCD/NP)

ANTHRO 10SC: Darwin, Evolution, and Galapagos (HUMBIO 17SC)
Lessons from the study of flora and fauna in Galapagos from Darwin's time to today. Adaptation, sexual selection, speciation, andadaptive radiation. The challenges the Galapagos Islands pose for conservation.
Terms: not given this year | Units: 2 | Grading: Letter (ABCD/NP)

ANTHRO 113: Faunal Analysis: Animal Remains for the Archaeologist (ANTHRO 213, BIO 166, BIO 266)
The analysis of fossil animal bones and shells to illuminate the behavior and ecology of prehistoric collectors, especially ancient humans. Theoretical and methodoloigcal issues. The identification, counting, and measuring of fossil bones and shells. Labs. Methods of numerical analysis.
Terms: Spr | Units: 5 | Grading: Letter or Credit/No Credit

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 imperialsm of the early 20th centrury? 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 130A: Interpreting Space and Place: An Introduction to Mapmaking
How mapmaking, geographical information systems (GIS), and spatial tools can be applied in social research. Qualitative and quantitative approaches in the use of geospatial information. Methodologies and case examples.
Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credit

ANTHRO 130B: Introduction to GIS in Anthropology (ANTHRO 230B)
How GIS and spatial tools can be applied in social research. Case studies and student projects address questions of social and cultural relevance using real data sets, including the collection of geospatial data and building of spatial evidence. Analytical approaches and how they can shape a social and cultural interpretation of space and place.
Terms: not given this year | Units: 5 | Grading: Letter (ABCD/NP)

ANTHRO 131: The Politics of Humanitarianism (ANTHRO 231)
Anthropological approaches to contemporary practices of humanitarian intervention. How social theory can inform the politics of humanitarianism, charity, and philanthropy. Focus is on Africa from the colonial era to the present.
Terms: not given this year | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

ANTHRO 14: Introduction to Anthropological Genetics
For upper division undergraduates. The extent and pattern of variation among human genomes, the origin of these patterns in human evolution, and the social and medical impact of recent discoveries. Topics include: the Human Genome Project; human origins; ancient DNA; genetic, behavioral, linguistic, cultural, and racial diversity; the role of disease in shaping genetic diversity; DNA forensics; genes and reproductive technology.
Terms: Win | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

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 15: Sex and Gender
Commonality and diversity of gender roles in crosscultural perspective. Cultural, ecological, and evolutionary explanations for such diversity. Theory of the evolution of sex and gender, changing views about men's and women's roles in human evolution, conditions under which gender roles vary in contemporary societies, and issues surrounding gender equality, power, and politics.
Terms: Win | Units: 3 | UG Reqs: GER:DBSocSci, GER:ECGender | Grading: Letter (ABCD/NP)

ANTHRO 152A: Urban Poverty and Inequality in Contemporary China
Experiences of poverty and inequality and their relationship to gender, space development, post-socialism, and globalization. How processes of class-making in China's cities are bound up with transformations in the country's sociopolitcal landscape.
Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credit

ANTHRO 16: Native Americans in the 21st Century: Encounters, Identity, and Sovereignty in Contemporary America
What does it mean to be a Native American in the 21st century? Beyond traditional portrayals of military conquests, cultural collapse, and assimilation, the relationships between Native Americans and American society. Focus is on three themes leading to in-class moot court trials: colonial encounters and colonizing discourses; frontiers and boundaries; and sovereignty of self and nation. Topics include gender in native communities, American Indian law, readings by native authors, and Indians in film and popular culture.
Terms: not given this year | Units: 5 | UG Reqs: GER:DBSocSci, GER:ECAmerCul | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

ANTHRO 161: Human Behavioral Ecology (ANTHRO 261)

Theory, method, and application in anthropology. How theory in behavioral ecology developed to understand animal behavior is applied to questions about human economic decision making in ecological and evolutionary contexts. Topics include decisions about foraging and subsistence, competition and cooperation, mating, and reproduction and parenting.

Terms: not given this year | Units: 3-5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

ANTHRO 161B: Human Ecology of the Amazon (ANTHRO 261B, LATINAM 202, LATINAM 302)

The ecosystems of the Amazon and their human inhabitants. The biotic and abiotic factors shaping human adaptation to the region. Ethnographic literature used to explore subsistence patterns and the resource use of native Amazonians. Current changes in these economies and lifeways due to acculturation and market forces, and the implications for conservation.

Terms: not given this year | 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 163: Conservation and Evolutionary Ecology (ANTHRO 263)

Environmental degradation resulting from human behavior, and what can be done about it. Patterns of interaction between people and environments, and why they vary over time and space. Topics include adaptation and behavior, resource acquisition and utilization, conflicts of interest, collective action problems, conspicuous consumption, waste, land management, and public policy.

Terms: not given this year | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

ANTHRO 164A: Anthropology of Ecotourism

Ecotourism has been touted as a win-win scenario for both biodiversity conservation and the well-being of local residents. In practice, these lofty ideals of ecotourism have proven difficult to implement. The rapid development of ecotourism over the last two decades. Focus is on the scholarly literature relating to ecotourism from both supporting and critical perspectives.

Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credit

ANTHRO 165: Parks and Peoples: The Benefits and Costs of Protected Area Conservation

Seminar. Emphasis is on the social impact of parks and reserves. Integrated conservation and development projects (ICDPs) based on protected areas; alternative ways to derive local social benefits from them. Cases include Yellowstone, Manu, Galápagos, Ngorongoro, and Guanacaste.

Terms: not given this year | Units: 5 | Repeatable for credit | Grading: Letter or Credit/No Credit

ANTHRO 165A: People and Parks: Management of Protected Areas

As resources become scarcer, parks increasingly serve as ideological battlegrounds for contested core human values and often put livelihoods at stake. Their historical development and the complex array of present-day issues associated with the formal protection of biodiversity. The ideas behind parks and the evolution of these ideas.

Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credit

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)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 171: The Biology and Evolution of Language (ANTHRO 271, HUMBIO 145L)

Language as an evolutionary adaptation of humans. Comparison of communicative behavior in humans and animals, and the inference of evolutionary stages. Structure, linguistic functions, and the evolution of the vocal tract, ear, and brain, with associated disorders (stuttering, dyslexia, autism, schizophrenia) and therapies. Controversies over language centers in the brain and the innateness of language acquisition. Vision, color terminology, and biological explanation in linguistic theory.

Terms: not given this year | Units: 4-5 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP

ANTHRO 172: Seminar on Cultural Evolution and Coevolution (ANTHRO 272)

Upper division/graduate seminar on recent approaches to the study of cultural evolution and coevolution. Critical evaluation of Darwinian and non-Darwinian theories, with special attention to the interplay of culture, genes, environment and society. Students will undertake projects of their own design to review, test, or improve current theoretical formulations. Prerequisite: a university-level course in evolution, ecology, or human behavioral biology.

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

ANTHRO 173: Human Dimensions of Global Environmental Change: Resilence, 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 nationmstates 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 179: Cultures of Disease: Cancer

History, politics, science, and anthropology of cancer; political and economic issues of disease and health care in the U.S., including the ethics and economics of health care provision, the pharmaceutical industry, carcinogen production, and research priorities.

Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credi

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)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

ANTHRO 180: Science, Technology, and Gender

Why is engineering often seen as a masculine profession? What have women's experiences been in entering fields of science and technology? How has gender been defined by scientists? Issues: the struggles of women in science to negotiate misogyny and cultural expectation (marriage, children), reproductive issues (surrogate motherhood, visual representations of the fetus, fetal surgery, breast feeding, childbirth practices), how the household became a site of consumerism and technology, and the cultural issues at stake as women join the ranks of scientists.

Terms: not given this year | Units: 3-5 | UG Reqs: GER:DBSocSci, GER:ECGender | Grading: Letter or Credit/No Credit

ANTHRO 181A: Gender in the Middle East: Iran, Turkey, and Egypt

This course explores the construction of gender in the Middle East. Drawing on the historical, sociological and anthropological research in the region, the course aims to question the stereotypes about the subordination of Muslim women and to offer students a systematic reading and analytical discussion of the political, economic and cultural structures that inform gender relations and practices in the region. The course starts with an examination of early Islam and religious sources with regard to women¿s status, then moves on to nationalist and modernization movements in the 19th and 20th centuries, and finally explores women¿s and men¿s lives in contemporary Egypt, Tu... more description for ANTHRO 181A »

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

ANTHRO 185A: Race and Biomedicine (ASNAMST 185A)

Race, identity, culture, biology, and political power in biomedicine. Biological theories of racial ordering, sexuality and the medicalization of group difference. Sources include ethnography, film, and biomedical literature. Topics include colonial history and medicine, the politics of racial categorization in biomedical research, the protection of human subjects and research ethics, immigration health and citizenship, race-based models in health disparities research and policy, and recent developments in human genetic variation research.

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

ANTHRO 21N: The Anthropology of Globalization

Preference to freshmen. Anthropological approach to how cultural change, economic restructuring, and political mobilization are bound up together in the process of globalization.

Terms: not given this year | Units: 4 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

ANTHRO 22: Archaeology of North America

Why and how people of N. America developed. Issues and processes that dominate or shape developments during particular periods considering the effects of history and interactions with physical and social environment. Topics include the peopling of the New World, explaining subsequent diversity in substance and settlement adaptations, the development of social complexity, and the impact of European contact.

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

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 309: Advanced Evolutionary Theory in Anthropological Sciences

History of evolutionary theory from the 19th century to present, emphasizing anthropological applications. Theory and concept in evolutionary biology; evolutionary theories of culture; and interactions of genetic, social, and cultural evolution and their implications. Emphasis is on tools of analysis and the value of evolutionary thinking for formulating research questions in anthropology today. Prerequisite: graduate standing or consent of instructor. (HEF II, III)

Terms: not given this year | Units: 5 | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 32: Theories in Race and Ethnicity

Concepts and theories of race and ethnicity in the social sciences and cultural studies. U.S. based definitions, ideas, and problems of race and ethnicity are compared to those that have emerged in other areas of the world.

Terms: not given this year | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

ANTHRO 320A: Race, Ethnicity, and Language (EDUC 389X, LINGUIST 253)

This seminar explores the linguistic construction of race and ethnicity across a wide variety of contexts and communities. Throughout the course, we will take a comparative perspective and highlight how different racial/ethnic formations participate in similar, yet different, ways of "doing race" though language, interaction and culture. Readings draw heavily from perspectives in (linguistic) anthropology and sociolinguistics.

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

ANTHRO 322: From Biopolitics to Necropolitics and Beyond

Scholarship produced and informed by Michel Foucault. Focus is on the final period of Foucault¿s life; how his discussions of biopolitics, subjectification, governmentality, and death have served as touchstones for recent empirical research. Key interventions initially made under these rubrics; how anthropologists and others have applied, challenged, and extended them. Prerequisite: consent of instructor.

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

ANTHRO 332: Transformative Design (ENGR 231)

Project-based. How interactive technologies can be designed to encourage behavioral transformation. Topics such as self-efficacy, social support, and mechanism of cultural change in domains such as weight-loss, energy conservation, or safe driving. Lab familiarizes students with hardware and software tools for interaction prototyping. Students teams create functional prototypes for self-selected problem domains. Prerequisite: consent of instructor. Design Institute class; see http://dschool.stanford.edu.

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

ANTHRO 336: Anthropology of Rights

Ideas of rights at the center of contemporary politics around the world. An anthropological perspective on how rights are invoked, claimed, and translated into institutional policies in ethnographic cases. The limitations of liberal notions of rights and innovative forms of politics emerging within and against rights talk. Prerequisite: consent of instructor.

Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credit

ANTHRO 337: The Politics of Humanitarianism

What does it mean to want to help, to organize humanitarian aid, in times of crisis? At first glance, the impulse to help issui generis a good one. Helping is surely preferable to indifference and inaction. This does not mean that humanitarian interventions entail no ethical ot political stakes ¿ or that they are beyond engaged critique. We need to critique precisely that which we value, and to ask some hard questions, among them these: What are the differences among humanitarianism, charity, and philanthropy? What of social obligations and solidarities? How does the neoliberal world order currently create structural inequalities that ensure the reproduction of poverty an... more description for ANTHRO 337 »

Terms: not given this year | Units: 5 | Grading: Letter (ABCD/NP)

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)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

ANTHRO 362A: Introduction to Human Evolution, Ecology, Genetics, and Culture

Themes and topics of lasting heuristic value in the anthropological sciences. Combines the lecture content of 2A and 2B with a discussion section for graduate students. Must be taken in the Autumn Quarter of a student's first year in the graduate program.

Terms: not given this year | Units: 5 | Grading: Letter (ABCD/NP)

ANTHRO 363: Demography and Life History Theory

Problems in demography and theoretical population biology applied to human systems. Emphasis is on establishing relationships between models in theoretical population biology and empirical demographic methodology. Topics include philosophy of models and model building, population dynamics, stable population theory, species interactions in human ecology, models of infectious diseases and their control, cultural evolution. Prerequisites: HUMBIO 137 or consent of instructor.

Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credit

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 373: Things: An Archaeology of the Relationships Between Humans and Things

This course examines a variety of approaches that claim to explore the relationships between humans and things. Some of the approaches include Marx and material culture studies; Heidegger; cognitive and phenomenological; Actor Network Theory. But there is a need also to examine behavioral and ecological and Darwinian approaches. Many of these approaches do not adequately deal with the physicality of things as objects and there is a need to seek a way to incorporate such aspects of things into social theory.

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

ANTHRO 375: Archaeology and Globalism

The emergence of archaeology as a discipline in the context of the rise of the nation state. Global economies and other issues have created a new context for archaeology. How are archaeology and heritage responding? The idea of world heritage. The impact of postcolonialism. The commodification of the past: the past as theme park, as travel tourism or nostalgia, as exotic and other. Conflict between uses of the past for identity and as theme park; between heritage and resource or play. The impact of the Goddess, New Age, and other movements. Archaeology and human rights issues including forensic archaeology. Prerequisite: consent of instructor.

Terms: not given this year | Units: 4-5 | Grading: Letter (ABCD/NP)

ANTHRO 380B: Gender Bias in the Past and Future of Asia: Kinship & Society

Topics vary. May be repeated for credit. Prerequisite: consent of instructor.

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

ANTHRO 380C: Gender Bias in the Past and Future of Asia: Governance

Topics vary. May be repeated for credit. Prerequisite: consent of instructor.

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

ANTHRO 82: Medical Anthropology (ANTHRO 282)

Emphasis is on how health, illness, and healing are understood, experienced, and constructed in social, cultural, and historical contexts. Topics: biopower and body politics, gender and reproductive technologies, illness experiences, medical diversity and social suffering, and the interface between medicine and science.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 136: Biology by the Numbers (BIOC 236)

Skill building in biological quantitative reasoning. Topics include: biological size scales from proteins to ecosystems; biological time scales from enzymatic catalysis and DNA replication to evolution; biological energy, motion, and force from molecular to organismic scales; mechanisms of environmental sensing from bacterial chemotaxis to vision. Prerequisite: PHYSICS 21, 41, or consent of instructor.

Terms: not given this year | Units: 3 | Grading: Medical Option (Med-Ltr-CR/NC)

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

ARCHLGY 133: LANDSCAPE ARCHAEOLOGIES (ARCHLGY 333)

People shape the world around them and are shaped by it. How is this essential interaction examined by archaeologists? And how can a meaningful engagement with space and place be discovered in the archaeological record? Landscape foundations, human ecology, typologies, perception and bodily experience, monuments, networks, settlement systems, political landscapes, frontiers, placelessness and mobility, place histories, and the effects of revolutionary advances in data collection and organization on how archaeologists and anthropologists approach spatial data and human interaction with space and landscape will be discussed in lecture and seminar format and studied throug... more description for ARCHLGY 133 »

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

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 12AX: Drawing Intensive: Revisiting Nature

As increasing technological advances can further separate us from direct impressions of nature, this class is designed to reconnect and enhance our relationship to the natural world and our surrounding environment. To do this we will develop visual skills and critical thinking through careful observation and classical drawing techniques.\nInspired by Stanford's natural and manicured landscapes, students will enjoy the great outdoors while learning elements of perspective, composition, light, and form. Students will learn about master landscape artists, investigate the built and natural environment of the campus, and experiment with various drawing techniques, mediums, and... more description for ARTSTUDI 12AX »

Terms: not given this year | Units: 2 | Grading: Satisfactory/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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

ARTSTUDI 184: Art and Biology

The relationship between biology and art. Rather than how art has assisted the biological sciences as in medical illustration, focus is on how biology has influenced art making practice. New technologies and experimental directions, historical shifts in artists' relationship to the living world, the effects of research methods on the development of theory, and changing conceptions of biology and life. Projects address these themes and others that emerge from class discussions and presentations. (upper level)

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

ARTSTUDI 184A: Along the Track of the Yellowstone Hotspot: Fusion of Art and Science (BIO 122)

The 20-million-year-old track of the Yellowstone hotspot through western North America, using the field setting to investigate ecology, evolution, and geology through an aesthetic and documentary media lens. Students create: experiential ways to learn about the natural world; a scientific yet personal intimacy about how ecosystems work and how they change; and ways to convey their observations to the public. Required trip to Yellowstone National Park.

Terms: not given this year | Units: 4 | Grading: Letter or Credit/No Credit

BIO 1: Human Evolution and Environment

Human genetic and cultural evolution and how people interact with their environments, from the ancestors of Australopithecus to current events. Issues include race, gender, and intelligence; pesticide and antibiotic resistance; abortion and contraception; ecosystem services; environmental economics and ethics; the evolution of religion; climate change; population growth and overconsumption; origins and spread of ideas and technologies; and the distribution of political and economic power.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | 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 105A: Jasper Ridge Docent Training (EARTHSYS 105A)

Formerly 96A. First of two-quarter sequence training program to join the Jasper Ridge education program. The scientific basis of ecological research in the context of a field station, hands-on field research, field ecology and the natural history of plants and animals, archaeology, geology, hydrology, land management, multidisciplinary environmental education; and research projects, as well as management challenges of the preserve presented by faculty, local experts, and staff. Participants lead research-focused educational tours, assist with classes, and attend continuing education classes available to members of the JRBP community after the course.

Terms: Win | Units: 4 | Grading: Satisfactory/No Credit

BIO 105B: Jasper Ridge Docent Training (EARTHSYS 105B)

Formerly 96B. Second of two-quarter sequence training program to join the Jasper Ridge education program. Multidisciplinary environmental education; hands-on field research. Field ecology and the natural history of plants and animals, archaeology, geology, hydrology, land management, and research projects of the preserve presented by faculty, local experts, and staff. Participants lead research-focused educational tours, assist with classes, and attend continuing education classes available to members of the JRBP community after the course. Prerequisite: 96A.

Terms: Spr | Units: 4 | Grading: Satisfactory/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 114: Field Course on Tropical Biogeochemistry: Amazon as Case Study (EARTHSYS 114)

Post-field seminar for students who went on the two-week field trip to the Amazon in September with Brazilian students under Professor Martinelli of the University of São Paulo and Stanford Latin American Studies. Land use changes over the last 30 years including the conversion of natural forest for cattle ranching and soy beans in the Amazon, the largest continuous area of tropical forests on Earth with the greatest number of plant and animal species. In English.

Terms: not given this year | Units: 3 | Grading: Satisfactory/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 11N: Biotechnology in Everyday Life

Preference to freshmen. The science that makes transgenic plants and animals possible. Current and future applications of biotechnology and the ethical issues raised.

Terms: alternate years, given next year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIO 121: Biogeography

Global distributions of organisms through the Phanerozoic, with emphasis on historical causes. Topics: plate tectonics, island biogeography, climatic change, dispersal, vicariance, ecology of invasions, extinction, gradients, diversity. Satisfies Central Menu Area 4.

Terms: not given this year | Units: 3 | 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 136: Evolutionary Paleobiology

A paleontological approach to evolutionary theory. Topics: history of life, speciation, heterochrony, evolutionary constraint, coevolution, macroevolution, the Cambrian Explosion, mass extinctions, taphonomy, life on land, life in the sea, life in the air. Satisfies Central Menu Area 4. Prerequisite: Biology Core.

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

BIO 137: Plant Genetics (BIO 237)

Gene analysis, mutagenesis, transposable elements; developmental genetics of flowering and embryo development; biochemical genetics of plant metabolism; scientific and societal lessons from transgenic plants. Satisfies Central Menu Area 2. Prerequisite: Biology core or consent of instructor.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

BIO 139: Biology of Birds

How birds interact with their environments and each other, emphasizing studies that had impact in the fields of population biology, community ecology, and evolution. Local bird communities. Emphasis is on field research. Enrollment limited to 20. Prerequisites: 43 or equivalent, and consent of instructor. Recommended: birding experience.

Terms: Spr, alternate years, not given next year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIO 13N: Environmental Problems and Solutions

Preference to freshmen. Students do independent investigations of current environmental problems, analyzing differing views of them and discussing possible solutions. Each student gives seminar presentations and leads seminar discussions. Short, documented position papers are written for policy makers.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

BIO 140: Population Biology of Butterflies

Field work on Euphydryas populations under study on campus and elsewhere in California. Course offered as participation in research when conditions permit; decisions not made until Winter Quarter. Prerequisites: 43 and consent of instructor.

Terms: not given this year | Units: 2-5 | Grading: Letter or Credit/No Credit

BIO 143: Evolution (BIO 243)

The basic facts and principles of the evolution of all life. The logic of and evidence for the correctness of Darwin's argument for evolution by natural selection. How Mendelian genetics was integrated into evolutionary thinking. The integration of physiological and ecological perspectives into the study of evolutionary adaptation within species. Species formation and evolutionary divergence among species. Patterns of evolution over long time scales. Satisfies Central Menu Area 4.

Terms: Aut | 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 145: Behavioral Ecology (BIO 245)

Animal behavior from an evolutionary and ecological perspective. Topics: foraging, territoriality, reproductive behavior, social groups. Lecture/ seminar format; seminars include discussion of journal articles. Independent research projects. Satisfies Central Menu Area 4. Prerequisites: Biology or Human Biology core, or consent of instructor. Recommended: statistics.

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

BIO 146: Population Studies

Series of talks by distinguished speakers introducing approaches to population and resource studies.

Terms: Win | Units: 1 | Repeatable for credit | Grading: Satisfactory/No Credit

BIO 14N: Plants and Civilization

Preference to freshmen. The role of plants in the development of civilization. Topics: the use of forests, woodlands, and grazing lands; centers of origins and spread of crops; viticulture, and wine and beer making; the spice route and the age of exploration; the use of plants as medicine; the global spread of weeds; engineering plants for the future; the importance of tea, coffee, chocolate, sugar, potatoes, natural dyes, and rubber in societal affairs and change.

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

BIO 164: Biosphere-Atmosphere Interactions (BIO 264)

Physiological, ecological, and physical aspects of ecosystem function, emphasizing how ecosystems influence and are influenced by the atmosphere. Prerequisites: 42, 43; or consent of instructor.

Terms: Win, alternate years, not given next year | Units: 4 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

BIO 16N: Island Ecology

Preference to freshmen. How ecologists think about the world. Focus is on the Hawaiian Islands: origin, geology, climate, evolution and ecology of flora and fauna, and ecosystems. The reasons for the concentration of threatened and endangered species in Hawaii, the scientific basis for their protection and recovery. How knowledge of island ecosystems can contribute to ecology and conservation biology on continents.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

BIO 175: Tropical Ecology and Conservation

Field trip to a field station at Los Tuxtlas, Mexico; lectures at Stanford. How to address scientific questions concerning ecology and conservation. Field trip includes natural history observations and group research projects. Symposium based on project results. Recommended: 43, 101, and 141 or STATS 60.

Terms: not given this year | Units: 5 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIO 196A: Biology Senior Reflection

Capstone course series for seniors. Creative, self-reflective and scientifically relevant projects conceived, produced and exhibited over the course of three quarters. Explore scientific content of personal interest through creative forms including but not limited to writing, music, fine arts, performing arts, photography, film or new media. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. Completed projects may be included in a creative portfolio. Required enrollment in 196A,B,C.

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

BIO 196B: Biology Senior Reflection

Capstone course series for seniors. Creative, self-reflective and scientifically relevant projects conceived, produced and exhibited over the course of three quarters. Explore scientific content of personal interest through creative forms including but not limited to writing, music, fine arts, performing arts, photography, film or new media. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. Completed projects may be included in a creative portfolio. Required enrollment in 196A,B,C.

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

BIO 196C: Biology Senior Reflection

Capstone course series for seniors. Creative, self-reflective and scientifically relevant projects conceived, produced and exhibited over the course of three quarters. Explore scientific content of personal interest through creative forms including but not limited to writing, music, fine arts, performing arts, photography, film or new media. A written essay on the creative process and scientific significance of the selected topic will accompany the creative work. Completed projects may be included in a creative portfolio. Required enrollment in 196A,B,C.

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

BIO 206: Field Studies in Earth Systems (EARTHSYS 189, EESS 189)

For advanced upper-division undergraduates and graduate students. Field-based, focusing on the components and processes by which terrestrial ecosystems function. Topics from biology, chemistry, ecology, geology, and soil science. Lecture, field, and lab studies emphasize standard field techniques, experimental design, analysis of data, and written and oral presentation. Small team projects test the original questions in the functioning of natural ecosystems. Admission by application; see Axess. Prerequisites: BIO 141 or EESS 160 (formerly GES 160), or equivalent.

Terms: not given this year | Units: 5 | Grading: Letter (ABCD/NP)

BIO 216: Terrestrial Biogeochemistry (EESS 216)

Nutrient cycling and the regulation of primary and secondary production in terrestrial, freshwater, and marine ecosystems; land-water and biosphere-atmosphere interactions; global element cycles and their regulation; human effects on biogeochemical cycles. Prerequisite: graduate standing in science or engineering; consent of instructor for undergraduates or coterminal students.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

BIO 227: Foundations of Community Ecology

Discussion of classic papers in community ecology (Forbes, Clements, Gleason, Grinnell, Lindeman, Preston, Elton, Hutchinson, May, MacArthur, Odum, Connell, Paine, Tilman, etc.) and contemporary papers on related topics, to develop historical perspectives to understand current issues and identify future directions. Prerequisite for undergraduates: consent of instructor.

Terms: Win, alternate years, not given next year | Units: 2 | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

BIO 275: Ecological Modeling

Develop literacy in ecological models and modeling; understand how to critically evaluate models as well as make a start at framing one's own models. Topics include: classical models of interacting species and ecosystems; global models used to develop future scenarios; resource use and human impact models for improved management decisions; techniques for analyzing and validating models and characterizing uncertainty.

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

BIO 3: Frontiers in Marine Biology

An introduction to contemporary research in marine biology, including ecology, conservation biology, environmental toxicology, behavior, biomechanics, evolution, neurobiology, and molecular biology. Emphasis is on new discoveries and the technologies used to make them. Weekly lectures by faculty from the Hopkins Marine Station.

Terms: Aut | Units: 1 | Grading: Satisfactory/No Credit

BIO 302: Current Topics and Concepts in Population Biology, Ecology, and Evolution

Required of first-year PhD students in population biology, and ecology and evolution. Major conceptual issues and developing topics.

Terms: Aut | Units: 1 | Grading: Satisfactory/No Credit

BIO 303: Current Topics and Concepts in Population Biology, Ecology, and Evolution

Required of first-year PhD students in population biology, and ecology and evolution. Major conceptual issues and developing topics.

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

BIO 304: Current Topics and Concepts in Population Biology, Ecology, and Evolution

Required of first-year PhD students in population biology, and ecology and evolution. Major conceptual issues and developing topics.

Terms: Spr | Units: 1 | Grading: Satisfactory/No Credit

BIO 312: Ethical Issues in Ecology and Evolutionary Biology

Focus is on ethical issues addressed in Donald Kennedy's *Academic Duty* and others of importance to academics and scientists in the fields of ecology, behavior, and evolutionary biology. Discussions led by faculty and outside guests. Satisfies ethics course requirement for ecology and evolutionary biology. Prerequisite: PhD student in the ecology and evolutionary biology or marine program, or consent of instructor.

Terms: Aut | Units: 1 | Grading: Satisfactory/No Credit

BIO 31Q: Ants: Behavior, Ecology, and Evolution

Preference to sophomores. Behavior: the organization of colonies, how they operate without central control, how they resemble other complex systems like brains. Ecology: how populations of colonies change, comparing the ecology of a species in SW American desert and invasive Argentine ants. Evolution: why are there so many species of ants; how are they alike, how do they differ, and why? Ants as the theme for exploring how to do research in animal behavior, ecology, and evolution. Research project will be on the invasive Argentine ant: its distribution on campus, foraging trails, and nest structure.

Terms: not given this year | Units: 3 | Grading: Satisfactory/No Credit

BIO 321: Ecological Genetics

Systematic exploration of (1) the types of questions that can be addressed by ecological genetics techniques (i.e., community genomics, genetic variation between species in the same ecosystem, resource use, landscape genetics, etc.); (2) laboratory techniques available; and (3) analyses and modeling best suited for ecological genetics questions. Analysis of specific research problems and efforts (now underway or planned for the near future) among seminar participants, and discussion of these efforts with group review of the relative merits of alternative approaches.

Terms: Spr | Units: 1 | 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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

BIO 323: Detecting Climate-Driven Changes in California Plant Ranges

Seminar. For advanced undergraduates and graduate students. Future anthropogenic climate change will continue to alter plant communities, plant ranges, and ecosystems. Studies have already documented plant and animal range shifts across the globe, yet many questions remain as to how plants will respond to climate change. Which taxa and functional groups will be most sensitive to changes in climate? What will happen to ecological communities with differential response of plant species to climate? Focus is on analyzing trends in climate change and long-term plant distribution data in California. May be repeated for credit. Prerequisite: familiarity with statistical, spatial... more description for BIO 323 »

Terms: not given this year | Units: 1-2 | Repeatable for credit | Grading: Letter or Credit/No Credit

BIO 324: Interpreting Ecological Data

Experimental design and the theory behind and appropriate use of parametric statistics including: student t-test; analysis of variance; linear regression and some variations including logistic regression and multiple regression; analysis of covariance; chi-squared similarity test; testing the independence of multiple tests; Monte Carlo and bootstrapping methods. Students encouraged to use data from their own research. Course does not fulfill undergraduate statistics requirement. Prerequisite: consent of instructor.

Terms: not given this year | Units: 4 | Grading: Letter or Credit/No Credit

BIO 326: Foundations in Biogeography

Seminar. Focus on classic papers covering the global distribution and abundance of organisms through time. Topics include: phylogenetics, phylogeography, plate tectonics, island biogeography, climatic change, dispersal, vicariance, ecology of invasions, extinction, gradients, diversity, conservation and a history of the field.

Terms: alternate years, given next year | Units: 2 | 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 342: Plant Biology Seminar

Topics announced at the beginning of each quarter. Current literature. May be repeated for credit. See http://carnegiedpb.stanford.edu/seminars/seminars.php.

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

BIO 34N: Hunger

The biology of hunger and satiety, disease states that disrupt normal responses to hunger and satiety, starvation responses and adaptations to starvation in a variety of organisms, food production and distribution mechanisms, historic famines and their causes, the challenges of providing adequate food and energy for the Earth's growing population, local and global efforts to alleviate hunger, and hunger in fiction.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIO 37N: Green Revolution and Plant Biotechnology

Feeding ever-growing populations is a constant challenge to mankind. In the second half of the 20th century, the breeding of improved varieties combined with the use of chemical fertilizers and pesticides led to crop yield increases labeled the Green Revolution. Modern technologies in genetic engineering are expected to bring the second green revolution. Meeting the current and future global food needs without further damaging the fragile environment requires innovative effort from scientists and the society.

Terms: alternate years, given next year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIO 38N: Photosynthesis: From Basic Mechanisms to Biofuels

Preference to freshmen. Photosynthetic processes in terrestrial and aquatic environments. Biological and chemical ways that have been developed to capture the energy of sunlight; how this light energy can be converted to usable forms of energy, including biofuels; and potential impacts of anthropogenic energy generation on the health of the planet.

Terms: alternate years, given next year | Units: 3 | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

BIO 39N: Networks in Biology

Networks are everywhere, including friendship links on Facebook, airline routes, power grids, and the Internet. Biology is no exception. Examples include food chains, protein interaction maps, and metabolic pathways. Despite their ubiquitousness, the study of networks in the real world only started about a decade ago. Exploration of the types of networks in biology and the approaches people use in studying them. Discussions and presentations of original research papers.

Terms: alternate years, given next year | Units: 3 | Grading: Letter or Credit/No Credit

BIO 3N: Views of a Changing Sea: Literature & Science

The state of a changing world ocean, particularly in the eastern Pacific, will be examined through historical and contemporary fiction, non-fiction and scientific publications. Issues will include harvest and mariculture fisheries, land-sea interactions and oceanic climate change in both surface and deep waters.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

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

BIO 459: Frontiers in Interdisciplinary Biosciences (BIOC 459, BIOE 459, CHEM 459, CHEMENG 459, PSYCH 459)

Students register through their affiliated department; otherwise register for CHEMENG 459. For specialists and non-specialists. Sponsored by the Stanford BioX Program. Three seminars per quarter address scientific and technical themes related to interdisciplinary approaches in bioengineering, medicine, and the chemical, physical, and biological sciences. Leading investigators from Stanford and the world present breakthroughs and endeavors that cut across core disciplines. Pre-seminars introduce basic concepts and background for non-experts. Registered students attend all pre-seminars; others welcome. See http://biox.stanford.edu/courses/459.html. Recommended: basic mathem... more description for BIO 459 »

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

BIO 7S: Introduction to Biology

The major fields of biology: biochemistry, the cell, evolution, and diversity. Foundation for higher-level biology courses.

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

BIO 8N: Human Evolution

A survey of the anatomical and behavioral evidence for human evolution and of the increasingly important information from molecular genetics. Emphasis on the split between the human and chimpanzee lines 6-7 million years ago, the appearance of the australopiths by 4.1 million years ago, the emergence of the genus Homo about 2.5 million years ago, the spread of Homo from Africa 1.7-1.6 million years ago, the subsequent divergence of Homo into different species on different continents, and the expansion of fully modern humans (Homo sapiens) from Africa about 50,000 years ago to replace the Neanderthals and other non-modern Eurasians.

Terms: not given this year | Units: 5 | Grading: Letter (ABCD/NP)

BIOHOPK 161H: Invertebrate Zoology (BIOHOPK 261H)

(Graduate students register for 261H.) Survey of invertebrate diversity emphasizing form and function in a phylogenetic framework. Morphological diversity, life histories, physiology, and ecology of the major invertebrate groups, concentrating on local marine forms as examples. Current views on the phylogenetic relationships and evolution of the invertebrates. Lectures, lab, plus field trips. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor.

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

BIOHOPK 162H: Comparative Animal Physiology (BIOHOPK 262H)

(Graduate students register for 262H.) How animals work. Topics: physiology of respiration, circulation, energy metabolism, thermal regulation, osmotic regulation, muscle physiology, and locomotion. Evolutionary and ecological physiology. Lectures, lab, and field research. An option to combine the course work with a more intensive research focus, with more units, is available. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor.

Terms: Spr, alternate years, given next year | Units: 5-8 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 164H: Marine Botany (BIOHOPK 264H)
(Graduate students register for 264H.) Introduction to plants in the sea. Phytoplankton and oceanic productivity; macrophytes and nearshore ecology; marine angiosperms from taxonomical, physiological, and ecological perspectives. Lectures, lab. Prerequisite: Biology core or consent of instructor.
Terms: Win, alternate years, not given next year | Units: 5 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIOHOPK 171H: Ecological and Evolutionary Physiology (BIOHOPK 271H)
(Graduate students register for 271H.) The interplay between environmental factors, such as temperature, light, nutrient supply, salinity, and oxygen availability, and adaptive change at the physiological level. Emphasis is on marine species and the roles played by physiological adaptations in establishing their distribution and performance. Satisfies Central Menu Area 3 for Bio majors. Prerequisite: Biology core or consent of instructor.
Terms: Spr | Units: 4 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

BIOHOPK 172H: Marine Ecology (BIOHOPK 272H)
(Graduate students register for 272H.) Focus is on quantitative approaches to questions in marine ecology and ecophysiology. Statistical methods, including multivariate statistical approaches and meta-analysis. Satisfies Central Menu Area 4 for Bio majors. Prerequisite: Biology core or consent of instructor.
Terms: Win | Units: 5 | 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 175H: Problems in Kelp Forest Ecology and Microbial Ecology
Intensive field and lab-based course to gain practical experience in experimental design and analysis. Learn field and laboratory techniques in focal areas to conduct original research integrated with on-going research in the Hopkins Marine Life Observatory. Focal areas include kelp-herbivore interactions and microbial ecology of kelp forests. Prerequisites: Biology core or equivalent, Statistics, or concurrent enrollment in BIOHOPK 174H, consent of instructor.
Terms: Spr | Units: 10-12 | UG Reqs: GER:DBNatSci | 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 184H: Holistic Biology: Monterey Bay and the Sea of Cortez (BIOHOPK 284H)
(Graduate students register for 284H.) For majors and non-majors. Complexity in natural systems from complementary points of view, including scientific, historical, philosophical, and literary. The work and writings of Ed Ricketts and John Steinbeck and historical and contemporary works concerning marine ecology and fisheries. Field work, laboratory studies with living invertebrates, and an individual research project. Course includes a component in Baja California, Mexico. Only 6 units may count towards the Biology major.
Terms: alternate years, given next year | Units: 16 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 contribut e 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 187H: Sensory Ecology (BIOHOPK 287H)

(Graduate students register for 287H.) Topics: the ways animals receive, filter, and process information gleaned from the environment, sensory receptor mechanisms, neural processing, specialization to life underwater, communication within and between species, importance of behavior to ecosystem structure and dynamics, impact of acoustic and light pollution on marine animals. Emphasis is on the current scientific literature. The laboratory portion of the class explores sensory mechanisms using neurobiological methods and methods of experimental animal behavior.

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

BIOHOPK 274: Hopkins Microbiology Course (BIO 274S, CEE 274S, EESS 253S)

(Formerly GES 274S.) Four-week, intensive. The interplay between molecular, physiological, ecological, evolutionary, and geochemical processes that constitute, cause, and maintain microbial diversity. How to isolate key microorganisms driving marine biological and geochemical diversity, interpret culture-independent molecular characterization of microbial species, and predict causes and consequences. Laboratory component: what constitutes physiological and metabolic microbial diversity; how evolutionary and ecological processes diversify individual cells into physiologically heterogeneous populations; and the principles of interactions between individuals, their populatio... more description for BIOHOPK 274 »

Terms: Sum | Units: 9-12 | Repeatable for credit | Grading: Letter or Credit/No Credit

BIOHOPK 277H: Biomechanics, Ecological Physiology, and Genetics of Intertidal Communities

Four week course. Introduction to the mechanical and physiological design of wave-swept organisms. How different abiotic stresses (wave exposure, wind speed, temperature, light) influence marine animals and plants, and adaptive responses to these stresses. Lab introduces methods for measuring environmental stress and organismal responses. Recommended: background in algology, intertidal ecology, or invertebrate zoology; basic physics and calculus.

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

BIOHOPK 280: Short Course on Ocean Policy

Course will introduce graduate students in the natural and social sciences to ocean policy and governance, and how science influences public policy decisions at the international, national and state levels. Students will learn about pressing challenges to ocean health, and together with leaders in ocean science and policy, examine how science and scientists can work with the policy-making process to address these challenges. Prerequisite: consent of instructor.\n\n\nCourse will use urgent ocean policy issues, such as ocean acidification and fisheries management, to demonstrate the complexity of ocean-related decision-making. Students will examine the roles of natural sci... more description for BIOHOPK 280 »

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

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

BIOMEDIN 156: Economics of Health and Medical Care (BIOMEDIN 256, ECON 126, HRP 256)

Graduate students with research interests should take ECON 248. Institutional, theoretical, and empirical analysis of the problems of health and medical care. Topics: institutions in the health sector; measurement and valuation of health; nonmedical determinants of health; medical technology and technology assessment; demand for medical care and medical insurance; physicians, hospitals, and managed care; international comparisons. Prerequisites: ECON 50 and ECON 102A or equivalent statistics. Recommended: ECON 51.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 129S: Climate Change Adaptation in the Coastal Built Environment (CEE 229S)

How will climate change impact coastal ports and harbors around the world? Leading experts discuss the latest science, policy, and engineering research on this important issue, including the necessary response to protect ports and harbors from significant sea-level rise and storm surge. Focus is on the built environment. Guest speakers. CEE 229/129 for research option. See www.groupspaces.com/seaports2100.

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

CEE 134A: Site and Space

Preference to Architectural Design and CEE majors; others by consent of instructor. An architectural design studio exploring the Stanford Green Dorm project. 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: not given this year | Units: 4 | Grading: Letter (ABCD/NP)

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)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CEE 138A: Contemporary Architecture: Materials, Structures, and Innovations

Structural and material bases for contemporary architecture; its roots in modern innovations. Recent technological developments; new materials and structural expressions. Sources include specific buildings and construction techniques. How to think critically about design strategies, material properties, and structural techniques.

Terms: not given this year | Units: 3 | 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 161A: Rivers, Streams, and Canals (CEE 264A)

Introduction to the movement of water through natural and engineered channels, streams, and rivers. Basic equations and theory (mass, momentum, and energy equations) for steady and unsteady descriptions of the flow. Application of theory to the design of flood- control and canal systems. Flow controls such as weirs and sluice gates; gradually varied flow; Saint-Venant equations and flood waves; and method of characteristics. Open channel flow laboratory experiments: controls such as weirs and gates, gradually varied flow, and waves. Limited enrollment in lab section.

Terms: Aut, Sum | Units: 3-4 | UG Reqs: GER:DBEngrAppSci | Grading: Letter (ABCD/NP)

CEE 164: Introduction to Physical Oceanography (CEE 262D, EARTHSYS 164)

The dynamic basis of oceanography. Topics: physical environment; conservation equations for salt, heat, and momentum; geostrophic flows; wind-driven flows; the Gulf Stream; equatorial dynamics and ENSO; thermohaline circulation of the deep oceans; and tides. Prerequisite: PHYSICS 41 (formerly 53).

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

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 166A: Watersheds and Wetlands (CEE 266A)

Introduction to the occurrence and movement of water in the natural environment and its role in creating and maintaining terrestrial, wetland, and aquatic habitat. Hydrologic processes, including precipitation, evaporation, transpiration, snowmelt, infiltration, subsurface flow, runoff, and streamflow. Rivers and lakes, springs and swamps. Emphasis is on observation and measurement, data analysis, modeling, and prediction. Prerequisite: 101B or equivalent. (Freyberg)

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

CEE 166B: Floods and Droughts, Dams and Aqueducts (CEE 266B)

Sociotechnical systems associated with human use of water as a resource and the hazards posed by too much or too little water. Potable and non-potable water use and conservation. Irrigation, hydroelectric power generation, rural and urban water supply systems, storm water management, flood damage mitigation, and water law and institutions. Emphasis is on engineering design. Prerequisite: 166A or equivalent. (Freyberg)

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

CEE 166D: Water Resources and Water Hazards Field Trips (CEE 266D)

Introduction to water use and water hazards via weekly field trips to local and regional water resources facilities (dams, reservoirs, fish ladders and hatcheries, pumping plants, aqueducts, hydropower plants, and irrigation systems) and flood damage mitigation facilities (storm water detention ponds, channel modifications, flood control dams, and reservoirs). Each trip preceded by an orientation lecture.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CEE 169: Environmental and Water Resources Engineering Design

Application of fluid mechanics, hydrology, water resources, environmental sciences, and engineering economy fundamentals to the design of a system addressing a complex problem of water in the natural and constructed environment. Problem changes each year, generally drawn from a challenge confronting the University or a local community. Student teams prepare proposals, progress reports, oral presentations, and a final design report. Prerequisite: senior in Civil Engineering or Environmental Engineering; 166B.

Terms: alternate years, given next year | Units: 5 | Grading: Letter (ABCD/NP)

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 171E: Environmental Challenges and Policies in Europe (CEE 271E)

Current and future environmental challenges in Europe and related public policies in the European Union (EU). State of the European environment and human development, European environmental policy-making (multi-level ecological governance), global ecological role of the EU. Specific challenges include climate change adaptation, mitigation (carbon taxes, carbon market), climate change and European cities, biodiversity and ecosystems preservation (economics of biodiversity), energy management. Specific policies include environmental justice (environmental inequalities), human development and environmental sustainability indicators (beyond GDP) and absolute and relative deco... more description for CEE 171E »

Terms: Sum | Units: 3 | 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 172A: Indoor Air Quality (CEE 278C)

Factors affecting the levels of air pollutants in the built indoor environment. The influence of ventilation, office equipment, floor coverings, furnishings, cleaning practices, and human activities on air quality including carbon dioxide, VOCs, resuspended dust, and airborne molds and fungi. Recommended: 172 or 278A.

Terms: Spr | Units: 2-3 | 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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 176F: Energy Systems Field Trips: China Energy Systems (CEE 276F)
Energy resources and policies in use and under development in China. 12-day field trip to China during Spring Break 2012. One unit for seminar and readings; one unit for field trip. Prerequisite: consent of instructor for field trip.
Terms: alternate years, given next year | Units: 1-2 | Grading: Satisfactory/No Credit

CEE 176S: Instrumental Analysis of Microconstituents in the Environment (CEE 276S)
Current research, practice, and thinking in environmental engineering and science. Featuring presentations by invited faculty, researchers and professionals to share their insight and perspectives on environmental issues. Students will prepare brief summaries of seminar presentations and associated readings. For 2-unit option, students will also prepare and give a short presentation on a relevant environmental topic.
Terms: Sum | Units: 3 | Grading: Letter or Credit/No Credit

CEE 177: Aquatic Chemistry and Biology
Introduction to chemical and biological processes in the aqueous environment. Basic aqueous equilibria; the structure, behavior, and fate of major classes of chemicals that dissolve in water; redox reactions; the biochemistry of aquatic microbial life; and biogeochemical processes that govern the fate of nutrients and metals in the environment and in engineered systems. Prerequisite: CHEM 31.
Terms: Aut | Units: 4 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

CEE 177P: Sustainability in Theory and Practice
The multidimensional concept of sustainable development. Students evaluate engineered systems using tools such as cost-benefit analysis, trade-off analysis, and lifecycle analysis. How to make judgments about sustainable and unsustainable courses of action. Case studies dealing with contemporary environmental and economic challenges.
Terms: not given this year | Units: 3 | Grading: Letter (ABCD/NP)

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 177X: Current Topics in Sustainable Engineering (CEE 277X)
Weekly seminar course run by Engineers for Sustainable World (ESW) student group in conjunction with faculty advisors. Speakers come in weekly to orient students to the science and engineering that is the foundation for current ESW projects. Instructor consent required.
Terms: Win | Units: 1 | Grading: Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CEE 178: Introduction to Human Exposure Analysis (CEE 276)

(Graduate students register for 276.) Scientific and engineering issues involved in quantifying human exposure to toxic chemicals in the environment. Pollutant behavior, inhalation exposure, dermal exposure, and assessment tools. Overview of the complexities, uncertainties, and physical, chemical, and biological issues relevant to risk assessment. Lab projects. Recommended: MATH 51. Apply at first class for admission.

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

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 179S: Environmental Engineering Seminar (CEE 279S)

Current research, practice, and thinking in environmental engineering and science. Special summer edition features presentations by invited speakers and enrolled students. Students will prepare and give two short presentations, and will be provided feedback on presentation skills. For 2-unit option, students will write seminar summaries of presentations by two invited speakers.

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

CEE 206: Decision Analysis for Civil and Environmental Engineers

Current challenges in selecting an appropriate site, alternate design, or retrofit strategy based on environmental, economic, and social factors can be best addressed through applications of decision science. Basics of decision theory, including development of decision trees with discrete and continuous random variables, expected value decision making, utility theory value of information, and elementary multi-attribute decision making will be covered in the class. Examples will cover many areas of civil and environmental engineering problems. Prerequisite: CEE 203 or equivalent.

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

CEE 217: Renewable Energy Infrastructure

coming later

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

CEE 226: Life Cycle Assessment for Complex Systems

Life cycle modeling of products, industrial processes, and infrastructure/building systems; material and energy balances for large interdependent systems; environmental accounting; and life cycle costing. These methods, based on ISO 14000 standards, are used to examine emerging technologies, such as biobased products, building materials, building integrated photovoltaics, and alternative design strategies, such as remanufacturing, dematerialization, LEED, and Design for Environment: DfE. Student teams complete a life cycle assessment of a product or system chosen from industry.

Terms: Aut | Units: 3-4 | 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 227: Global Project Finance

Public and private sources of finance for large, complex, capital-intensive projects in developed and developing countries. Benefits and disadvantages, major participants, risk sharing, and challenges of project finance in emerging markets. Financial, economic, political, cultural, and technological elements that affect project structures, processes, and outcomes. Case studies. Limited enrollment.

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

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)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CEE 241A: Infrastructure Project Development (CEE 141A)

Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities, and communications sectors. Analysis of the condition of the nation's infrastructure and how projects are planned and financed. Focus is on public works projects in the U.S.. The role of public and private sectors through a step-by-step study of the project development process. Case studies of real infrastructure projects. Industry guest speakers. Field trips to real world of project development.

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

CEE 241B: Infrastructure Project Delivery (CEE 141B)

Infrastructure is critical to the economy, global competitiveness and quality of life. Topics include energy, transportation, water, public facilities ,and communications sectors. Analysis of how projects are designed, constructed, operated, and maintained. Focus is on public works projects in the U.S. Alternative project delivery approaches and organizational strategies. Case studies of real infrastructure projects. Industry guest speakers. Field trips to real world of project delivery.

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

CEE 241C: Global Infrastructure Projects Seminar (CEE 141C)

Infrastructure is critical to the economy, global competitiveness, and quality of life. Course analyzes and compares the development and delivery of mega-projects around the world. Alternative project delivery methods, the role of public and private sector, different project management strategies, and lessons learned. Case studies of real infrastructure projects. Industry guest speakers. Field trips to local projects.

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

CEE 243: Predicting and Measuring Building Energy Use

Energy modeling has entered commercial use and can help evaluate the impact of potential energy-saving interventions in commercial building design. Methods to create building information models to enable energy analysis, use energy analysis tools and interpret their results for commercial buildings, analyze measured building performance and relate prediction to measurement, and develop guidance for owners on how to use these methods in practice. May be repeated for credit. Prerequisites: Revit or Digital Project competence or CEE 210, CEE 211, or CEE 135 with equivalent experience. Recommended: energy modeling experience, CEE 176A, CEE 226E, or CEE 256.

Terms: Spr | Units: 2-3 | Grading: Letter or Credit/No Credit

CEE 245A: Global Project Seminar

Issues related to large, complex, global development projects including infrastructure development, urban and rural development, and the development of new cities. Guest presentations by industry practitioners and academics, including: Sabeer Bhatia, founder of Hotmail and architect of NanoCity; Ian Bremmer, CEO of the Eurasia Group, and Greg Huger, managing director of AirliePartners. May be repeated for credit.

Terms: not given this year | Units: 3 | Repeatable for credit | Grading: Letter or Credit/No Credit

CEE 248G: Certifying Green Buildings

Open to all disciplines. Goal is prepare students for the United States Green Building Council's professional accreditation exam. Basic metrics for project certification via USGBC's LEED rating system. Recommended: familiarity with design and construction terminology .

Terms: not given this year | Units: 1 | Grading: Letter (ABCD/NP)

CEE 256: Building Systems (CEE 156)

HVAC, lighting, and envelope systems for commercial and institutional buildings, with a focus on energy efficient design. Knowledge and skills required in the development of low-energy buildings that provide high quality environment for occupants.

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

CEE 257: Building Systems Practice

Technical fundamentals, major components, connecting elements, field operations for active building systems: HVAC, electric power, water and waste, fire protection, control and instrumentation and vertical transportation. Integration, coordination and commissioning of systems. Field trip to HVAC specialty contractor.

Terms: Spr | Units: 1 | Grading: Satisfactory/No Credit

CEE 262B: Transport and Mixing in Surface Water Flows
Application of fluid mechanics to problems of pollutant transport and mixing in the water environment. Mathematical models of advection, diffusion, and dispersion. Application of theory to problems of transport and mixing in rivers, estuaries, and lakes and reservoirs. Recommended: 262A and CME 102 (formerly ENGR 155A), or equivalents.
Terms: Win | Units: 3-4 | Grading: Letter or Credit/No Credit

CEE 262E: Lakes and Reservoirs
Physics and water quality dynamics in lakes and reservoirs. Implementation of physical and biogeochemical processes in 1-D models. Recommended: 262B.
Terms: not given this year | Units: 2-3 | Grading: Letter or Credit/No Credit

CEE 262F: Ocean Waves
The fluid mechanics of surface gravity waves in the ocean of relevance to engineers and oceanographers. Topics include irrotational waves, wave dispersion, wave spectra, effects of bathymetry (shoaling), mass transport, effects of viscosity, and mean currents driven by radiation stresses. Prerequisite: CEE 262A or a graduate class in fluid mechanics.
Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

CEE 263A: Air Pollution Modeling
The numerical modeling of urban, regional, and global air pollution focusing on gas chemistry and radiative transfer. Stratospheric, free-tropospheric, and urban chemistry. Methods for solving stiff systems of chemical ordinary differential, including the multistep implicit-explicit method, Gear's method with sparse-matrix techniques, and the family method. Numerical methods of solving radiative transfer, coagulation, condensation, and chemical equilibrium problems. Project involves developing a basic chemical ordinary differential equation solver. Prerequisite: CS 106A or equivalent.
Terms: alternate years, given next year | Units: 3-4 | Grading: Letter or Credit/No Credit

CEE 263B: Numerical Weather Prediction
Numerical weather prediction. Continuity equations for air and water vapor, the thermodynamic energy equation, and momentum equations derived for the atmosphere. Numerical methods of solving partial differential equations, including finite-difference, finite-element, semi-Lagrangian, and pseudospectral methods. Time-stepping schemes: the forward-Euler, backward-Euler, Crank-Nicolson, Heun, Matsuno, leapfrog, and Adams-Bashforth schemes. Boundary-layer turbulence parameterizations, soil moisture, and cloud modeling. Project developing a basic weather prediction model. Prerequisite: CS 106A or equivalent.
Terms: Spr | Units: 3-4 | Grading: Letter or Credit/No Credit

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 265D: Water and Sanitation in Developing Countries
Economic, social, political, and technical aspects of sustainable water supply and sanitation service provision in developing countries. Case studies from Asia, Africa, and Latin America. Service pricing, alternative institutional structures including privatization, and the role of consumer demand and community participation in the planning process. Environmental and public health considerations, and strategies for serving low-income households. Limited enrollment. Prerequisite: consent of instructor.
Terms: Win | Units: 1-3 | Grading: Letter (ABCD/NP)

CEE 266C: Advanced Topics in Hydrology and Water Resources
Graduate seminar. Focus is on one or more hydrologic processes or water resources systems. Topics vary based on student and instructor interest. Examples include freshwater wetland hydrology, watershed-scale hydrologic modeling, renaturalization of stream channels, reservoir sediment management, and dam removal. Enrollment limited. Prerequisites: 266A,B, or equivalents. Recommended: 260A or equivalent.
Terms: Spr | Units: 3 | Grading: Letter (ABCD/NP)

CEE 268E: Engineered Subsurface Systems: Geothermal, Carbon Sequestration & Nuclear \n\nWaste Storage.
Overview of the science and fundamentals behind Enhanced Geothermal Systems (EGSs), Geological Carbon Sequestration (GCS), and Nuclear Waste Disposal (NWD) in the subsurface. Subjects covered include: Geological, hydrological, geophysical, and geomechanical site characterization; fundamentals of single and multi-phase flow, heat and mass transport in porous and fractured media; stimulation of fractures; circulation cells and flow barriers; induced seismicity; surface and subsurface monitoring and verification techniques; US regulations. Several worked technical examples and real site illustrations will be presented. Reading assignments about real cases will be given. Stu... more description for CEE 268E »
Terms: Win, offered once only | Units: 3-4 | Grading: Letter or Credit/No Credit

CEE 269: Environmental Fluid Mechanics and Hydrology Seminar
Problems in all branches of water resources. Talks by visitors, faculty, and students. May be repeated for credit.
Terms: Spr | Units: 1 | Repeatable for credit | Grading: Satisfactory/No Credit

CEE 270: Movement and Fate of Organic Contaminants in Waters
Transport of chemical constituents in surface and groundwater including advection, dispersion, sorption, interphase mass transfer, and transformation; impacts on water quality. Emphasis is on physicochemical processes and the behavior of hazardous waste contaminants. Prerequisites: undergraduate chemistry and calculus. Recommended: 101B.
Terms: Aut, Sum | Units: 3 | Grading: Letter (ABCD/NP)

CEE 271A: Physical and Chemical Treatment Processes
Physical and chemical unit operations for water treatment, emphasizing process combinations for drinking water supply. Application of the principles of chemistry, rate processes, fluid dynamics, and process engineering to define and solve water treatment problems by flocculation, sedimentation, filtration, disinfection, oxidation, aeration, and adsorption. Investigative paper on water supply and treatment. Prerequisites: 101B, 270. Recommended: 273.
Terms: Win | Units: 3 | Grading: Letter (ABCD/NP)

CEE 271B: Environmental Biotechnology
Stoichiometry, kinetics, and thermodynamics of microbial processes for the transformation of environmental contaminants. Design of dispersed growth and biofilm-based processes. Applications include treatment of municipal and industrial waste waters, detoxification of hazardous chemicals, and groundwater remediation. Prerequisites: 270; 177 or 274A or equivalents.
Terms: Win | Units: 4 | Grading: Letter or Credit/No Credit

CEE 271D: Introduction to Wastewater Treatment Process Modeling
The course will present a structured protocol for simulator application comprising project definition, data collection and reconciliation, model set-up, calibration and validation, and simulation and result interpretation. This course will include a series of guided simulation exercises evaluating resource consumption (e.g., electrical energy, natural gas, chemicals) and resource recovery (e.g., biogas, struvite, biosolids, recycled water) from a variety of treatment plant configurations. Coursework for all students will comprise guided simulation exercises begun in class. Students may elect to take the course for 2 units by completing a group project evaluating an assign... more description for CEE 271D »
Terms: Spr | Units: 1-2 | Grading: Satisfactory/No Credit

CEE 272: Coastal Contaminants
Coastal pollution and its effects on ecosystems and human health. The sources, fate, and transport of human pathogens and nutrients. Background on coastal ecosystems and coastal transport phenomena including tides, waves, and cross shelf transport. Introduction to time series analysis with MATLAB. Undergraduates require consent of instructor.
Terms: Aut | Units: 3-4 | Grading: Letter or Credit/No Credit

CEE 272R: Modern Power Systems Engineering
Focus is on Power Engineering from a systems point of view. Topics covered may include modeling of generation, transmission and distribution systems, load flow analysis, transient and steady-state stability analysis. Special emphasis given to modern market operations and dispatch, modeling intermittent controllable power sources, storage technologies, mechanisms for demand response, sensing the grid and the role of market mechanisms for deep integration. Course content may vary year to year.
Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CEE 272W: Wind Power project Development

Introduction to wind power resource assessment and project development. Topics include the dynamics of large-scale and small-scale wind systems, vertical scaling of winds in the boundary layer, measurement instruments used for resource assessments, wind turbine technology, and wind farm siting, planning and economics. Analysis methods of wind data, use of industry-standard software for optimizing turbine siting and project feasibility studies. Project work using existing resource assessment from local areas. Prerequisite: Math41/42 or equivalent. Limited enrollment.

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

CEE 273: Aquatic Chemistry

Chemical principles and their application to the analysis and solution of problems in aqueous geochemistry (temperatures near 25° C and atmospheric pressure). Emphasis is on natural water systems and the solution of specific chemical problems in water purification technology and water pollution control. Prerequisites: CHEM 31 and 33, or equivalents.

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

CEE 273C: Introduction to Membrane Technology for Water/Wastewater Treatment

Membrane separation processes focusing on their use for water and wastewater purification. Topics will include membrane types and materials; transport across and rejection by membranes; membrane fouling, cleaning and degradation; and design and operation of membrane systems.

Terms: not given this year | Units: 1 | Grading: Satisfactory/No Credit

CEE 273C: Introduction to Membrane Technology for Water/Wastewater Treatment

Membrane separation processes focusing on their use for water and wastewater purification. Topics will include membrane types and materials; transport across and rejection by membranes; membrane fouling, cleaning and degradation; and design and operation of membrane systems.

Terms: not given this year | Units: 1 | Grading: Satisfactory/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 274B: Metabolic Biochemistry of Microorganisms (CHEMENG 456)

Microbial metabolism, biochemical and metabolic principles, unity and diversity of metabolic pathways, evolution of enzymes and metabolic pathways, microbial degradation of natural and anthropogenic organic compounds, predicting biodegradation, and metabolic origin of life.

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

CEE 274D: Pathogens and Disinfection

Introduction to epidemiology, major pathogens and infectious diseases, the immune system, movement and survival of pathogens in the environment, transfer of virulence and antibiotic resistance genes, and pathogen control, with an emphasis on public health engineering measures (disinfection). Prerequisite: 274A.

Terms: alternate years, given next year | Units: 3 | Grading: Letter (ABCD/NP)

CEE 274E: Pathogens in the Environment

Sources, fates, movement, and ecology of waterborne pathogens in the natural environment and disinfection systems; epidemiology and microbial risk assessment. No microbiology background required; undergraduates may enroll with consent of instructor.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

CEE 274P: Environmental Health Microbiology Lab

Microbiology skills including culture-, microscope-, and molecular-based detection techniques. Focus is on standard and EPA-approved methods to enumerate and isolate organisms used to assess risk of enteric illnesses, such as coliforms, enterococci, and coliphage, in drinking and recreational waters including lakes, streams, and coastal waters. Student project to assess the microbial water quality of a natural water. Limited enrollment; priority to CEE graduate students.

Terms: not given this year | Units: 3-4 | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CEE 275B: Process Design for Environmental Biotechnology

Use of microbial bioreactors for degradation of contaminants and recovery of clean water, clean energy and/or green materials. Student teams design, operate, and analyze bioreactors and learn to write consulting style reports. Limited enrollment. Prerequisites: 271B

Terms: not given this year | Units: 3 | Grading: Letter (ABCD/NP)

CEE 276: Introduction to Human Exposure Analysis (CEE 178)

(Graduate students register for 276.) Scientific and engineering issues involved in quantifying human exposure to toxic chemicals in the environment. Pollutant behavior, inhalation exposure, dermal exposure, and assessment tools. Overview of the complexities, uncertainties, and physical, chemical, and biological issues relevant to risk assessment. Lab projects. Recommended: MATH 51. Apply at first class for admission.

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

CEE 276E: Environmental Toxicants

Chemicals in the environment that pose toxicity risk. Introduction to environmental toxicology principles for identifying and characterizing toxicants based on sources, properties, pathways, and toxic action. Past and present environmental toxicant issues.

Terms: not given this year | Units: 2-3 | Grading: Letter or Credit/No Credit

CEE 277A: Teaching Science Literacy for a Sustainable Society

Teaching science to nontechnical audiences emphasizing technologies and science for the sustainable use of water. Guest lecturers. Learning styles, and the role of engineers and scientists in K-12 and media communication. Students develop teaching modules to be used in educational settings involving nontechnical audiences.

Terms: not given this year | Units: 2-4 | Grading: Letter (ABCD/NP)

CEE 277C: Environmental Governance

Interaction between private, public and civil sectors in decision making that effects environmental sustainability. Governance on global to local scales, US and international case studies. Theoretical concepts of environmental policy design and implementation: common property and collective action, social movements and locally unwanted land uses, sustainable cities, ecological modernization, shifts in corporate environmental norms, ISO 14001 and green supply chains, and global institutions for constraining carbon emissions. Limited enrollment.

Terms: alternate years, given next year | Units: 3 | Grading: Letter or Credit/No Credit

CEE 277D: Water, Sanitation and Health in Developing Countries

Graduate seminar focused on emerging research in the areas of water supply, sanitation, hygiene and health in developing countries. Limited enrollment; instructor permission required.

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

CEE 277F: Advanced Field Methods in Water, Health and Development

Field methods for assessing household stored water quality, hand contamination, behaviors, and knowledge related to water, sanitation and health. Limited enrollment. Instructor consent required.

Terms: not given this year | Units: 10-15 | Grading: Credit/No Credit

CEE 277K: Environmental Information Engineering

The role of information technology (IT) in enabling mankind to understand its impact on the planet and balance that with improving the quality of life of a rapidly growing population. After surveying the field, the course will examine the specific impacts that IT may have, by reference to case studies from energy, transportation, water and urban design fields. While some specific information technologies will be examined, this will be from a business perspective - detailed technical knowledge of IT not required.

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

CEE 278A: Air Pollution Physics and Chemistry

The sources and health effects of pollutants. The influence of meteorology on pollution: atmospheric energy balance, temperature profiles, stability classes, inversion layers, turbulence. Atmospheric diffusion equations, downwind dispersion of emissions from point and line sources. Tropospheric chemistry: mechanisms for ozone formation, photochemical reactions, radical chain mechanisms, heterogeneous chemical reactions. Prerequisites: MATH 51, CHEM 31, or equivalents. Recommended: 101B, 273 or CHEM 135, or equivalents.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CEE 278B: Atmospheric Aerosols

The characterization of atmospheric particulate matter: size distributions, chemical composition, health effects. Atmospheric diffusion and transport of particles: removal by convection, impaction, gravitational settling. Effect of aerosols on visibility: light scattering and absorption, reduction of visual range. Mechanics influencing ambient size distributions: Brownian coagulation, laminar shear flow, homogeneous nucleation, heterogeneous condensation. Prerequisite: MATH 51, or equivalent. Recommended: 101B or equivalent.

Terms: alternate years, given next year | Units: 3 | Grading: Letter or Credit/No Credit

CEE 279: Environmental Engineering Seminar

Current research, practice, and thinking in environmental engineering and science. Attendance at seminars is self-directed, and may be accrued throughout the school year.

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

CEE 297: Issues in Geotechnical and Environmental Failures

Causes and consequences of the failure of buildings, earth structures, waste storage, and high hazard facilities in contact with the environment; technical, ethical, economic, legal, and business aspects; failure analysis and forensic problems; prevention, liability, and dispute management. Case histories including earthquake, flood, and hazardous waste facilities. Student observation, participation in active lawsuits where possible.

Terms: not given this year | Units: 3 | Grading: Letter (ABCD/NP)

CEE 301: The Energy Seminar (ENERGY 301)

Interdisciplinary exploration of current energy challenges and opportunities, with talks by faculty, visitors, and students. May be repeated for credit.

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

CEE 316: Sustainable Built Environment Research

Covers Ph.D. candidacy requirements of industry problem analysis and critical literature review for post-MS students conducting research on sustainable planning, design, management, and operation of buildings and infrastructure. Identify industry problems and related research questions. Design experiments and research methods for: ethnographies, case studies, surveys, classical experiments mathematical and computational simulations. Overview of statistical methods for data analysis. Publication strategies.

Terms: not given this year | Units: 3-4 | Grading: Letter (ABCD/NP)

CEE 363C: Ocean and Estuarine Modeling

Advanced topics in modeling for ocean and estuarine environments, including methods for shallow water, primitive, and nonhydrostatic equations on Cartesian, curvilinear, and unstructured finite-volume grid systems. Topics include free-surface methods, nonhydrostatic solvers, and advanced Eulerian and Lagrangian advection techniques. Focus is on existing techniques and code packages, and their methodologies, including POM, ROMS, TRIM, ELCOM, and SUNTANS. Prerequisites: CME 200, 206, or equivalents.

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

CEE 363F: Oceanic Fluid Dynamics (EESS 363F)

Dynamics of rotating stratified fluids with application to oceanic flows. Topics include: inertia-gravity waves; geostrophic and cyclogeostrophic balance; vorticity and potential vorticity dynamics; quasi-geostrophic motions; planetary and topographic Rossby waves; inertial, symmetric, barotropic and baroclinic instability; Ekman layers; and the frictional spin-down of geostrophic flows. Prerequisite: CEE 262A or a graduate class in fluid mechanics.

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

CEE 363G: Field Techniques in Coastal Oceanography

This course focuses on the design and implementation of coastal oceanographic field studies from implementation through analysis. A wide range of field instrumentation and techniques, including AUVs and scientific diving is covered. Field studies. Data collection and analysis under instructor guidance.

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

CEE 364Y: Advanced Topics in Coastal Oceanography
The dynamics and transport implications of features in estuaries and coastal oceans characterized by sharp gradients: fronts, interfaces, and layers. Analytic framework to describe the formation, maintenance, and dissipation of such features. Examples include tidal mixing fronts, buoyant plume fronts and tidal intrusions, biological thin layers, and axial convergent fronts. Second unit for students who give a presentation.
Terms: not given this year | Units: 1-2 | Grading: Satisfactory/No Credit

CEE 365A: Advanced Topics in Environmental Fluid Mechanics and Hydrology
Students must obtain a faculty sponsor.
Terms: Aut | Units: 2-6 | Repeatable for credit | Grading: Letter (ABCD/NP)

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 370D: 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: Sum | Units: 3-6 | 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 374A: Introduction to Physiology of Microbes in Biofilms
Diversification of biofilm populations, control of gene expression in biofilm environments, and evolution of novel genetic traits in biofilms.
Terms: Aut | Units: 1-6 | Grading: Satisfactory/No Credit

CEE 374S: Advanced Topics in Microbial Pollution
May be repeated for credit. Prerequisite: consent of instructor.
Terms: Aut, Win, Spr, Sum | Units: 1-5 | Repeatable for credit | Grading: Satisfactory/No Credit

CEE 374T: Advanced Topics in Coastal Pollution
May be repeated for credit. Prerequisite: consent of instructor.
Terms: Aut, Win, Spr, Sum | Units: 1-5 | Repeatable for credit | Grading: Satisfactory/No Credit

CEE 374U: Advanced Topics in Submarine Groundwater Discharge
May be repeated for credit. Prerequisite: consent of instructor.
Terms: Aut, Win, Spr, Sum | Units: 1-5 | Repeatable for credit | Grading: Satisfactory/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CEE 374V: Advanced Topics in Microbial Source Tracking
May be repeated for credit. Prerequisite: consent of instructor.
Terms: Aut, Win, Spr, Sum | Units: 1-5 | Repeatable for credit | Grading: Satisfactory/No Credit

CEE 374W: Advanced Topics in Water, Health and Development
Advanced topics in water, health and development. Emphasis on low-and-middle-income countries. Class content varies according to interests of students. Instructor consent required.
Terms: Aut, Win, Spr, Sum | Units: 1-6 | Repeatable for credit | Grading: Letter or Credit/No Credit

CEE 375: Advanced Methods in Pathogen Detection
Molecular and culture-based techniques for pathogen detection in water.
Terms: not given this year | Units: 2 | Grading: Satisfactory/No Credit

CEE 378: Statistical Analysis of Environmental Data: Tools and Applications
Preference to Environmental Engineering and Science Ph.D. students. Practical data analysis techniques applicable to environmental engineering. The role of statistics in data collection, experimental design, data exploration, and effective communication of results. Use of statistical packages such as Excel, Matlab, and R. Discussions partially based on student interest and available datasets. Topics may include summarizing data, hypothesis testing, nonparametric statistics, regression analysis, classification and regression trees, cluster analysis, and computationally intensive methods. Limited enrollment.
Terms: not given this year | Units: 2-3 | Grading: Satisfactory/No Credit

CEE 385: Performance-Based Earthquake Engineering
Synthesis and application of approaches to performance-based design and assessment that recently have been developed or are under development. Emphasis is on quantitative decision making based on life-cycle considerations that incorporate direct losses, downtime losses, and collapse, and the associated uncertainties. Hazard analysis, response simulation, damage and loss estimation, collapse prediction. Case studies. Prerequisites: 282, 287, and 288.
Terms: Aut | Units: 2-3 | Grading: Letter (ABCD/NP)

CEE 48N: Organizing Global Projects
Preference to freshmen. Challenges associated with planning and managing both commercial and governmental/non-profit global projects; theory, methods, and tools to enhance global project outcomes. Students teams model and simulate crosscultural teams engaged in global projects. Opportunities to participate in research in the Collaboratory for Research on Global Projects involving faculty from Stanford departments and schools; see http://crgp.stanford.edu.
Terms: not given this year | Units: 4 | Grading: Letter or Credit/No Credit

CEE 63: Weather and Storms (CEE 263C)
Daily and severe weather and global climate. Topics: structure and composition of the atmosphere, fog and cloud formation, rainfall, local winds, wind energy, global circulation, jet streams, high and low pressure systems, inversions, el Niño, la Niña, atmosphere/ocean interactions, fronts, cyclones, thunderstorms, lightning, tornadoes, hurricanes, pollutant transport, global climate and atmospheric optics.
Terms: Aut | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

CEE 64: Air Pollution: From Urban Smog to Global Change (CEE 263D)
Survey of urban- through global-scale air pollution. Topics: the evolution of the Earth's atmosphere, indoor air pollution, urban smog formation, history of discovery of atmosphere chemicals, visibility, acid rain, the greenhouse effect, historical climate, global warming, stratospheric ozone reduction, Antarctic ozone destruction, air pollution transport across political boundaries, the effects of air pollution on ultraviolet radiation, and impacts of energy systems on the atmosphere.
Terms: Win | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CEE 70N: Water, Public Health, and Engineering

Preference to sophomores. Linkages between water, wastewater and public health, with an emphasis on engineering interventions. Topics include the history of water and wastewater infrastructure development in the U.S. and Europe; evolution of epidemiological approaches for water-related health challenges; biological and chemical contaminants in water and wastewater and their management; and current trends and challenges in access to water and sanitation around the world. How to identify ways in which freshwater contributes to human health; exposure routes for water- and sanitation-illness; how to classify these illnesses by pathogen type and their geographic distribution; ... more description for CEE 70N »

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

CHEM 24N: Nutrition and History

Preference to freshmen. Intended to broaden the introductory chemistry experience. The biochemical basis of historically important nutritional deficiencies (vitamins, minerals, starvation, metabolic variants that predispose to disease) and environmental toxins is related to physiological action and the sociological, political, and economic consequences of its effect on human populations. Prerequisite: high school chemistry. Recommended: 31A,B, or 31X, or 33.

Terms: Spr | Units: 3 | 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)

CHEM 31AC: Problem Solving in Science

Development and practice of critical problem solving skills using chemical examples. Limited enrollment. Prerequisite: consent of instructor. Corequisite: CHEM 31A.

Terms: Aut | Units: 1 | Grading: Satisfactory/No Credit

CHEM 31BC: Problem Solving in Science

Development and practice of critical problem solving skills using chemical\n\nexamples. Students should also be concurrently enrolled in the parent\n\ncourse 31B. Limited enrollment and with permission of the instructor.

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

CHEM 33C: Problem Solving in Science

Development and practice of critical problem solving skills using chemical examples. Limited enrollment. Prerequisite: consent of instructor. Corequisite: CHEM 33.

Terms: Spr | Units: 1 | Grading: Satisfactory/No Credit

CHEMENG 140: Micro and Nanoscale Fabrication Engineering (CHEMENG 240)

(Same as CHEMENG 140) Survey of fabrication and processing technologies in industrial sectors, such as semiconductor, biotechnology, and energy. Chemistry and transport of electronic and energy device fabrication. Solid state materials, electronic devices and chemical processes including crystal growth, chemical vapor deposition, etching, oxidation, doping, diffusion, thin film deposition, plasma processing. Micro and nanopatterning involving photolithography, unconventional soft lithography and self assembly. Recommended: CHEM 33, 171, and PHYSICS 55

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

CHEMENG 174: Environmental Microbiology I (CEE 274A, CHEMENG 274)

Basics of microbiology and biochemistry. The biochemical and biophysical principles of biochemical reactions, energetics, and mechanisms of energy conservation. Diversity of microbial catabolism, flow of organic matter in nature: the carbon cycle, and biogeochemical cycles. Bacterial physiology, phylogeny, and the ecology of microbes in soil and marine sediments, bacterial adhesion, and biofilm formation. Microbes in the degradation of pollutants. Prerequisites: CHEM 33, 35, and BIOSCI 41, CHEMENG 181 (formerly 188), or equivalents.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CHEMENG 183: Biochemistry II (BIO 189, BIO 289, CHEM 183, CHEMENG 283)

Focus on metabolic biochemistry: the study of chemical reactions that provide the cell with the energy and raw materials necessary for life. Topics include glycolysis, gluconeogenesis, the citric acid cycle, oxidative phosphorylation, photosynthesis, the pentose phosphate pathway, and the metabolism of glycogen, fatty acids, amino acids, and nucleotides as well as the macromolecular machines that synthesize RNA, DNA, and proteins. Medical relevance is emphasized throughout. Satisfies Central Menu Area 1 for Bio majors. Prerequisite: BIO 188/288 or CHEM 181 or CHEMENG 181/281 (formerly 188/288).

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

CHEMENG 25B: Biotechnology (ENGR 25B)

Biology and chemistry fundamentals, genetic engineering, cell culture, protein production, pharmaceuticals, genomics, viruses, gene therapy, evolution, immunology, antibodies, vaccines, transgenic animals, cloning, stem cells, intellectual property, governmental regulations, and ethics. Prerequisites: CHEM 31 and MATH 41 or equivalent courage.

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

CHEMENG 25E: Energy: Chemical Transformations for Production, Storage, and Use (ENGR 25E)

An introduction and overview to the challenges and opportunities of energy supply and consumption. Emphasis on energy technologies where chemistry and engineering play key roles. Review of energy fundamentals along with historical energy perspectives and current energy production technologies. In depth analysises of solar thermal systems, biofuels, photovoltaics and electrochemical devices (batteries and fuel cells). Prerequisites: high school chemistry or equivalent.

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

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 457: Microbial Ecology and Evolution (CEE 274C)

Structure/function relationship of microbial communities; metabolic and ecological basis of interactions in microbial communities; microbial ecology and population biology in natural and human host systems; and evolution of microbial life. Prerequisite: CEE 274A, CHEMENG 281 (formerly 288), or equivalent.

Terms: not given this year | Units: 3 | 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)

CHEMENG 70Q: Masters of Disaster

Preference to sophomores. For students interested in science, engineering, politics, and the law. Learn from past disasters to avoid future ones. How disasters can be tracked to failures in the design process. The roles of engineers, artisans, politicians, lawyers, and scientists in the design of products. Failure as rooted in oversight in adhering to the design process. Student teams analyze real disasters and design new products presumably free from the potential for disastrous outcomes.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

CHICANST 201B: From Racial Justice to Multiculturalism: Movement-based Arts Organizing in the Post Civil Rights Era (CSRE 201B)

How creative projects build and strengthen communities of common concern. Projects focus on cultural reclamation, multiculturalism, cultural equity and contemporary cultural wars, media literacy, independent film, and community-based art. Guest artists and organizers, films, and case studies.

Terms: Aut | Units: 5 | 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

CLASSGEN 5N: The Nile and its Life-cycles

Studying the Nile River, in all its aspects involving antiquity. Particular focus on the period between 500 BC and AD 500, with limited materials before and after said period. Is it useful or misleading to think of the river itself as ancient? What happens when we consider the Nile spatially as a whole? Since only a part of the river flows through Egypt we will also focus on Ethiopia, the Sudan and equatorial Africa, which were also objects of ancient Greek and Roman fascination.

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

COMM 131: Media Ethics and Responsibility (COMM 231)

(Graduate students register for COMM 231.) The development of professionalism among American journalists, emphasizing the emergence of objectivity as a professional and the epistemological norm. An applied ethics course where questions of power, freedom, and truth autonomy are treated normatively so as to foster critical thinking about the origins and implications of commonly accepted standards of responsible journalism.

Terms: Win | Units: 4-5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

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)

COMPMED 81N: Comparative Anatomy and Physiology of Mammals

Preference to freshmen. Emphasis is on a comparative approach to anatomy and physiology of a wide range of mammals, the unique adaptations of each species in terms of its anatomical, and behavioral characteristics, and how these species interact with human beings and other animals. Dissection required. Class size is limited to 16.

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

COMPMED 83N: Horse Medicine

Preference to freshmen. The most common equine diseases, ranging from colic to lameness are reviewed using problem-oriented approach. Topics include: equine infectious diseases, care of the newborn foal, medical emergencies, and neurological disorders. A lab on the physical and neurological examination of the horse at the Red Barn.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

COMPMED 84Q: Globally Emerging Zoonotic Diseases

Preference to sophomores. Infectious diseases impacting veterinary and human health around the world today. Mechanisms of disease, epidemiology, and underlying diagnostic, treatment and control principles associated with these pathogens.

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

COMPMED 87Q: Introduction to the Mouse in Biomedical Research

Preference to sophomores. Focus is on the laboratory mouse, one of the most widely used models for biomedical research. Topics include the natural history and origin of the laboratory mouse; characteristics of commonly used strains; mouse anatomy, physiology, and husbandry; common mouse diseases and their effects on research; coat color genetics; and genetically engineered mouse technology. Demonstrations and hands-on experience with necropsy, mouse handling, and research techniques.

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

CS 181: Computers, Ethics, and Public Policy

(Formerly 201.) Primarily for majors entering computer-related fields. Ethical and social issues related to the development and use of computer technology. Ethical theory, and social, political, and legal considerations. Scenarios in problem areas: privacy, reliability and risks of complex systems, and responsibility of professionals for applications and consequences of their work. Prerequisite: 106B or X.

Terms: Spr | Units: 4 | UG Reqs: GER:ECEthicReas | Grading: Letter or Credit/No Credit

CS 523: The Future of the Automobile (ME 302)

Guest speakers from academia and industry present their research results, share their visions, explain challenges, and offer solutions regarding individual transportation. Students are requested to draft brief write-ups on selected topics that will be discussed in class to develop an understanding of the interactions of technology, business, and society with a specific automotive focus. No specific technical background is required as it is encouraged that everyone brings in specific expertise regarding the automobile as a student, researcher, and/or consumer.

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

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)

CTL 312: Science and Engineering Course Design (ENGR 312)

For students interested in an academic career and who anticipate designing science courses at the undergraduate or graduate level. Goal is to apply research on science learning to the design of effective course materials. Topics include syllabus design, course content and format decisions, assessment planning and grading, and strategies for teaching improvement.

Terms: Win | Units: 2-3 | Grading: Satisfactory/No Credit

DUC 324X: The Ecology of Equality

This seminar is designed for doctoral students. One of the claims of American educational policy and practice is the desire to achieve equitable educational results across society. But what does "equity" really entail? This course will survey a range of research and literature that examines the landscape of myraid social institutions known to influence educational processes. The course will take an interdisciplinary approach to deconstructing the main issues affronting schools today and to discussing effective polices and practices.

Terms: Spr, alternate years, not given next year | Units: 4 | Grading: Letter or Credit/No Credit

EARTHSCI 1: Current Research in the Earth and Environmental Sciences

(Formerly GES 3.) Primarily for freshmen and sophomores. An introduction to faculty and research areas in the School of Earth Sciences, including biogeochemistry, oceanography, paleobiology, geophysics, tectonics, geostatistics, soil science, hydrogeology, energy resources, earth surface processes, geochronology, volcanoes and earthquakes, and remote sensing. May be repeated for credit.

Terms: Aut | Units: 1 | Repeatable for credit | Grading: Satisfactory/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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\n\ntypes of choices involved in: bounding the scope of your topic, placing your\n\nproject in context, planning your methods, and communicating your ideas in a\n\nproposal. Three-fold course emphasis: 1) What do earth and environmental\n\nscientists actually do? Learn diverse methods of conducting research. 2)\n\nWhat are the differences among "interdisciplinary", "multi-disciplinary",\n\nand "disciplinary" approaches to a problem? When/why might you choose one\n\napproach over another? 3) Practical skill development: project planning,\n\nproposal writing, identifying relevant scientific literatu... more description for EARTHSCI 180 »

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

EARTHSCI 218: Communicating Science

(Formerly GES 218.) For undergraduates and graduate students interested in teaching science in local schools. Inquiry-based science teaching methods. How to communicate scientific knowledge and improve presentations. Six weeks of supervised teaching in a local school classroom. Prerequisite: course in introductory biology, geology, chemistry, or marine sciences.

Terms: not given this year | Units: 3 | Repeatable for credit | Grading: Satisfactory/No Credit

EARTHSCI 300: Earth Sciences Seminar

(Formerly cross-listed in all School of Earth Sciences departments.) Required for incoming graduate students except coterms. Research questions, tools, and approaches of faculty members from all departments in the School of Earth Sciences. Goals are: to inform new graduate students about the school's range of scientific interests and expertise; and introduce them to each other across departments and research groups. Panel discussions or faculty member presentations at each meeting. May be repeated for credit.

Terms: Aut | Units: 1 | Repeatable for credit | 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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

EARTHSYS 104: The Water Course (GEOPHYS 104)
The pathway that water takes from rainfall to the tap using student home towns as an example. How the geological environment controls the quantity and quality of water; taste tests of water from around the world. Current U.S. and world water supply issues.
Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | 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 108: Coastal Wetlands (EARTHSYS 208)
Ecological structure and function of wetlands emphasizing local, coastal wetlands. Topics include: wetland distribution, classification, and history; and interactions between biotic and abiotic components of wetland ecosystems. Labs and local field trips for exposure to landscape patterns, and common sampling equipment and methods. Recommended: 104 or CEE 166A.
Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

EARTHSYS 113: Earthquakes and Volcanoes (GEOPHYS 113)
Earthquake location, magnitude and intensity scales, seismic waves, styles of eruptions and volcanic hazards, tsunami waves, types and global distribution of volcanoes, volcano forecasting. Plate tectonics as a framework for understanding earthquake and volcanic processes. Forecasting; earthquake resistant design; building codes; and probabilistic hazard assessment. For non-majors and potential earth scientists.
Terms: Win | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

EARTHSYS 122: Paleobiology (GES 123)
Introduction to the fossil record with emphasis on marine invertebrates. Major debates in paleontological research. The history of animal life in the oceans. Topics include the nature of the fossil record, evolutionary radiations, mass extinctions, and the relationship between biological evolution and environmental change. Fossil taxa through time. Exercises in phylogenetics, paleoecology, biostratigraphy, and statistical methods.
Terms: Spr | Units: 4 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

EARTHSYS 124: Environmental Justice: Local, National, and International Dimensions (EARTHSYS 224)
Focus is on whether minorities and low income citizens suffer disproportionate environmental and health impacts resulting from government and corporate decision making in contexts such as the siting of industrial facilities and waste dumps, toxic chemical use and distribution, and the enforcement of environmental mandates and policies. Implications of environmental justice issues at the international level, emphasizing climate change.
Terms: not given this year | Units: 4 | Grading: Letter or Credit/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 130: Soil Physics and Hydrology (GES 130)
The occurrence, distribution, circulation, and reaction of water at the surface and within the near surface. Topics: precipitation, evapotranspiration, infiltration and vadose zone, groundwater, surface water and streamflow generation, and water balance estimates. Current and classic theory in soil physics and hydrology. Urban, rangeland, and forested environments.
Terms: Aut | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

EARTHSYS 131: Communicating Environmental Research Using Narratives and Stories (EARTHSYS 231, EESS 131, EESS 231)

Creative strategies by which earth scientists can overcome impediments to scientific literacy. Construction of stories and narratives out of research. The role of imagination and cognitive perception in environmental issues. Barriers and problems that arise in risk and science awareness. Connections between environmentalism and environmental science. Environmental issues in fictional narratives. The responsible function for earth scientists in public debates. Reflections on the role of science in current and future issues likely to involve members outside of science. Priority given to students seeking degrees in the School of Earth Sciences.

Terms: not given this year | Units: 1 | Grading: Satisfactory/No Credit

EARTHSYS 131H: Hydrologically-Driven Landscape Evolution (GES 131)

Materials of the Earth and hydrologically driven landscape processes. Topics: hillslope hydrology, weathering of rocks and soils, erosion, flow failures, mass wasting, and conceptual models of landscape evolution. Current and classic theory in geomorphology.

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

EARTHSYS 133: Climate Change Law and Policy: From California to the Federal Government (EARTHSYS 233)

California climate laws, including the California Global Warming Solutions Act of 2006 (AB32), the Clean Cars and Trucks Bill (SB 1493), and the Greenhouse Gas Emissions Performance Standard (SB 1368), and complementary and subsidiary regulations such as the Renewable Portfolio Standard, the Low Carbon Fuel Standard, land use law, and energy efficiency and decoupling. The draft scoping plan to outline California's policies for achieving its ambitious economy-wide reductions in greenhouse gas emissions. The Western Climate Initiative. The history, details, and current status of California's efforts as platforms to delve into larger legal issues.

Terms: not given this year | Units: 3 | Grading: Letter (ABCD/NP)

EARTHSYS 141: Remote Sensing of the Oceans (EARTHSYS 241, EESS 141, EESS 241)

How to observe and interpret physical and biological changes in the oceans using satellite technologies. Topics: principles of satellite remote sensing, classes of satellite remote sensors, converting radiometric data into biological and physical quantities, sensor calibration and validation, interpreting large-scale oceanographic features.

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

EARTHSYS 142: Remote Sensing of Land (EARTHSYS 242, EESS 162, EESS 262)

The use of satellite remote sensing to monitor land use and land cover, with emphasis on terrestrial changes. Topics include pre-processing data, biophysical properties of vegetation observable by satellite, accuracy assessment of maps derived from remote sensing, and methodologies to detect changes such as urbanization, deforestation, vegetation health, and wildfires.

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

EARTHSYS 143: Marine Biogeochemistry (EARTHSYS 243, EESS 143, EESS 243)

(Graduate students register for 243.) Processes that control the mean concentration and distribution of biologically utilized elements and compounds in the ocean. Processes at the air-sea interface, production of organic matter in the upper ocean, remineralization of organic matter in the water column, and processing of organic matter in the sediments. Cycles of carbon, oxygen, and nutrients; the role of the ocean carbon cycle in interannual to decadal variability, paleoclimatology, and the anthropogenic carbon budget.

Terms: Spr | Units: 3-4 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

EARTHSYS 144: Fundamentals of Geographic Information Science (GIS) (EESS 164)

Survey of geographic information including maps, satellite imagery, and census data, approaches to spatial data, and tools for integrating and examining spatially-explicit data. Emphasis is on fundamental concepts of geographic information science and associated technologies. Topics include geographic data structure, cartography, remotely sensed data, statistical analysis of geographic data, spatial analysis, map design, and geographic information system software. Computer lab assignments.

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

EARTHSYS 146A: Atmosphere, Ocean, and Climate Dynamics: The Atmospheric Circulation (EARTHSYS 246A, EESS 146A, EESS 246A, GEOPHYS 146A, GEOPHYS 246A)

Introduction to the physics governing the circulation of the atmosphere and ocean and their control on climate with emphasis on the atmospheric circulation. Topics include the global energy balance, the greenhouse effect, the vertical and meridional structure of the atmosphere, dry and moist convection, the equations of motion for the atmosphere and ocean, including the effects of rotation, and the poleward transport of heat by the large-scale atmospheric circulation and storm systems. Prerequisites: MATH 51 or CME100 and PHYSICS 41.

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

EARTHSYS 146B: Atmosphere, Ocean, and Climate Dynamics: the Ocean\n\nCirculation (EARTHSYS 246B, EESS 146B, EESS 246B, GEOPHYS 146B, GEOPHYS 246B)

Introduction to the physics governing the circulation of the atmosphere\n\nand ocean and their control on climate with emphasis on the large-scale\n\nocean circulation. This course will give an overview of the structure\n\nand dynamics of the major ocean current systems that contribute to the\n\nmeridional overturning circulation, the transport of heat, salt, and\n\nbiogeochemical tracers, and the regulation of climate. Topics include\n\nthe tropical ocean circulation, the wind-driven gyres and western\n\nboundary currents, the thermohaline circulation, the Antarctic\n\nCircumpolar Current, water mass formation, atmosphere-ocean coupling,\n\nand climate variability. Prere... more description for EARTHSYS 146B »

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

EARTHSYS 155: Science of Soils (EESS 155)

Physical, chemical, and biological processes within soil systems. Emphasis is on factors governing nutrient availability, plant growth and production, land-resource management, and pollution within soils. How to classify soils and assess nutrient cycling and contaminant fate. Recommended: introductory chemistry and biology.

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

EARTHSYS 156: Soil and Water Chemistry (EARTHSYS 256, EESS 156, EESS 256)

(Graduate students register for 256.) Practical and quantitative treatment of soil processes affecting chemical reactivity, transformation, retention, and bioavailability. Principles of primary areas of soil chemistry: inorganic and organic soil components, complex equilibria in soil solutions, and adsorption phenomena at the solid-water interface. Processes and remediation of acid, saline, and wetland soils. Recommended: soil science and introductory chemistry and microbiology.

Terms: alternate years, given next year | Units: 1-4 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

EARTHSYS 158: Geomicrobiology (EARTHSYS 258, EESS 158, EESS 258)

How microorganisms shape the geochemistry of the Earth's crust including oceans, lakes, estuaries, subsurface environments, sediments, soils, mineral deposits, and rocks. Topics include mineral formation and dissolution; biogeochemical cycling of elements (carbon, nitrogen, sulfur, and metals); geochemical and mineralogical controls on microbial activity, diversity, and evolution; life in extreme environments; and the application of new techniques to geomicrobial systems. Recommended: introductory chemistry and microbiology such as CEE 274A.

Terms: given next year | Units: 3 | Grading: Letter or Credit/No Credit

EARTHSYS 160: Statistical Methods for Earth and Environmental Sciences: General Introduction (EESS 160)

Extracting information from data using statistical summaries and graphical visualization, statistical measures of association and correlation, distribution models, sampling, error estimation and confidence intervals, linear models and regression analysis, introduction to time-series and spatial data with geostatistics, applications including environmental monitoring, natural hazards, and experimental design.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBMath | Grading: Letter or Credit/No Credit

EARTHSYS 161: Statistical Methods for the Earth and Environmental Sciences: Geostatistics (EESS 161, ENERGY 161)

Statistical analysis and graphical display of data, common distribution models, sampling, and regression. The variogram as a tool for modeling spatial correlation; variogram estimation and modeling; introduction to spatial mapping and prediction with kriging; integration of remote sensing and other ancillary information using co-kriging models; spatial uncertainty; introduction to geostatistical software applied to large environmental, climatological, and reservoir engineering databases; emphasis is on practical use of geostatistical tools.

Terms: not given this year | Units: 3-4 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

EARTHSYS 165: Promoting Behavior Change (HUMBIO 165)

How to apply principles of behavioral change to a real world public health problem: climate change and environmental sustainability. Sources include theory, research, and practice from perspectives such as social and cognitive psychology, media and communication, education, behavioral medicine, social marketing, and consumer behavior. Student groups create an intervention to help elementary school students reduce their environmental footprint. Research performed in local high schools to develop optimally feasible, acceptable, and effective interventions. Prerequisite: Human Biology core or equivalent, or consent of instructor.

Terms: not given this year | Units: 4 | Grading: Letter or Credit/No Credit

EARTHSYS 170: Environmental Geochemistry (GES 170)

Solid, aqueous, and gaseous phases comprising the environment, their natural compositional variations, and chemical interactions. Contrast between natural sources of hazardous elements and compounds and types and sources of anthropogenic contaminants and pollutants. Chemical and physical processes of weathering and soil formation. Chemical factors that affect the stability of solids and aqueous species under earth surface conditions. The release, mobility, and fate of contaminants in natural waters and the roles that water and dissolved substances play in the physical behavior of rocks and soils. The impact of contaminants and design of remediation strategies. Case studie... more description for EARTHSYS 170 »

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

EARTHSYS 173: Aquaculture and the Environment: Science, History, and Policy (EARTHSYS 273, EESS 173, EESS 273)

Can aquaculture feed billions of people without degrading aquatic ecosystems or adversely impacting local communities? Interdisciplinary focus on aquaculture science and management, international seafood markets, historical case studies (salmon farming in Chile, tuna ranching in the Mediterranean, shrimp farming in Vietnam), current federal/state legislation. Field trip to aquaculture farm and guest lectures.

Terms: alternate years, given next year | Units: 3 | Grading: Letter or Credit/No Credit

EARTHSYS 177: Interdisciplinary Research Survival Skills (EARTHSYS 277)

Learning in interdisciplinary situations. Framing research questions. Developing research methods that benefit from interdisciplinary understanding. Writing for multiple audiences and effectively making interdisciplinary presentations. Discussions with interdisciplinary experts from across campus regarding interdisciplinary research projects.

Terms: Spr | 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 180: Fundamentals of Sustainable Agriculture (EARTHSYS 280, EESS 180, EESS 280)

Ecological, economic, and social dimensions of sustainable agriculture in the context of a growing world population. Focus is on management and technological approaches, and historical content of agricultural growth and change, organic agriculture, soil and water resource management, nutrient and pest management, biotechnology, ecosystem services, and climate change.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/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 181: Concepts of Urban Agriculture (EARTHSYS 281, EESS 181, EESS 281)

For advanced undergraduates and graduate students from all fields. Seminar. Current status of and potential for global urban agriculture. Topics include: environmental and economic dimensions of urban food production and sourcing; city policy and land-use planning; and an ecosystem services approach to urban agriculture. Developed and developing world contexts. Two field trips to nearby cities; guest lectures; case studies; group projects. Attendance at first class is mandatory. Enrollment is limited. Enrollment permissions will be determined after first class meeting.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

EARTHSYS 182: Current Issues in Sustainable Agriculture (EARTHSYS 282, EESS 182, EESS 282)
Sustainability and ethics of animal production in the U.S. Demystification of the marketing of agricultural products. The past, present, and future of small family farms. Farm labor issues. Students lead discussions and write response papers.
Terms: not given this year | Units: 2 | Grading: Satisfactory/No Credit

EARTHSYS 183: Food Matters: Agriculture in Film (EARTHSYS 283, EESS 183, EESS 283)
Film series presenting historical and contemporary issues dealing with food and agriculture across the globe. Students discuss reactions and thoughts in a round table format. May be repeated for credit.
Terms: Win | Units: 1 | Repeatable for credit | Grading: Satisfactory/No Credit

EARTHSYS 184: Climate and Agriculture (EARTHSYS 284, EESS 184, EESS 284)
The effects of climate change on global food and agricultural systems. Climate assessment and socioeconomic modeling approaches to quantify the impacts of climate on agro-ecosystems and society. Enrollment limited to 25; priority to graduate students, seniors, and juniors. Prerequisites: ECON 106/206.
Terms: alternate years, given next year | Units: 3-4 | Grading: Letter or Credit/No Credit

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 189: Field Studies in Earth Systems (BIO 206, EESS 189)
For advanced upper-division undergraduates and graduate students. Field-based, focusing on the components and processes by which terrestrial ecosystems function. Topics from biology, chemistry, ecology, geology, and soil science. Lecture, field, and lab studies emphasize standard field techniques, experimental design, analysis of data, and written and oral presentation. Small team projects test the original questions in the functioning of natural ecosystems. Admission by application; see Axess. Prerequisites: BIO 141 or EESS 160 (formerly GES 160), or equivalent.
Terms: not given this year | Units: 5 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

EARTHSYS 19: Food for Thought: Alternative Spring Break
Preparation for Alternative Spring Break program. Current issues in sustainable agriculture with a focus on the San Francisco Bay Area. Topics include making informed food choices, garden education, food politics, urban agriculture, school lunch programs, the economics of sustainability, and the local food movement. Enrollment limited to Food for thought ASB 2011 participants.
Terms: Win | Units: 1 | Grading: Satisfactory/No Credit

EARTHSYS 2: Earth System History (EESS 2)
The evolution of Earth's systems from formation to the present. Couplings and relationships among biosphere, lithosphere, hydrosphere, and atmosphere. Topics include the evolution of life, origin of the oceans, atmosphere and continents, and changes in climate. Modern climate change and anthropogenic effects.
Terms: Win | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

EARTHSYS 272: Antarctic Marine Geology (EESS 242)
For upper-division undergraduates and graduate students. Intermediate and advanced topics in marine geology and geophysics, focusing on examples from the Antarctic continental margin and adjacent Southern Ocean. Topics: glaciers, icebergs, and sea ice as geologic agents (glacial and glacial marine sedimentology, Southern Ocean current systems and deep ocean sedimentation), Antarctic biostratigraphy and chronostratigraphy (continental margin evolution). Students interpret seismic lines and sediment core/well log data. Examples from a recent scientific drilling expedition to Prydz Bay, Antarctica. Up to two students may have an opportunity to study at sea in Antarctica duri... more description for EARTHSYS 272 »
Terms: Aut, alternate years, given next year | Units: 3 | 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 298: Earth Systems Book Review
For Earth Systems master's students and advanced undergraduates only. Analysis and discussion of selected literary nonfiction books relevant to Earth systems topics. Examples of previous topics include political presentations of environmental change in the popular press, review of the collected works of Aldo Leopold, disaster literature, and global warming.
Terms: Spr | Units: 2 | Repeatable for credit | Grading: Satisfactory/No Credit

EARTHSYS 37N: Energy and the Environment on the Back of an Envelope (EESS 37N)
Preference to freshmen. How quantitative understanding of the Earth helps inform decisions about energy supply. How can enough energy be provided to support future growth and development throughout the world without damaging the natural environment? Focus is on simple quantitative observations and calculations that facilitate evaluation of potential solutions to this problem; algebra only, no calculus.
Terms: given next year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

EARTHSYS 38N: The Worst Journey in the World: The Science, Literature, and History of Polar Exploration (EESS 38N, GES 38N)
Preference to freshmen. The isolation of polar explorers under the harshest conditions on Earth, and the chronicles of their explorations and hardships dating to the 1500s for the Arctic and the 1700s for the Antarctic. Focus is on scientific and geographic achievements. Sources include *The Worst Journey in the World* by Apsley Cherry-Garrard who in 1911 participated in a midwinter Antarctic sledging trip to recover emperor penguin eggs. Class jointly authors essay on themes from such literature. Optional field trip into the high Sierra in December. (Dunbar)
Terms: Win | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

EARTHSYS 39N: The Carbon Cycle: Reducing Your Impact (EESS 39N)
Preference to freshmen. Changes in the long- and short-term carbon cycle and global climate through the burning of fossil fuels since the Industrial Revolution. How people can shrink their carbon footprints. Long-term sources and sinks of carbon and how they are controlled by tectonics and short-term sources and sinks and the interaction between the biosphere and ocean. How people can shrink their carbon footprints. Held at the Stanford Community Farm.
Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

EARTHSYS 4: Evolution and Extinction: Introduction to Historical Geology (GES 4)
Focus is on the end-Cretaceous mass extinction. Principles of stratigraphy, correlation, the geological timescale, the history of biodiversity, and the interpretation of fossils. The use of data from sedimentary geology, geochemistry, and paleontology to test theories to explain the mass extinction event. Two half-day field trips.
Terms: alternate years, given next year | Units: 4 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

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 46N: Exploring the Critical Interface between the Land and Monterey Bay: Elkhorn Slough (EESS 46N)
Preference to freshmen. Field trips to sites in the Elkhorn Slough, a small agriculturally impacted estuary that opens into Monterey Bay, a model ecosystem for understanding the complexity of estuaries, and one of California's last remaining coastal wetlands. Readings include Jane Caffrey's *Changes in a California Estuary: A Profile of Elkhorn Slough*. Basics of biogeochemistry, microbiology, oceanography, ecology, pollution, and environmental management.
Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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

EARTHSYS 8: The Oceans: An Introduction to the Marine Environment (EESS 8)

For non-majors and majors in earth science or environmental science. Students will learn about the major ocean ecosystems and how they function both naturally and under the influence of human activities. Emphasis will be placed on the dominant organisms of each ecosystem and how they interact with each other and their physical and chemical environment. The types of ecosystems discussed will include coral reefs, deep-sea hydrothermal vents, coastal upwelling systems, blue-water oceans, estuaries, near-shore dead zones, etc. The course will incorporate a mix of lectures, multi-media presentations, and group activities.

Terms: Spr | 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

EASTASN 70SI: Critical Issues in U.S.-China Relations Today

Multidisciplinary approach to historical factors, current events, and key issues that drive relations between the United States and China today, including: economic reform and the current financial crisis; security concerns over Taiwan, North Korea and Tibet; energy and the environment; role of NGOs and media in society; and human rights and prospects for political liberalization. Guest lectures from faculty and personal experiences from individuals who have lived or worked in China.

Terms: Spr | Units: 2 | Grading: Satisfactory/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 118: Development Economics

The economic problems and policy concerns of developing countries. Theories of growth and development; inequality and poverty; credit and labor markets; health and education; politics and corruption. Emphasis is on economic models and econometric evidence rather than case studies. Prerequisites: 52, 102B.

Terms: Aut | Units: 5 | UG Reqs: GER:ECGlobalCom | 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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 19N: The Economics of Cities

In most countries of the world, urban areas tend to have the highest per-worker productivity and generate most of the economic output and economic innovation. In this class, we will explore what economics has to say about the costs and benefits of urbanization. We will discuss a number of classic topics in urban economics, including agglomeration advantages, human capital externalities, the economics of congestion, and efficient economic development policies. Prerequisite: Econ 1A

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

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 214: Development Economics I

Microeconomic analysis of markets and institutions in developing countries. Topics: the role of the household; health and nutrition; education; property rights; governance; and technology. Emphasis is on empirical tests of and evidence for theoretical models. Prerequisites: 202 or 202N, 270.

Terms: not given this year | Units: 2-5 | Grading: Letter or Credit/No Credit

ECON 216: Development Economics III

Use of quantitative theory to understand various aspects of the growth and development process. Emphasis on family and demographic issues and their importance for development. Theoretical models of fertility and marriage decisions, and their empirical relevance. Unified growth theories: demographic transition and industrial revolution. Family institutions such as marriage payments and polygamy. The political economy of family-related institutions, e.g. the evolution of women's and children's rights. Female labor supply and development. Theories of disease and development. Prerequisite: 202, 203, 204, 210, 211, 212, 270, 271, 272.

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

ECON 224: Science, Technology, and Economic Growth

Upper-division undergraduates may enroll with consent of instructor. The roles played by the growth of scientific knowledge and technical progress in the development of industrial societies. Emphasis is on the interactions between science and technology, and the organizational factors which have influenced their effectiveness in contributing to productivity growth.

Terms: not given this year | Units: 2-5 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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, valuationof 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

ECON 251: Natural Resource and Energy Economics
Issues in provision and management of non-renewable and renewable natural resources, and energy products and services. Theory and empirical methods related to: market structure, pricing, and performance of important energy and resource industries; sources of market failure in these industries; and alternative regulatory approaches. Prerequisites: 202, 203, 204, 271, and 272, or equivalents with consent of instructor.
Terms: not given this year | Units: 2-5 | Grading: Letter or Credit/No Credit

ECON 341: Public Economics and Environmental Economics Seminar
Issues in measuring and evaluating the economic performance of government tax, expenditure, debt, and regulatory policies; their effects on levels and distribution of income, wealth, and environmental quality; alternative policies and methods of evaluation. Workshop format combines student research, faculty presentations, and guest speakers. Prerequisite: 241 or consent of instructor.
Terms: Aut, Win, Spr | Units: 1-10 | Repeatable for credit | Grading: Satisfactory/No Credit

EDUC 102: Examining Social Structures, Power, and Educational Access
Goal is to prepare Education and Youth Development fellows for their work with adolescents in the Haas Center's pre-college summer programs and to define their role in addressing educational inequities in the summer programs and beyond.
Terms: Spr | Units: 2-3 | Repeatable for credit | Grading: Letter or Credit/No Credit

EDUC 104X: Conduct of Research with and in Communities
For undergraduates interested in service learning and research in community settings. The historical and theoretical underpinnings of community-based participatory research (CBPR), action research, community-embedded research, participant observation, and qualitative research.
Terms: not given this year | Units: 3-4 | Grading: Letter or Credit/No Credit

EDUC 122X: From Local to Global: Collaborations for International Environmental Education (EARTHSYS 123)
A collaboration with three universities in Africa. Discourse and debate using Internet and mobile technology interactions. Topics include the global environment, climate change, sustainable development, and food security.
Terms: not given this year | Units: 2 | Grading: Letter or Credit/No Credit

EDUC 179B: Youth Empowerment and Civic Engagement (EDUC 279B)
Focus is on youth development policies and practices: what makes them effective, and how they operate in broader institutional contexts. Research-based information; conceptual underpinnings; best learning from experience; and the perspective of expert youth workers, policymakers, and youth about what works.
Terms: not given this year | Units: 2-4 | Grading: Letter (ABCD/NP)

EDUC 205X: The Impact of Social and Behavioral Science Research on Educational Issues
Ways in which research intersects with educational policy and practice. Emphasis is on behavioral, social, and cognitive traditions. Topics include early childhood education, early reading, science education, bilingual education, school desegregation, class size reduction, classroom organization, violence and juvenile crime, and affirmative action in higher education. Policy debates and how research informs or fails to inform deliberations and decisions in these areas.
Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

EDUC 215X: International Human Rights and Education
Theory and practice. Focus is on how education may be seen as a human rights issue and a tool to educate citizens about their human rights. The history of human rights and the spread of the international human rights regime in terms of organizations and treaties. Issues include street and working children, language rights, and women¿s right to education.
Terms: not given this year | Units: 4-5 | Grading: Letter or Credit/No Credit

EDUC 216X: Education, Race, and Inequality in African American History, 1880-1990 (CSRE 216X, HISTORY 255E)

Seminar. The relationship among race, power, inequality, and education from the 1880s to the 1990s. How schools have constructed race, the politics of school desegregation, and ties between education and the late 20th-century urban crisis.

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

EDUC 230X: Social Enterprise

(Same as STRAMGT 341.) Approaches for creating social value through a social enterprises including nonprofits, for-profits, and hybrid forms of organization. Perspectives include entrepreneur, CEO, funder, and board member. Topics include undertaking the social entrepreneurship process; mobilizing economic and human resources; achieving social objectives with commercial vehicles; crafting alliances; managing growth; measuring and managing performance; governing for excellence. Case studies. Student teams carry out field-based research in a significant strategic or operational issue of a social enterprise

Terms: not given this year | Units: 4 | Grading: Letter (ABCD/NP)

EDUC 247: Moral Education

Contemporary scholarship and educational practice related to the development of moral beliefs and conduct in young people. The psychology of moral development; major philosophical, sociological, and anthropological approaches. Topics include: natural capacities for moral awareness in the infant; peer and adult influences on moral growth during childhood and adolescence; extraordinary commitment during adulthood; cultural variation in moral judgment; feminist perspectives on morality; the education movement in today's schools; and contending theories concerning the goals of moral education. (PSE)

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

EDUC 267E: Development of Scientific Reasoning and Knowledge

For STEP elementary teacher candidates. Theories and methods of teaching and learning science. How to develop curricula and criteria for critiquing curricula. Students design a science curriculum plan for a real setting. State and national science frameworks and content standards. Alternative teaching approaches; how to select approaches that are compatible with learner experience and lesson objectives. Focus is on the linguistic and cultural diversity of California public school students.

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

EDUC 267F: Development of Scientific Reasoning and Knowledge II

Continuation of 267E. Scientific knowledge and pedagogical skills for supporting science instruction. Topics include: how children build scientific understandings and what that understanding might look and sound like in young children; what school science is and how concepts are connected to the doing of it; physical, life, and earth science constructs.

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

EDUC 306A: Economics of Education in the Global Economy

Case material considers development problems in the U.S. and abroad. Discussion sections on economic aspects of educational development. (SSPEP/ICE)

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

EDUC 306D: World, Societal, and Educational Change: Comparative Perspectives (EDUC 136, SOC 231)

Theoretical perspectives and empirical studies on the structural and cultural sources of educational expansion and differentiation, and on the cultural and structural consequences of educational institutionalization. Research topics: education and nation building; education, mobility, and equality; education, international organizations, and world culture.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

EDUC 321X: Leading Social Change: Educational and Social Entrepreneurship (OB 385)

(Same as OB 385) The course provides an overview of different approaches to leading change in the social sector, drawing primarily, but not exclusively, on case examples in education. While there is a substantial need for innovation and visionary leadership in sectors such as education, social entrepreneurs who want to drive change must appreciate the significant barriers and unique opportunities presented by non-market forces in these sectors. The course will equip students with an appreciation for different mechanisms of change and theories of action as well as some of the challenges of initiating and sustaining meaningful change in social sectors such as education. ... more description for EDUC 321X »

Terms: not given this year | Units: 4 | 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

EDUC 359C: Science Literacy

The changing debate over conceptions of the nature of science and the calls to broaden it. Themes, directions, limitations, and epistemological foundations of the body of research on the nature of science.

Terms: not given this year | Units: 2-3 | Repeatable for credit | Grading: Letter or Credit/No Credit

EDUC 362X: The Science Curriculum: Values and Ideology in a Contested Terrain

The issue of what should be taught in schools is a site of contestation where issues of beliefs, values and ideologies emerge. This course will use the school science curriculum and the history of its development to explore the common positions adopted and argued for in approaching curriculum development. Course will help students develop a knowledge of curriculum reform in school science and a deeper understanding of the arguments that have shaped its present form and their historical antecedents.

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

EDUC 97X: Science Education through Community Service

This one-unit directed reading, service-learning course will focus on educational inequity in the sciences for k-8 children in the communities of the Ravenswood School District. It is intended for students who are participating in the Haas Center's Science in Service program. Students will attend a 2-hr/week seminar. Through the readings students will familiarize themselves with the communities, gain an understanding of the root causes of educational inequity in the sciences, and acquire skills in teaching science and mentoring children.

Terms: Aut | Units: 1 | Grading: Satisfactory/No Credit

EE 140: The Earth From Space: Introduction to Remote Sensing (GEOPHYS 140)

Global change science as viewed using space remote sensing technology. Global warming, ozone depletion, the hydrologic and carbon cycles, topographic mapping, and surface deformation. Physical concepts in remote sensing. EM waves and geophysical information. Sensors studied: optical, near and thermal IR, active and passive microwave.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

EE 237: Solar Energy Conversion

Basics of solar energy conversion in photovoltaic devices and solar thermal systems. Solar cell device physics: electrical and optical. Solar system issues including module assembly, inverters, and micro-inverters. Concentrated solar power. Students design solar cells. Prerequisite: EE 116 or EE 216.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

EE 292H: Engineering and Climate Change

The purpose of this seminar series is to help equip students and professionals with the tools to apply the engineering mindset to problems that stem from climate change, in order to consider and evaluate possible interventional, remedial and adaptive approaches. This course is not a crash course on climate change (established climate experts are better equipped for that), nor is it a crash course in policy ¿ instead the course focuses on discovering and exploring climate problems that seem most likely to benefit from adding the engineering mindset as solutions are considered. \n\n \nIn each weekly class, a guest speaker will deliver a brief introductory talk (20-30 minut... more description for EE 292H »

Terms: Win | Units: 1 | Repeatable for credit | Grading: Credit/No Credit

EE 293A: Fundamentals of Energy Processes (ENERGY 293A)

For seniors and graduate students. Thermodynamics, heat engines, thermoelectics, biomass. Recommended: MATH 41, 43; PHYSICS 41, 43, 45

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

EE 293B: Fundamentals of Energy Processes (ENERGY 293B)

For seniors and graduate students. Fuel cells. Production of hydrogen: electrolytic, chemical, thermolytic, photolytic. Hydrogen storage: hydrides. Photoelectric converters; photo-thermovoltaic converters. Wind turbines. Recommended: EE 293A; MATH 41; PHYSICS 41, 43, 45

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

EE 322: Molecular Electronics and Photonics

Physics of charge and energy transfer in molecular systems and connection with traditional mesoscopic transport theories. Analysis of molecular organic light-emitting diodes, photovoltaic cells and transistors. Technology and applications of molecular semiconductors. Prerequisite: 228 or equivalent.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

EE 327: Properties of Semiconductor Materials

Modern semiconductor devices and integrated circuits are based on unique energy band, carrier transport, and optical properties of semiconductor materials. How to choose these properties for operation of semiconductor devices. Emphasis is on quantum mechanical foundations of the properties of solids, energy bandgap engineering, semi-classical transport theory, semi-conductor statistics, carrier scattering, electro-magneto transport effects, high field ballistic transport, Boltzmann transport equation, quantum mechanical transitions, optical absorption, and radiative and non-radiative recombination that are the foundations of modern transistors and optoelectronic devices. ... more description for EE 327 »

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

EE 392N: INTELLIGENT ENERGY SYSTEMS

The key systems engineering steps for design of automated systems in application to of existing and future intelligent energy systems. Existing design approaches and practices for the energy systems. Every second lecture of the course will be a guest lecture discussing the communication system design for a certain type of energy system. They will alternate with guest lectures discuss-ing the on-line analytical functions.

Terms: Spr | Units: 1 | Grading: Credit/No Credit

EE 60N: Man versus Nature: Coping with Disasters Using Space Technology (GEOPHYS 60N)

Stanford Introductory Seminar. Preference to freshman. Natural hazards, such as earthquakes, volcanoes, floods, hurricanes, and fires, affect the lives of thousands of people worldwide everyday. Over the past twenty years developments in spaceborne imaging technology have made it possible to monitor and respond to such disasters much more rapidly than in the past, saving lives and money. Additionally, greater understanding of the physical processes involved allows us to anticipate and plan for mitigation of the consequences of the disasters. In this course we will explore these new tools, how they are applied to natural disasters, and learn how the remotely-sensed data... more description for EE 60N »

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

EESS 213: Spatial Statistics and Analysis for Environmental Data

Introduction to common algorithms and concepts of data analysis and spatial statistics as used in environmental sciences. The first part of the class focuses on methods usually performed on remote sensing data set such as clustering, classification, and landscape fragmentation. The second part of the class focuses on spatial statistics such as, variogram, kriging estimators and change of support models. Each algorithm will be coded using the python language with an emphasis on programming styles and designs to foster a collaborative research environment. No programming experience is required. Open to graduates. Open to undergrads with consent from the instructor.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

EESS 215: Earth System Dynamics
This is a graduate level course that examines the dynamics of the Earth System from an integrated perspective. Lectures introduce the physical, biogeochemical, ecological, and human dimensions of the Earth System, with emphasis on feedbacks, thresholds and tipping points. Human interactions with climate and land systems are emphasized in order to enable in-depth exploration of Earth System dynamics. Lab projects focus on a region of the globe for which rich coordinated data sources exist and complex Earth System dynamics dominate the environment
Terms: Spr | Units: 4 | Grading: Letter or Credit/No Credit

EESS 217: Climate of the Cenozoic
For upper-division undergraduate and graduate students. The paleoclimate of the Cenozoic and how climate changes in the past link to the carbon cycle. Topics include long- and short-term records of climate on continents and oceans, evidence for and causes of hyperthermal events, how the Earth's climate has responded in increased carbon dioxide in the atmosphere. Guest speakers, student presentations.
Terms: not given this year | Units: 3 | Grading: Letter (ABCD/NP)

EESS 220: Physical Hydrogeology (CEE 260A)
(Formerly GES 230.) Theory of underground water occurrence and flow, analysis of field data and aquifer tests, geologic groundwater environments, solution of field problems, and groundwater modeling. Introduction to groundwater contaminant transport and unsaturated flow. Lab. Prerequisite: elementary calculus.
Terms: Aut | Units: 4 | Grading: Letter (ABCD/NP)

EESS 221: Contaminant Hydrogeology (CEE 260C)
(Formerly GES 231.) For earth scientists and engineers. Environmental and water resource problems involving contaminated groundwater. The processes affecting contaminant migration through porous media including interactions between dissolved substances and solid media. Conceptual and quantitative treatment of advective-dispersive transport with reacting solutes. Predictive models of contaminant behavior controlled by local equilibrium and kinetics. Modern methods of contaminant transport simulation and optimal aquifer remediation. Prerequisite: GES 230 or CEE 260A or equivalent.
Terms: Spr | Units: 4 | Grading: Letter or Credit/No Credit

EESS 240: Advanced Oceanography
For upper-division undergraduates and graduate students in the earth, biologic, and environmental sciences. Topical issues in marine science/ oceanography. Topics vary each year following or anticipating research trends in oceanographic research. Focus is on links between the circulation and physics of the ocean with climate in the N. Pacific region, and marine ecologic responses. Participation by marine scientists from research groups and organizations including the Monterey Bay Aquarium Research Institute.
Terms: Aut | Units: 3 | Repeatable for credit | Grading: Satisfactory/No Credit

EESS 244: Marine Ecosystem Modeling
Practical background necessary to construct and implement a 2-dimensional (space and time) numerical model of a simple marine ecosystem. Computer programming, model design and parameterization, and model evaluation. Students develop and refine their own multi-component marine ecosystem model.
Terms: Aut | Units: 3 | Grading: Letter or Credit/No Credit

EESS 245: Advanced Biological Oceanography
For upper-division undergraduates and graduate students. Themes vary annually but include topics such as marine bio-optics, marine ecological modeling, and phytoplankton primary production. Hands-on laboratory and computer activities, and field trips into local waters. May be repeated for credit.
Terms: not given this year | Units: 3-4 | Repeatable for credit | Grading: Letter (ABCD/NP)

EESS 250: Elkhorn Slough Microbiology
(Formerly GES 270.) The microbial ecology and biogeochemistry of Elkhorn Slough, an agriculturally-impacted coastal estuary draining into Monterey Bay. The diversity of microbial lifestyles associated with estuarine physical/chemical gradients, and the influence of microbial activity on the geochemistry of the Slough, including the cycling of carbon, nitrogen, sulfur, and metals. Labs and field work. Location: Hopkins Marine Station.
Terms: Sum | Units: 3 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

EESS 259: Environmental Microbial Genomics

The application of molecular and environmental genomic approaches to the study of biogeochemically-important microorganisms in the environment without the need for cultivation. Emphasis is on genomic analysis of microorganisms by direct extraction and cloning of DNA from natural microbial assemblages. Topics include microbial energy generation and nutrient cycling, genome structure, gene function, physiology, phylogenetic and functional diversity, evolution, and population dynamics of uncultured communities.

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

EESS 301: Topics in Environmental Earth System Science

Current topics, issues, and research related to interactions that link the oceans, atmosphere, land surfaces and freshwater systems. May be repeated for credit.

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

EESS 330: Advanced Topics in Hydrogeology

Topics: questioning classic explanations of physical processes; coupled physical, chemical, and biological processes affecting heat and solute transport. May be repeated for credit.

Terms: Win | Units: 1-2 | Repeatable for credit | Grading: Letter or Credit/No Credit

EESS 385: Practical Experience in the Geosciences

On-the-job training, that may include summer internship, in applied aspects of the geosciences, and technical, organizational, and communication dimensions. Meets USCIS requirements for F-1 curricular practical training. May be repeated for credit.

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

EESS 398: Current Topics in Ecosystem Modeling

Terms: not given this year | Units: 1-2 | Repeatable for credit | Grading: Satisfactory/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)

ENERGY 155: Undergraduate Report on Energy Industry Training

On-the-job practical training under the guidance of on-site supervisors. Required report detailing work activities, problems, assignments and key results. Prerequisite: written consent of instructor.

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

ENERGY 160: Modeling Uncertainty in the Earth Sciences (ENERGY 260)

Whether Earth Science modeling is performed on a local, regional or global scale, for scientific or engineering purposes, uncertainty is inherently present due to lack of data and lack of understanding of the underlying phenomena. This course highlights the various issues, techniques and practical modeling tools available for modeling uncertainty of complex 3D/4D Earth systems. The course focuses on a practical breath rather than theoretical depth. Topics covered are: the process of building models, sources of uncertainty, probabilistic techniques, spatial data analysis and geostatistics, grid and scale, spatio-temporal uncertainty, visualizing uncertainty in large dimens... more description for ENERGY 160 »

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

ENERGY 167: Engineering Valuation and Appraisal of Oil and Gas Wells, Facilities, and Properties (ENERGY 267)
Appraisal of development and remedial work on oil and gas wells; appraisal of producing properties; estimation of productive capacity, reserves; operating costs, depletion, and depreciation; value of future profits, taxation, fair market value; original or guided research problems on economic topics with report. Prerequisite: consent of instructor.
Terms: Win | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

ENERGY 180: Oil and Gas Production Engineering (ENERGY 280)
Design and analysis of production systems for oil and gas reservoirs. Topics: well completion, single-phase and multi-phase flow in wells and gathering systems, artificial lift and field processing, well stimulation, inflow performance. Prerequisite: 120.
Terms: Spr | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter (ABCD/NP)

ENERGY 191: OPTIMIZATION OF ENERGY SYSTEMS (ENERGY 291)
Introductory mathematical programming and optimization using examples from energy industries. Emphasis on problem formulation and solving, secondary coverage of algorithms. Problem topics include optimization of energy investment, production, and transportation; uncertain and intermittent energy resources; energy storage; efficient energy production and conversion. Methods include linear and nonlinear optimization, as well as multi-objective and goal programming. Tools include Microsoft Excel and AMPL mathematical programming language. Prerequisites: MATH 41, MATH 51, or consent of instructor. Programming experience helpful (e.g, CS 106A-B).
Terms: Win | Units: 3 | Grading: Letter (ABCD/NP)

ENERGY 194: Special Topics in Energy and Mineral Fluids
May be repeated for credit.
Terms: Aut, Win, Spr, Sum | Units: 1-3 | Repeatable for credit | Grading: Satisfactory/No Credit

ENERGY 210: Energy Policy for Scientists and Engineers
Graduate level seminar that addresses energy policy issues through\n\ndiscussion, invited talks and visits/field trips to policy making organizations\n \nand industry leaders.
Terms: Spr | Units: 1 | Grading: Letter or Credit/No Credit

ENERGY 227: Enhanced Oil Recovery
The physics, theories, and methods of evaluating chemical, miscible, and thermal enhanced oil recovery projects. Existing methods and screening techniques, and analytical and simulation based means of evaluating project effectiveness. Dispersion-convection-adsorption equations, coupled heat, and mass balances and phase behavior provide requisite building blocks for evaluation.
Terms: alternate years, given next year | Units: 3 | Grading: Letter (ABCD/NP)

ENERGY 24: Making Molehills out of Mountains: Energy and Development in Appalachia
Preparation for Alternative Spring Break trip to examine the past, present, and future role of energy in Appalachia. Positive and negative impacts of energy production; meetings with energy industry leaders, community groups, and policymakers. The larger role of energy development and energy issues in society. May be repeated for credit.
Terms: not given this year | Units: 1 | Grading: Letter or Credit/No Credit

ENERGY 240: Geostatistics for Spatial Phenomena (GES 240)
Probabilistic modeling of spatial and/or time dependent phenomena. Kriging and cokriging for gridding and spatial interpolation. Integration of heterogeneous sources of information. Multiple-point geostatistics and training image-based stochastic imaging of reservoir/field heterogeneities. Introduction to GSLIB and SGEMS software. Case studies from the oil and mining industry and environmental sciences. Prerequisites: introductory calculus and linear algebra, STATS 116, GES 161, or equivalent.
Terms: Spr | Units: 2-3 | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

ENGLISH 103Q: Reading and Writing Poetry about Science (STS 103Q)

Preference to sophomores. Students will study recent poetry inspired by the phenomena and history of the sciences in order to write such poems themselves. These poems bring sensuous human experience to bear on biology, ecology, neuroscience, physics, astronomy, and geology, as well as on technological advances and missteps. Poets such as Mark Doty, Jody Gladding, Albert Goldbarth, Jorie Graham, Sarah Lindsay, Adrienne Rich, W.S. Merwin, and C. K. Williams. Grounding in poetics, research in individually chosen areas of science, weekly analytical and creative writing. Enrollment limited to 12.

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

ENGLISH 153G: Technology, Ecology, and the Imagination of the Future (STS 114)

Seminar. Literary visions of the future from the 60s to the present. How such texts imagine new and existing technologies in interrelation with the evolution of natural ecosystems. The development of wild habitats, alterations of the human body, and visions of the future city. The role of images and stories about globalization. Literary, scientific, and technical texts.

Terms: not given this year | Units: 5 | UG Reqs: GER:DBHum | Grading: Letter (ABCD/NP)

ENGR 120: Fundamentals of Petroleum Engineering (ENERGY 120)

Lectures, problems, field trip. Engineering topics in petroleum recovery; origin, discovery, and development of oil and gas. Chemical, physical, and thermodynamic properties of oil and natural gas. Material balance equations and reserve estimates using volumetric calculations. Gas laws. Single phase and multiphase flow through porous media.

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

ENGR 131: Ethical Issues in Engineering (STS 115)

Moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistle blowing; ethical conflicts of engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Case studies, guest practitioners, and field research. Limited enrollment.

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

ENGR 150: Social Innovation and Entrepreneurship (ENGR 250)

(Graduate students register for 250.) The art of innovation and entrepreneurship for social benefit. Project team develops, tests, and iteratively improves technology-based social innovation and business plan to deploy it. Feedback and coaching from domain experts, product designers, and successful social entrepreneurs. Limited enrollment; application required. See http://sie.stanford.edu for course information.

Terms: Aut, Win, Spr | Units: 1-6 | Grading: Letter or Credit/No Credit

ENGR 192: Engineering Public Service Project

Volunteer work on a public service project with a technical engineering component. Project requires a faculty sponsor and a community partner such as a nonprofit organization, school, or individual. Required report. See http://soe.stanford.edu/publicservice. May be repeated for credit. Prerequisite: consent of instructor.

Terms: not given this year | Units: 1-2 | Repeatable for credit | Grading: Letter or Credit/No Credit

ENGR 204: Research Ethics for Engineers and Scientists

Explores ethical responsibilities of engineering and science researchers in relation to laboratory safety, data acquisition and management, experiment and product design, collaborative research, authorship and peer review, mentorship, human subjects research, funding applications and funded research, media accounts of research, and new and emerging technologies (e.g., in nanotechnology and bioengineering). Responsibilities of researchers toward society at large, and Stanford and government policies regarding the conduct of engineering and science research will also be addressed. Lectures, discussion, guest researchers, and real case studies. Primarily for graduate student... more description for ENGR 204 »

Terms: Spr | Units: 1-2 | 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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

ENVRES 220: Our Coastal Society: An interdisciplinary seminar on ocean/coastal themes

Utilizing guest speaker presentations from various academic and non-academic organizations, this seminar will explore marine science and policy for the Pacific Coast that informs natural resource as well as conservation decision-making and future challenges. Topics to be covered may include tuna and shark research along the California coast, kelp forest ecosystems, fisheries management, marine spatial planning, legislative advances such as the Marine Life Protection Act (MLPA), climate change threats to our coast, the importance of the US west coast in the context of Pacific Ocean ecosystem health, and others. Students enrolled in the course will be expected to attend all... more description for ENVRES 220 »

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

ENVRES 220D: Agricultural Systems in Emerging Economies (EESS 320)

Agricultural Systems in Emerging Economies. This interdisciplinary seminar examines the social, economic, institutional, and ecological aspects of agricultural systems in emerging economies. Begins with an overview of global agricultural systems and then focuses on the agricultural systems in Brazil, India, Indonesia and China. Short lectures by guest Stanford faculty and discussion topics based on the questions posed by lecturers, as well as readings. Students are expected to attend regularly, to summarize the content and relevance of one assigned reading, and to assist in leading discussion for the week that reading is discussed. The goal of the course is to provide ... more description for ENVRES 220D »

Terms: Spr, offered once only | Units: 2 | Grading: Credit/No Credit

ENVRES 260: Global Water: Challenges and Opportunities

Explores challenges in the global supply, quality, and accessibility of freshwater. Speakers from Stanford and outside organizations on key topics such as threats due to climate change, agriculture demands, challenges of urbanization, water and sanitation, as well as discussion of policy, market, technology, and other potential solutions. Weekly readings in advance of speaker. Active participation expected of all enrolled students; those enrolled for 2-3 units will have one or more additional written assignments and will facilitate one or more discussions.

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

ENVRES 270: Graduate Practicum in Environment and Resources

Opportunity for E-IPER students to pursue areas of specialization in an institutional setting such as a laboratory, clinic, research institute, governmental agency, non-governmental organization, or multilateral organization. Meets US CIS requirements for off-campus employment with endorsement from designated school official.

Terms: Aut, Win, Spr, Sum | Units: 1-9 | Repeatable for credit | 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 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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 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 ecosys-tems, climate and energy. Spreadsheet modeling, optimization, and Monte Carlo simulation applied to resource management and envi-ronmental policy. Accelerated version of ENVRES 338 for stu-dents 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 model-ing/optimization/simulation. This course is open only to students in the E-IPER Ph.D. program or Joint M.S. in Environment and Re-sources 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 133: Ethics and Politics of Public Service (HUMBIO 178, PHIL 175A, PHIL 275A, POLISCI 133, PUBLPOL 103D)

Ethical and political questions in public service work, including volunteering, service learning, humanitarian assistance, and public service professions such as medicine and teaching. Motives and outcomes in service work. Connections between service work and justice. Is mandatory service an oxymoron? History of public service in the U.S. Issues in crosscultural service work. Integration with the Haas Center for Public Service to connect service activities and public service aspirations with academic experiences at Stanford.

Terms: not given this year | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

ETHICSOC 136R: Introduction to Global Justice (INTNLREL 136R, PHIL 76, POLISCI 136R, POLISCI 336)

Recent work in political theory on global justice. Topics include global poverty, human rights, fair trade, immigration, climate change. Do developed countries have a duty to aid developing countries? Do rich countries have the right to close their borders to economic immigrants? When is humanitarian intervention justified? Readings include Charles Beitz, Thomas Pogge, John Rawls.

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

ETHICSOC 171: Justice (IPS 208, PHIL 171, PHIL 271, POLISCI 3P, POLISCI 136S, POLISCI 336S, PUBLPOL 103C, PUBLPOL 307)

Focus is on the ideal of a just society, and the place of liberty and equality in it, in light of contemporary theories of justice and political controversies. Topics include protecting religious liberty, financing schools and elections, regulating markets, assuring access to health care, and providing affirmative action and group rights. Issues of global justice including human rights and global inequality.

Terms: Aut | Units: 4-5 | UG Reqs: GER:ECEthicReas, GER:DBHum | Grading: Letter or Credit/No Credit

ETHICSOC 174A: Moral Limits of the Market (PHIL 174A, PHIL 274A)

Morally controversial uses of markets and market reasoning in areas such as organ sales, procreation, education, and child labor. Would a market for organ donation make saving lives more efficient; if it did, would it thereby be justified? Should a nation be permitted to buy the right to pollute? Readings include Walzer, Arrow, Rawls, Sen, Frey, Titmuss, and empirical cases.

Terms: not given this year | Units: 4 | UG Reqs: GER:DBHum | Grading: Letter or Credit/No Credit

ETHICSOC 177M: HUMAN RIGHTS & MORAL QUESTIONS (ETHICSOC 277M, PHIL 177M, PHIL 277M)

The proliferation of human rights in the discourse of international justice has raised a number of important questions in both moral and legal theory. What are human rights? How should they be conceptualized? Who ought to bear the duties associated with them? Can their protection justify military interventions into sovereign states? This course will cover topics in moral and legal theory surrounding human rights. The course has three main focuses. The first concerns the question of what these rights are. The second focus is on the various substantive moral justifications for the protection of human rights. The third is on the moral issues raised by the dominance of human ... more description for ETHICSOC 177M »

Terms: Aut | Units: 4-5 | UG Reqs: GER:ECEthicReas | Grading: Letter (ABCD/NP)

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)

ETHICSOC 198: Community Engagement Internship

Restricted to Ethics in Society minors with the citizenship option. Opportunities for students to engage in community work via the Haas Center for Public Service. Students work with Haas Center staff to design an internship involving community-based research or supported by a Haas Center fellowship or community service work/study, or to serve for an academic year as a tutor in one of the Haas Center's several K-12 programs in East Palo Alto. May be repeated for credit.

Terms: Aut, Win, Spr, Sum | Units: 3-5 | Repeatable for credit | Grading: Letter or Credit/No Credit

ETHICSOC 9SI: Civil Liberties and Critical Issues in American Society

This class is a lecture series featuring guest speakers from various academic departments, the Stanford Law School, and public interest organizations from around the Bay Area. Issues that will be addressed include prison reform, capital punishment, education reform, and other issues. Some of the speakers will include Professors Larry Marshall and Richard Ford of the Stanford Law School, as well as Richard Lee (Prop 19 advocate).

Terms: Spr | Units: 1 | Grading: Satisfactory/No Credit

FEMST 101: Introduction to Feminist Studies (ANTHRO 144A)

What is feminism and why does it matter today? Debates over the status and meaning of feminism in the 21st century. Feminist theories and practices across topics that intersect with gender inequality such as race, health, socioeconomics, sexual orientation, international perspectives, new media, civil rights, and political change. Perspectives from philosophy, education, visual culture, literary and ethnic studies, performance and expressive arts, and social sciences.

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

GEOPHYS 150: Geodynamics: Our Dynamic Earth

In this course we cover the dynamic forces acting upon the Earth. We will investigate how geophysical forces effect the bending of tectonic plates, the flow of heat, sea level topography, the breaking point of rocks, porous flow, and how faults store and release energy. Math 52 or CME 102, GP 107 or permission from instructor.\n\nMore detailed course description to come.

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

GEOPHYS 170: Global Tectonics

The architecture of the Earth's crust; regional assembling of structural or deformational features and their relationship, origin and evolution. The plate-tectonic cycle: rifting, passive margins, sea-floor spreading, subduction zones, and collisions. Case studies.

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

GEOPHYS 171: Tectonics Field Trip

Long weekend field trip to examine large-scale features in the crust. Destinations may include the San Andreas fault, Mendocino Triple Junction, Sierra Nevada, and western Basin and Range province. Offered every other year, spring quarter.

Terms: alternate years, given next year | Units: 1-3 | Grading: Satisfactory/No Credit

GEOPHYS 185: Rock Physics for Reservoir Characterization (GEOPHYS 260)

How to integrate well log and laboratory data to determine and theoretically generalize rock physics transforms between sediment wave properties (acoustic and elastic impendence), bulk properties (porosity, lithology, texture, permeability), and pore fluid conditions (pore fluid and pore pressure). These transforms are used in seismic interpretation for reservoir properties, and seismic forward modeling in what-if scenarios. Offered every other year, spring quarter.

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

Instructors: Dvorkin, J. (PI)

Schedule for GEOPHYS 185

GEOPHYS 187: Environmental Soundings Image Estimation (GEOPHYS 211)

Imaging principles exemplified by means of imaging geophysical data of various uncomplicated types (bathymetry, altimetry, velocity, reflectivity). Adjoints, back projection, conjugate-gradient inversion, preconditioning, multidimensional autoregression and spectral factorization, the helical coordinate, and object-based programming. Common recurring issues such as limited aperture, missing data, signal/noise segregation, and nonstationary spectra. See http://sep.stanford.edu/sep/prof/. Offered every year, autumn quarter.

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

Instructors: Claerbout, J. (PI) ; Li, Y. (TA)

Schedule for GEOPHYS 187

GEOPHYS 190: Near-Surface Geophysics

Introduction to the integration of geophysical field measurements and laboratory measurements for imaging and characterizing the top 100 meters of Earth. Examples will focus on applications related to water resource management. The link between the measured geophysical properties of rocks, soils, and sediments, and their material properties. Forward modeling and inversion of geophysical data sets. Each week includes two hours of lectures; plus one two-hour lab that involves acquisition of field or lab data, or computer modeling/analysis of data. Pre-requisite: CME 100 or Math 51, or co-registration in either. Offered every year, spring quarter.

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

Instructors: Knight, R. (PI)

Schedule for GEOPHYS 190

GEOPHYS 201: Frontiers of Geophysical Research at Stanford: Faculty Lectures

Required for new students entering the department. Second-year and other graduate students may attend either for credit or as auditors. Department faculty and senior research staff introduce the frontiers of research problems and methods being employed or developed in the department and unique to department faculty and students: what the current research is, why the research is important, what methodologies and technologies are being used, and what the potential impact of the results might be. Offered every year, autumn quarter.

Terms: Aut | Units: 1 | Grading: Satisfactory/No Credit

Instructors: Beroza, G. (PI)

Schedule for GEOPHYS 201

GEOPHYS 202: Reservoir Geomechanics

Basic principles of rock mechanics and the state of stress and pore pressure in sedimentary basins related to exploitation of hydrocarbon and geothermal reservoirs. Mechanisms of hydrocarbon migration, exploitation of fractured reservoirs, reservoir compaction and subsidence, hydraulic fracturing, utilization of directional and horizontal drilling to optimize well stability. Offered every other year, winter quarter.

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

Instructors: Heller, R. (PI) ; Zoback, M. (PI) ; Brown, J. (TA)

Schedule for GEOPHYS 202

GEOPHYS 20Q: Predicting Volcanic Eruptions

Preference to sophomores. The physics and chemistry of volcanic processes and modern methods of volcano monitoring. Volcanoes as manifestations of the Earth's internal energy and hazards to society. How earth scientists better forecast eruptive activity by monitoring seismic activity, bulging of the ground surface, and the discharge of volcanic gases, and by studying deposits from past eruptions. Focus is on the interface between scientists and policy makers and the challenges of decision making with incomplete information. Field trip to Mt. St. Helens, site of the 1980 eruption.

Terms: given next year | Units: 3 | Grading: Letter or Credit/No Credit

GEOPHYS 210: Basic Earth Imaging

Echo seismogram recording geometry, head waves, moveout, velocity estimation, making images of complex shaped reflectors, migration by Fourier and integral methods. Anti-aliasing. Dip moveout. Computer labs. See http://sep.stanford.edu/sep/prof/. Offered every year, autumn quarter.

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

Instructors: Claerbout, J. (PI) ; Clapp, R. (PI) ; Shen, X. (TA)

Schedule for GEOPHYS 210

GEOPHYS 255: Report on Energy Industry Training

On-the-job-training for master's and doctoral degree students under the guidance of on-site supervisors. Students submit a report detailing work activities, problems, assignment, and key results. May be repeated for credit. Prerequisite: written consent of adviser.

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

Instructors: Beroza, G. (PI) ; Biondi, B. (PI) ; Dunham, E. (PI) ; Dvorkin, J. (PI) ... more instructors for GEOPHYS 255 »

Schedule for GEOPHYS 255

GEOPHYS 257: Introduction to Computational Earth Sciences

Techniques for mapping numerically intensive algorithms to modern high performance computers such as the Center for Computational Earth and Environmental Science¿s (CEES) high productivity technical computing (HPTC). Topics include: debugging, performance analysis, and concepts of parallel programming; efficient serial and parallel programs; OpenMP; and MPI. Exercises using SMP and cluster computers. See http://pangea.stanford.edu/research/cees/. Recommended: familiarity with MATLAB, C, or Fortran. May be repeated for credit. Offered every other year, winter quarter.

Terms: not given this year | Units: 2-4 | Repeatable for credit | Grading: Letter or Credit/No Credit

GEOPHYS 262: Rock Physics

Properties of and processes in rocks as related to geophysical exploration, crustal studies, and tectonic processes. Emphasis is on wave velocities and attenuation, hydraulic permeability, and electrical resistivity in rocks. Application to in situ problems, using lab data and theoretical results. Offered every year, autumn quarter.

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

Instructors: Mavko, G. (PI) ; Allan, A. (TA) ; Tew, A. (TA)

Schedule for GEOPHYS 262

GEOPHYS 280: 3-D Seismic Imaging
The principles of imaging complex structures in the Earth subsurface using 3-D reflection seismology. Emphasis is on processing methodologies and algorithms, with examples of applications to field data. Topics: acquisition geometrics of land and marine 3-D seismic surveys, time vs. depth imaging, migration by Kirchhoff methods and by wave-equation methods, migration velocity analysis, velocity model building, imaging irregularly sampled and aliased data. Computational labs involve some programming. Lab for 3 units. Offered every year, winter quarter.
Terms: Win | Units: 2-3 | Grading: Letter or Credit/No Credit
Instructors: Biondi, B. (PI) ; Wong, M. (TA)
Schedule for GEOPHYS 280

GEOPHYS 284: Hydrogeophysics
The use of geophysical methods for imaging and characterizing the top 100 meters of Earth for hydrogeologic applications. Includes material properties, forward modeling, data acquisition, inversion, and integration with other forms of measurement. Each week includes three hours of lectures; plus one three-hour lab that involves acquisition of data at campus or near-by sites, or computer modeling of data.
Terms: Spr | Units: 3 | Grading: Letter (ABCD/NP)

GEOPHYS 286: Global Seismology
This course investigates how waves propagate through the whole Earth. This course examines the questions ¿How do body waves and surface waves behave within the Earth?¿ and ¿What does that tell us about the Earth?¿ The course delves into both theory and how we apply that theory to understand seismic observations. Requirements: Math 52 or CME 102, GP130 or permission from instructor.
Terms: Win | Units: 3 | Grading: Letter (ABCD/NP)

GEOPHYS 287: Earthquake Seismology
Theorems in elastodynamics, Green's functions, attenuation, wave propagation in layered media, ray theory, seismic moment tensors, finite-source effects, kinematics and dynamics of earthquakes, and engineering aspects of seismology.
Terms: Spr | Units: 3 | Grading: Letter (ABCD/NP)

GEOPHYS 288A: Crustal Deformation
Earthquake and volcanic deformation, emphasizing analytical models that can be compared to data from GPS, InSAR, and strain meters. Deformation, stress, and conservation laws. Dislocation models of strike slip and dip slip faults, in 2 and 3 dimensions. Crack models, including boundary element methods. Dislocations in layered and elastically heterogeneous earth models. Models of volcano deformation, including sills, dikes, and magma chambers. Offered every other year, autumn quarter.
Terms: Aut, not given next year | Units: 3-5 | Grading: Letter or Credit/No Credit
Instructors: Segall, P. (PI)
Schedule for GEOPHYS 288A

GEOPHYS 288B: Crustal Deformation
Earthquake and volcanic deformation, emphasizing analytical models that can be compared to data from GPS, InSAR, and strain meters. Viscoelasticity, post-seismic rebound, and viscoelastic magma chambers. Effects of surface topography and earth curvature on surface deformation. Gravity changes induced by deformation and elastogravitational coupling. Poro-elasticity, coupled fluid flow and deformation. Earthquake nucleation and rate-state friction. Models of earthquake cycle at plate boundaries. Offered every other year, winter quarter.
Terms: Win, not given next year | Units: 3-5 | Grading: Letter or Credit/No Credit
Instructors: Segall, P. (PI)
Schedule for GEOPHYS 288B

GEOPHYS 289: Global Positioning System in Earth Sciences
The basics of GPS, emphasizing monitoring crustal deformation with a precision of millimeters over baselines tens to thousands of kilometers long. Applications: mapping with GIS systems, airborne gravity and magnetic surveys, marine seismic and geophysical studies, mapping atmospheric temperature and water content, measuring contemporary plate motions, and deformation associated with active faulting and volcanism.
Terms: alternate years, given next year | Units: 3-5 | Grading: Letter or Credit/No Credit

GEOPHYS 385B: Environmental Geophysics
Research on the use of geophysical methods for near-surface environmental problems. May be repeated for credit.
Terms: Aut, Win, Spr, Sum | Units: 1-5 | Repeatable for credit | Grading: Letter or Credit/No Credit

GERGEN 235: Survival and the Biopolitics of Bare Life
Michel Foucault¿s concept of biopolitics refers to a modern form of political reign that drags corporeity, biological processes of life and the natural foundations of society into its control zone. Recently, Giorgio Agamben has tried to use Foucault¿s concept of biopolitics for the benefit of the analysis of phenomenons of the present. He sees the crucial turn towards biopolitics rather in the constitution of forms of survival than in the politicization of life. His works contribute essentially to the upward trend of the concept of survival, which ¿ under the sign of international terrorism, ecological crisis or the intensifying struggle for resources ¿ seems to become an approach more and more influential for the interpretation of the present. In this seminar, classic texts concerning the history and topicality of the relation between biopower and survival shall be read and discussed, amongst them texts by Giorgio Agamben, Hannah Arendt, Bruno Bettelheim, Cathy Caruth, Michel Foucault, Sigmund Freud, Lawrence Langer, Jay Robert Lifton, Terrence DesPres and others. less description for GERGEN 235 «
Terms: Spr | Units: 3-5 | Grading: Letter (ABCD/NP)

GERGEN 265: Art and Nature
The role of nature in aesthetic experience and artistic creativity; the historically changing relation between aesthetic attitudes toward nature and art. Readings in English by Winckelmann, Kant, Schelling, Hegel, and Adorno.
Terms: Spr | Units: 3-5 | Grading: Letter or Credit/No Credit

GES 102: Earth Materials: Introduction to Mineralogy
The minerals and materials that comprise the earth and their uses in modern society. How to identify, classify, and interpret rock-forming minerals. Emphasis is on information provided by common minerals about the nature of the Earth's interior and processes such as magmatism and metamorphism that operate there, as well as the major processes of weathering and erosion that link plate tectonics to earth cycles. Prerequisite: introductory geology course. Recommended: introductory chemistry.
Terms: Aut | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

GES 102L: Introductory Mineralogy Laboratory
One weekly 3-hour laboratory to identify and interpret rock-forming minerals, industrially important minerals, and gems. Introduction to the use of hand lens, petrographic microscope and x-ray diffraction. Prerequisite: GES102 taken concurrently.
Terms: Aut | Units: 1 | Grading: Letter or Credit/No Credit

GES 103: Earth Materials: Rocks in Thin Section
Use of petrographic microscope to identify minerals and common mineral associations in igneous, metamorphic, and sedimentary rocks. Crystallization histories, mineral growth and reaction relations, deformation textures in metamorphic rocks, and provenance of siliciclastic rocks. Prerequisite 102.
Terms: Win | Units: 3 | Grading: Letter (ABCD/NP)

GES 104: Earth Materials: Introduction to Petrology
The origin of different rock types as a function of geologic and plate tectonic setting. How mineral and energy resources occur in rocks. Prerequisite: introductory geology course. Recommended: GES102.
Terms: Spr | Units: 3 | Grading: Letter or Credit/No Credit

GES 104L: Introductory Petrology Laboratory
One weekly 3-hour laboratory on how to identify igneous, metamorphic, and sedimentary rocks, and interpret their mode and conditions of formation using hand lens and petrographic microscope. Prerequisite: GES 102L; GES103; GES104 taken concurrently.
Terms: Spr | Units: 1 | Grading: Letter or Credit/No Credit

GES 105: Introduction to Field Methods
Two-week, field-based course in the White Mountains of eastern California. Introduction to the techniques for geologic mapping and geologic investigation in the field: systematic observations and data collection for lithologic columns and structural cross-sections. Interpretation of field relationships and data to determine the stratigraphic and deformational history of the region. Prerequisite: GES 1. Recommended: GES 102.
Terms: Aut | Units: 3 | Grading: Letter or Credit/No Credit

GES 107: Journey to the Center of the Earth (GEOPHYS 184)
The interconnected set of dynamic systems that make up the Earth. Focus is on fundamental geophysical observations of the Earth and the laboratory experiments to understand and interpret them. What earthquakes, volcanoes, gravity, magnetic fields, and rocks reveal about the Earth's formation and evolution.
Terms: alternate years, given next year | Units: 3 | Grading: Letter or Credit/No Credit

GES 110: Structural Geology and Tectonics
Theory, principles, and practical techniques to measure, describe, analyze, and interpret deformation-related structures on Earth. Collection of fault and fold data in the field followed by lab and computer analysis; interpretation of geologic maps and methods of cross-section construction; structural analysis of fault zone and metamorphic rocks; measuring deformation; regional structural styles and associated landforms related to plate tectonic convergence, rifting, and strike-slip faulting; the evolution of mountain belts and formation of sedimentary basins. Prerequisite: GES 1, calculus. Recommended: 102.
Terms: Spr | Units: 3-5 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

GES 111A: Fundamentals of Structural Geology (CEE 195A)
Techniques for structural mapping; using differential geometry to characterize structures; dimensional analysis and scaling relations; kinematics of deformation and flow; measurement and analysis of stress. Sources include field and laboratory data integrated with conceptual and mechanical models. Models of tectonic processes are constructed and solutions visualized using MATLAB. Prerequisites: GES 1, MATH 51, 52.
Terms: Aut | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

GES 111B: Fundamentals of Structural Geology (CEE 195B)
Continuation of GES 111A/CEE 195A. Conservation of mass and momentum in a deformable continuum; linear elastic deformation and elastic properties of rock; brittle deformation including fracture and faulting; linear viscous flow including folding and magma dynamics; model development and methodology. Sources include field and laboratory data integrated with conceptual and mechanical models. Models of tectonic processes are constructed and solutions visualized using MATLAB. Prerequisite: GES 111A/CEE 195B.
Terms: Win | Units: 3 | Grading: Letter or Credit/No Credit

GES 115: Engineering Geology Practice (CEE 196)
The application of geology and global change to the planning, design, and operation of engineering projects. Case histories taught in a seminar setting and field trips emphasize the impact of geology and global change on both individual engineering works and the built environment by considering Quaternary history and tectonics, anthropogenic sea level rise, active geologic processes, engineering properties of geologic deposits, site exploration, and professional ethics. Prerequisite: GES 1 or consent of instructor.
Terms: alternate years, given next year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

GES 120: Planetary and Early Biological Evolution Seminar (GES 220)
Interdisciplinary. For upper division science undergraduates and graduate students. Synthesis of biology, geology, physics, and chemistry. Recent approaches for identifying traces of past life on Earth. How to look for life on other planets such as Mars, Europa, and Titan. May be repeated for credit.
Terms: not given this year | Units: 2-3 | Repeatable for credit | Grading: Letter or Credit/No Credit

GES 121: What Makes a Habitable Planet? (GES 221)
Physical processes affecting habitability such as large impacts and the atmospheric greenhouse effect, comets, geochemistry, the rise of oxygen, climate controls, and impact cratering. Detecting and interpreting the spectra of extrasolar terrestrial planets. Student-led discussions of readings from the scientific literature. Team taught by planetary scientists from NASA Ames Research Center.
Terms: Aut | Units: 3 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

GES 122: Planetary Systems: Dynamics and Origins

(Students with a strong background in mathematics and the physical sciences should register for 222.) Motions of planets and smaller bodies, energy transport in planetary systems, composition, structure and dynamics of planetary atmospheres, cratering on planetary surfaces, properties of meteorites, asteroids and comets, extrasolar planets, and planetary formation. Prerequisite: some background in the physical sciences, especially astronomy, geophysics, or physics.

Terms: alternate years, given next year | Units: 3-4 | Grading: Letter or Credit/No Credit

GES 150: Senior Seminar: Issues in Earth Sciences

Focus is on written and oral communication in a topical context. Topics from current frontiers in earth science research and issues of concern to the public. Readings, oral presentations, written work, and peer review.

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

GES 151: Sedimentary Geology and Petrography: Depositional Systems

Topics: weathering, erosion and transportation, deposition, origins of sedimentary structures and textures, sediment composition, diagenesis, sedimentary facies, tectonics and sedimentation, and the characteristics of the major siliciclastic and carbonate depositional environments. Lab: methods of analysis of sediments in hand specimen and thin section. Field trips. Prerequisites: 1, 102, 103.

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

GES 163: Introduction to Isotope Geochemistry (GES 263)

Stable, cosmogenic, and radiogenic isotopes; processes that govern isotopic variations. Application of isotopes to geologic, biologic, and hydrologic questions. Major isotopic systems and their applications. Simple modeling techniques used in isotope geochemistry.

Terms: alternate years, given next year | Units: 3 | Grading: Letter or Credit/No Credit

GES 171: Geochemical Thermodynamics

Introduction to the application of chemical principles and concepts to geologic systems. The chemical behavior of fluids, minerals, and gases using simple equilibrium approaches to modeling the geochemical consequences of diagenetic, hydrothermal, metamorphic, and igneous processes. Topics: reversible thermodynamics, solution chemistry, mineral-solution equilibria, reaction kinetics, and the distribution and transport of elements by geologic processes. Prerequisite: GES 102.

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

GES 180: Igneous Processes

For juniors, seniors and beginning graduate students in Earth Sciences. Structure and physical properties of magmas; use of phase equilibria and mineral barometers and thermometers to determine conditions of magmatic processes; melting and magmatic lineages as a function of tectonic setting; processes that control magma composition including fractional crystallization, partial melting, and assimilation; petrogenetic use of trace elements and isotopes. Labs emphasize identification of volcanic and plutonic rocks in thin section and interpretation of rock textures. Prerequisite 102, 103, or consent of instructor.

Terms: alternate years, given next year | Units: 4 | Grading: Letter (ABCD/NP)

GES 181: Metamorphic Processes

For juniors, seniors, and beginning graduate students in Earth Sciences. Thermodynamics and phase equilibria of multiple component systems; use of phase equilibria to determine pressure and temperature of metamorphic assemblages; geochronology of metamorphic rocks; heat flow in the lithosphere; links between tectonics and metamorphism; and the role of heat and mass transfer in the Earth's crust and mantle. Labs emphasize identification of metamorphic rocks and minerals for common pelitic and basic rocks and interpretation of rock textures. May be taken for 3 units without lab. Prerequisites: 102, 103, or consent of instructor.

Terms: not given this year | Units: 3-5 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

GES 182: Field Seminar on Continental-Margin Volcanism

For juniors, seniors, and graduate students in the earth sciences and archeology. One weekend-long, and two one-day field trips to study Cenozoic volcanism associated with subduction and with passage of the Mendocino Triple Junction off the west coast of California: Mt. Lassen/Mt. Shasta/ Modoc plateau; Clear Lake/Sonoma volcanics; Pinnacles National Monument. Andesite and basalt lavas, cinder cones, mixed magmas, blast deposit, debris avalanches, volcanic mudflows, hydrologic controls of springs in volcanic terrains, hydrothermal alteration and modern geothermal systems, Hg mineralization, obsidian source. Prerequisite: 1, 104 or equivalent.

Terms: offered occasionally | Units: 2 | Grading: Letter or Credit/No Credit

GES 183: California Desert Geology

Field seminar. Six-day field trip over Spring Break to Mojave Desert, Death Valley, and Owens Valley. Basin-and-range faulting, alluvial fans, playas, sand dunes, metamorphic rocks, granites of the Sierra Nevada, obsidian lava flows and the deposits of major explosive eruptions, hot springs and ore deposits, and desert landscapes. Camping and moderate hiking. Recommended: introductory geology.

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

GES 185: Volcanology

For juniors, seniors, and beginning graduate students. Volcanic landforms and deposits and eruptive processes. How they relate to physical properties of magmas and the modes of emplacement. Volcanic hazards and the effects of eruptions on climate; volcanic-hosted geothermal systems and mineral resources. Required 4-day field trip over Memorial Day weekend to study silicic and mafic volcanism associated with the western margin of the Basin and Range Province. Those taking the class for 4 units will complete a 3-hour weekly lab involving hand specimen and thin section identification and interpretation, which emphasizes recognizing types of lavas and products of explosi... more description for GES 185 »

Terms: alternate years, given next year | Units: 3-4 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

GES 186: Geoarchaeology

For juniors, seniors, and beginning graduate students with interests in archaeology or geosciences. Geological concepts, techniques, and data in the study of artifacts and the interpretation of the archaeological record. Topics include: sediments and soils; sedimentary settings of site formation; postdepositional processes that disturb sites; paleoenvironmental reconstruction of past climates and landscapes using plant and animal remains and isotopic studies; raw materials (minerals, metals, stone, shells, clay, building materials) and methods used in sourcing; estimating age based on stratigraphic and radiometric techniques. Weekly lab; weekend field trip to local archae... more description for GES 186 »

Terms: not given this year | Units: 5 | UG Reqs: GER:DBNatSci | Grading: Letter or Credit/No Credit

GES 190: Research in the Field

Two to three-week long courses that provide students with the opportunity to collect data in the field as part of a team-based investigation of research questions or topics under the expert guidance of knowledgeable faculty and graduate students. Topics and locations vary. May be taken multiple times for credit. Prerequisites: GES 1, GES 102, GES 105.

Terms: Aut, Win, Spr, Sum | Units: 2-4 | Repeatable for credit | Grading: Letter (ABCD/NP)

GES 191: GES Field Trips

Four- to seven-day field trips to locations of geologic and environmental interest. Includes trips offered during Thanksgiving and Spring breaks. May be repeated for credit. See http://pangea.stanford.edu/GES/undergraduates/courses/.

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

GES 192: Undergraduate Research in Geological and Environmental Sciences

Field-, lab-, or literature-based. Faculty supervision. Written reports. May be repeated for credit.

Terms: Aut, Win, Spr, Sum | Units: 1-10 | Repeatable for credit | Grading: Letter or Credit/No Credit

GES 198: Special Problems in Geological and Environmental Sciences

Reading and instruction under faculty supervision. Written reports. May be repeated for credit.

Terms: Aut, Win, Spr, Sum | Units: 1-10 | Repeatable for credit | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

GES 1A: Introduction to Geology: The Physical Science of the Earth

For non-majors or prospective majors in the Earth Sciences. Lectures, hands-on laboratories, and three one-day weekend field trips. Focus is on the physical and chemical processes of heat and mass transfer within the earth and its fluid envelopes, including deep-earth, crustal, surface, and atmospheric processes. Topics include the dynamics of and interactions between the inner earth, plate tectonics, surface processes, and atmospheric processes such as climate change and global warming. Only one of GES 1A, 1B, or 1C may be taken for credit. Prerequisites: MATH 19 or equivalent.

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

GES 1BN: Introduction to Geology: California Desert Field Geology

California's Death Valley and Owens Valley are used as natural laboratories for studying active geologic processes and a billion years of earth history: ancient ocean sediments, mountain building, earthquake faulting, glacial landscapes, volcanic eruptions, hot springs and ore deposits, prehistoric climate changes, and historic human impacts. The course culminates in a 6-day field trip to these areas during Spring Break. Class lectures provide the basics of plate tectonics and physical geology. Laboratory exercises involve rock identification and interpreting topographic and geologic maps and remote sensing imagery. Camping and moderate hiking required. Limited enrollment... more description for GES 1BN »

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

GES 1C: Introduction to Geology: Dynamic Earth

For non-majors or prospective majors in the Earth Sciences. Integrated lecture-lab includes hands-on activities and local field trips. Focus is on reading the dynamic geological landscape, with an emphasis on California¿primarily Bay Area¿geology. Topics include plate tectonics, earthquakes and volcanoes, Earth materials, geologic time, stream processes, and climate change over geologic time. Only one of GES 1A, 1B, or 1C may be taken for credit.

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

GES 210: Geologic Evolution of the Western U.S. Cordillera

The geologic and tectonic evolution of the U.S. Cordillera based on its rock record through time. This region provides good examples of large-scale structures and magmatic activity generated during crustal shortening, extension, and strike-slip faulting and affords opportunity to study crustal-scale processes involved in mountain building in context of plate tectonic motions.

Terms: given next year | Units: 2-3 | Grading: Letter or Credit/No Credit

GES 211: Topics in Regional Geology and Tectonics

May be repeated for credit.

Terms: Aut, Win, Spr | Units: 2-3 | Repeatable for credit | Grading: Letter or Credit/No Credit

GES 212: Topics in Tectonic Geomorphology

For upper-division undergraduates and graduate students. Topics vary and may include coupling among erosional, tectonic, and chemical weathering processes at the scale of orogens; historical review of tectonic geomorphology; hillslope and fluvial process response to active uplift; measures of landscape form and their relationship to tectonic uplift and bedrock lithology. May be repeated for credit.

Terms: Aut | Units: 2 | Repeatable for credit | Grading: Satisfactory/No Credit

GES 213: Topics in Sedimentary Geology

For upper division undergraduates and graduate students. Topics vary each year but the focus is on current developments and problems in sedimentary geology, sedimentology, and basin analysis. These include issues in deep-water sediments, their origin, facies, and architecture; sedimentary systems on the early Earth; and relationships among tectonics, basin development, and basin fill. May be repeated for credit.

Terms: by arrangement | Units: 2 | Repeatable for credit | Grading: Letter or Credit/No Credit

GES 214: Topics in Paleobiology

For upper division undergraduates and graduate students. Topics vary each year; focus is on paleontological, sedimentological, and geochemical approaches to the history of life. Topics may include: mass extinction events; evolutionary radiations; the history of global biodiversity; links between evolutionary histories of primary producers and consumers; and the quality of the fossil record. Term paper. May be repeated for credit.

Terms: offered occasionally | Units: 2 | Repeatable for credit | Grading: Satisfactory/No Credit

GES 216: Rock Fracture Mechanics
Principles and tools of elasticity theory and fracture mechanics are applied to the origins and physical behaviors of faults, dikes, joints, veins, solution surfaces, and other natural structures in rock. Field observations, engineering rock fracture mechanics, and the elastic theory of cracks. The role of natural fractures in brittle rock deformation, and fluid flow in the earth's crust with applications to crustal deformation, structural geology, petroleum geology, engineering, and hydrogeology. Prerequisite: 215 or equivalent.
Terms: Spr | Units: 3-5 | Grading: Letter or Credit/No Credit

GES 217: Faults, Fractures, and Fluid Flow
Process-based approach to rock failure; the microstructures and overall architectures of the failure products including faults, joints, solution seams, and types of deformation bands. Fluid flow properties of these structures are characterized with emphasis on sealing and transmitting of faults and their role in hydrocarbon flow, migration, and entrapment. Case studies of fracture characterization experiments in aquifers, oil and gas reservoirs, and waste repository sites. Guest speakers; weekend field trip. Prerequisite: first-year graduate student in Earth Sciences.
Terms: Win | Units: 3 | Grading: Letter or Credit/No Credit

GES 224: Modeling Transport and Transformations in the Environment
An introduction to geochemical and reactive transport modeling using Geochemist¿s Workbench and other appropriate models. Students required to participate in a weekend-long short course at the beginning of the quarter. Throughout the quarter the students will use the principles and tools presented in the class to develop and analyze an environmental problem as part of a simulated consulting exercise. Topics covered include contaminant transport, mineral dissolution/precipitation and aquifer microbiology. Prerequisites: Either EESS 221 (CEE 260C) or EESS 220 (CEE 260A) and either GES 90, 170, or 171, or permission from instructors.
Terms: Aut | Units: 2-3 | Grading: Letter (ABCD/NP)

GES 238: Soil Physics
Physical properties of the soil solid phase emphasizing the transport, retention, and transformation of water, heat, gases, and solutes in the unsaturated subsurface. Field experiments.
Terms: Aut | Units: 3 | Grading: Letter or Credit/No Credit

GES 249: Petroleum Geochemistry in Environmental and Earth Science
How molecular fossils in crude oils, oil spills, refinery products, and human artifacts identify their age, origin, and environment of formation. The origin and habitat of petroleum, technology for its analysis, and parameters for interpretation, including: origins of molecular fossils; function, biosynthesis, and precursors; tectonic history related to the evolution of life, mass extinctions, and molecular fossils; petroleum refinery processes and the kinds of molecular fossils that survive; environmental pollution from natural and anthropogenic sources including how to identify genetic relationships among crude oil or oil spill samples; applications of molecular fossils... more description for GES 249 »
Terms: alternate years, given next year | Units: 3 | Grading: Letter (ABCD/NP)

GES 250: Sedimentation Mechanics
The mechanics of sediment transport and deposition and the origins of sedimentary structures and textures as applied to interpreting ancient rock sequences. Dimensional analysis, fluid flow, drag, boundary layers, open channel flow, particle settling, erosion, sediment transport, sediment gravity flows, soft sediment deformation, and fluid escape. Field trip required.
Terms: alternate years, given next year | Units: 4 | Grading: Letter or Credit/No Credit

GES 251: Sedimentary Basins
Analysis of the depositional framework and tectonic evolution of sedimentary basins. Topics: tectonic and environmental controls on facies relations, synthesis of basin development through time in terms of depositional systems and tectonic settings. Weekend field trip required. Prerequisites: 110, 151.
Terms: alternate years, given next year | Units: 3 | Grading: Letter or Credit/No Credit

GES 252: Sedimentary Petrography
Siliciclastic sediments and sedimentary rocks. Research in modern sedimentary mineralogy and petrography and the relationship between the composition and texture of sediments and their provenance, tectonic settings, and diagenetic histories. Topics vary yearly. Prerequisite: 151 or equivalent.
Terms: Aut | Units: 4 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

GES 253: Petroleum Geology and Exploration

The origin and occurrence of hydrocarbons. Topics: thermal maturation history in hydrocarbon generation, significance of sedimentary and tectonic structural setting, principles of accumulation, and exploration techniques. Prerequisites: 110, 151. Recommended: GEOPHYS 223.

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

GES 254: Carbonate Sedimentology

Processes of precipitation and sedimentation of carbonate minerals with emphasis on marine systems. Topics include: geographic and bathymetric distribution of carbonates in modern and ancient oceans; genesis and environmental significance of carbonate grains and sedimentary textures; carbonate rocks and sediments as sources of geochemical proxy data; carbonate diagenesis; changes in styles of carbonate deposition through Earth history; carbonate depositional patterns and the global carbon cycle. Lab exercises emphasize petrographic and geochemical analysis of carbonate rocks including map and outcrop scale, hand samples, polished slabs, and thin sections.

Terms: alternate years, given next year | Units: 3-4 | Grading: Letter or Credit/No Credit

GES 256: Quantitative Methods in Paleobiology

Introduction to statistical methods relevant to the analysis of paleobiological data. Methods include principles of inference, linear and logistic regression, principal components analysis, time-series, and re-sampling methods. Paleobiological problems include assessment of spatial and temporal patterns in biodiversity, selectivity of extinction and origination, and evolutionary trends. Readings, examples, and problems from the primary literature. Term paper. Prerequisite: Previous course in paleobiology or permission of the instructor.

Terms: offered occasionally | Units: 3 | Grading: Letter or Credit/No Credit

GES 258: Introduction to Depositional Systems

The characteristics of the major sedimentary environments and their deposits in the geologic record, including alluvial fans, braided and meandering rivers, aeolian systems, deltas, open coasts, barred coasts, marine shelves, and deep-water systems. Emphasis is on subdivisions; morphology; the dynamics of modern systems; and the architectural organization and sedimentary structures, textures, and biological components of ancient deposits.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

GES 277: Flood Basalts and Mass Extinctions

Recent work in geochronology and paleobiology supports the temporal coincidence of the eruption of continental flood basalts with mass extinction in the marine and terrestrial realms. The mechanisms and timescale of flood basalt eruptions, their likely environmental and biological consequences, and the evidence for flood basalt eruptions as the triggers of many mass extinction events. Sources include recent primary literature.

Terms: offered occasionally | Units: 3 | Grading: Letter or Credit/No Credit

GES 290: Departmental Seminar in Geological and Environmental Sciences

Current research topics. Presentations by guest speakers from Stanford and elsewhere. May be repeated for credit.

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

GES 292: Directed Reading with Geological and Environmental Sciences Faculty

May be repeated for credit.

Terms: Aut, Win, Spr, Sum | Units: 1-10 | Repeatable for credit | Grading: Letter or Credit/No Credit

GES 299: Field Research

Two-three week field research projects. Written report required. May be repeated three times.

Terms: Aut, Win, Spr, Sum | Units: 2-4 | Repeatable for credit | Grading: Letter

GES 310: Climate Change, Climate Variability, and Landscape Development

The impact of long-term climate change on erosional processes and the evolution of Cenozoic landscapes. Climate data that highlight recurring climate variability on inter-annual to decadal timescales. The behavior of climate on multi-decadal to tectonic timescales over which significant changes in topography take place. The effects of climate change and variability on landscape development, sedimentary environments, and the deposits of these events. May be repeated for credit.

Terms: not given this year | Units: 1 | Repeatable for credit | Grading: Satisfactory/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

GES 311: Interpretation of Tectonically Active Landscapes

Focuses on interpreting various topographic attributes in terms of horizontal and vertical tectonic motions. Topics include identification, mapping, and dating of geomorphic markers, deducing tectonic motions from spatial changes in landscape steepness, understanding processes that give rise to different landscape elements, interrogating the role of climate and lithology in producing these landscape elements, and understanding relationships between tectonic motions, surface topography, and the spatial distribution of erosion. Consists of two one hour lectures per week and one laboratory section that help students gain proficiency in Quaternary mapping and interpretation... more description for GES 311 »

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

GES 328: Seminar in Paleobiology

For graduate students. Current research topics including paleobotany, vertebrate and invertebrate evolution, paleoecology, and major events in the history of life on Earth.

Terms: Spr | Units: 1 | Repeatable for credit | Grading: Satisfactory/No Credit

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

GES 40N: Diamonds

Preference to freshmen. Topics include the historyof diamonds as gemstones, prospecting and mining, and their often tragic politics. How diamond samples provide clues for geologists to understand the Earth's deep interior and the origins of the solar system. Diamond's unique materials properties and efforts in synthesizing diamonds.

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

GES 42N: Landscapes and Tectonics of the San Francisco Bay Area

Active faulting and erosion in the Bay Area, and its effects upon landscapes. Earth science concepts and skills through investigation of the valley, mountain, and coastal areas around Stanford. Faulting associated with the San Andreas Fault, coastal processes along the San Mateo coast, uplift of the mountains by plate tectonic processes, and landsliding in urban and mountainous areas. Field excursions; student projects.

Terms: not given this year | Units: 4 | Grading: Letter (ABCD/NP)

GES 50Q: The Coastal Zone Environment

Preference to sophomores. The oceanographic, geological, and biological character of coastal zone environments, including continental shelves, estuaries, and coastal wetlands, with emphasis on San Francisco Bay. Five required field trips examine estuarine and coastal environments, and agencies and facilities that manage these resources. Students present original research. Prerequisite: beginning course in Biology such as BIOSCI 51, Chemistry such as CHEM 30 or 31, Earth Sciences such as GES 1 or 2, or Earth Systems such as EARTHSYS 10.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | Grading: Letter (ABCD/NP)

GES 55Q: The California Gold Rush: Geologic Background and Environmental Impact

Preference to sophomores. Topics include: geologic processes that led to the concentration of gold in the river gravels and rocks of the Mother Lode region of California; and environmental impact of the Gold Rush due to population increase, mining operations, and high concentrations of arsenic and mercury in sediments from hard rock mining and milling operations. Recommended: introductory geology.

Terms: Win | Units: 3 | UG Reqs: Writing2, GER:DBNatSci | Grading: Letter or Credit/No Credit

GES 7A: An Introduction to Wilderness Skills

Living, traveling, and working in the wilderness for those planning fieldwork in the back country. Local geology, environmental ethics, trip planning, first aid, and leadership techniques. Four mandatory weekend outings focus on back country travel, minimum impact camping, equipment use and maintenance, rock climbing, and navigation. 7A emphasizes wilderness travel and climbing. 7B emphasizes winter camping skills and back country skiing. Food, group, and major personal gear provided. Guest speakers. Fee. See http://www.stanford.edu/class/ges7, or email oep-teachers@lists.stanford.edu.

Terms: Aut | Units: 1 | Grading: Satisfactory/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

GES 7B: An Introduction to Wilderness Skills

Living, traveling, and working in the wilderness for those planning fieldwork in the backcountry. Local geology, environmental ethics, trip planning, first aid, and leadership techniques. Four mandatory weekend outings focus on backcountry travel, minimum impact camping, equipment use and maintenance, rock climbing, and navigation. 7A emphasizes wilderness travel and climbing. 7B emphasizes winter camping skills and backcountry skiing. Food, group, and major personal gear provided. Guest speakers. Fee. See http://www.stanford.edu/class/ges7, or email oep-teachers@lists.stanford.edu.

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

GES 7C: Advanced Wilderness Skills

For students with prior backcountry experience. Backcountry skiing, mountaineering, climbing, first aid, and trip planning. Focus is on outdoor leadership experience and trip management techniques. Food, group, and major personal gear provided. Four mandatory weekend trips. Fee. See http://www.stanford.edu/class/ges7/ for information or contact oep-teachers@lists.stanford.edu. Prerequisite: application.

Terms: Spr | Units: 1 | Grading: Satisfactory/No Credit

GES 8: Oceanography: An Introduction to the Marine Environment

For non-majors and earth science and environmental majors. Topics: topography and geology of the sea floor; evolution of ocean basins; circulation of ocean and atmosphere; nature of sea water, waves, and tides; and the history of the major ocean basins. The interface between continents and ocean basins, emphasizing estuaries, beaches, and continental shelves with California margin examples. Relationships among the distribution of inorganic constituents, ocean circulation, biologic productivity, and marine environments from deep sea to the coast. One-day field trip to measure and analyze waves and currents.

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

GES 90: Introduction to Geochemistry

The chemistry of the solid earth and its atmosphere and oceans, emphasizing the processes that control the distribution of the elements in the earth over geological time and at present, and on the conceptual and analytical tools needed to explore these questions. The basics of geochemical thermodynamics and isotope geochemistry. The formation of the elements, crust, atmosphere and oceans, global geochemical cycles, and the interaction of geochemistry, biological evolution, and climate. Recommended: introductory chemistry.

Terms: Win | Units: 3-4 | 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 transfor... more description for GSBGEN 339 »

Units: 4 | Grading: GSB Letter Graded

GSBGEN 356: Dynamics of the World Wine Industry

This seminar will examine the impact of the globalization of the wine industry on competitive strategies of wine producers. It builds on on-going field research on the role of organizational identity in creating sustainable advantage of niche producers in the Italian wine industry. This research concentrates on the contest between modernist and traditionalist identities and practices. This contest is being played out, to a greater or lesser degree, in most wine producing countries. Participants in the seminar will carry out research on the dynamics of the wine industry in one or a few countries. Collectively the seminar will attempt to provide an integrated account of ind... more description for GSBGEN 356 »

Units: 4 | Grading: GSB Letter Graded

GSBGEN 358: The Power of Social Technology

The goal of the class is simple: to marshal social technology in support of a clear social objective.\n\n\nThis course is a Bass Seminar, and thus project-based - i.e. owned and driven by the students (rather than a more traditional class based on lectures and cases). The focus of this project-based seminar is to explore how social technology (e.g. the use of blogs, websites, podcasts, widgets, community groups, social network feeds) can change attitudes and behaviors in ways that cultivate social change and improve the lives of others. Students will study the strategies and tactics used by companies and causes that have successfully catalyzed active social persuasion (e.... more description for GSBGEN 358 »

Units: 4 | Grading: GSB Letter Graded

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

GSBGEN 394: Global Project Finance

The course covers principles of project finance as well as fundamentals of infrastructure project development, public-private partnerships, and principal investment in the burgeoning infrastructure asset class. The course provides a conceptual framework for how to think about structuring, de-risking, and financing large, complex, capital-intensive projects in the transportation, energy, communications, and social infrastructure sectors.\n\n \nThe course examines the range of public and private sources of finance currently available for infrastructure projects in developed and developing countries. It covers benefits and disadvantages of project finance as a financing style... more description for GSBGEN 394 »

Units: 4 | Grading: GSB Letter Graded

GSBGEN 522: Ethical Issues in the Biotech Industry

This course focuses on the bioscience industry (biotechnology, pharmaceutical, medical device, genomics, and vaccine) with an emphasis on the ethical and social challenges of running these companies. Additionally, it will introduce students to the processes and decision-making with regard to new biotechnology product development, clinical research (both in developed and developing countries), responsibilities to human research subjects, regulatory hurdles, market timing decisions, interactions with customer physicians, product safety, data publication, direct-to-consumer marketing of prescription drugs, and product litigation. Students in the class will be representative ... more description for GSBGEN 522 »

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

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

GSBGEN 566: Real-Life Ethics

GSBGEN 566 will be an elective course offered to 2nd-year MBA and Sloan students. The goal of this course is to improve students' judgment in confronting ethical situations encountered in the normal course of business activities. The course will be taught by Mark Leslie, Lecturer, and will include additional guest lecturers in many of the specific areas.\n\n\nThe course, which will be case-based, will involve frequent student-to-student and student-to-instructor role-playing. Cases will be drawn from a wide selection of business situations, including such topics as raising venture capital, managing major industrial customers, product introduction through major retailers, ... more description for GSBGEN 566 »

Units: 2 | Grading: GSB Pass/Fail

GSBGEN 585: Social Innovation through Corporate Social Responsibility

This course accepts that the (CSR) movement linking business, communities and sustainability has moved past the stage of debate. The last decade has seen an increased awareness in regard to environmental and social issues that has found its way up the corporate ladder and into company boardrooms. How companies incorporate CSR programs and strategies, however, is varied and diverse. The course will utilize reading assignments, case analysis and/or company presentations to provide an overview of CSR, the frameworks and models for developing a CSR strategy and the growing utilization of cross-sector partnerships in CSR and innovation efforts. Particular focus will be on cutt... more description for GSBGEN 585 »

Units: 2 | Grading: GSB Pass/Fail

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

GSBGEN 586: Poverty, Entrepreneurship, and Development

Global poverty is a problem that persists on a massive scale, and its persistence may itself be a major impediment to growth in emerging economies. Recent years have seen a blossoming interest in socially innovative approaches to alleviating poverty and stimulating economic growth in emerging economies. In this short course, we will explore different conceptualizations of the problem of global poverty, the potential role of entrepreneurship in helping to address it, as well as the strengths and weaknesses of different approaches. Some possible areas of focus include:\n\n- Different conceptualizations of the main drivers of persistent, extreme poverty\n\n- The challenges t... more description for GSBGEN 586 »

Units: 2 | Grading: GSB Pass/Fail

HISTORY 102: The History of the International System since 1914

After defining the characteristics of the international system at the beginning of the twentieth century, this course reviews the primary developments in its functioning in the century that followed. Topics include the major wars and peace settlements; the emergence of Nazism and Communism; the development of the Cold War and nuclear weapons; the rise of China, India, and the EU; and the impact of Islamic terrorism. The role of international institutions and international society will also be a focus as will the challenge of environment, health, poverty, and climate issues to the functioning of the system.

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

Instructors: Naimark, N. (PI)

Schedule for HISTORY 102

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 106A: Global Human Geography: Asia and Africa

Global patterns of demography, economic and social development, geopolitics, and cultural differentiation, covering E. Asia, S. Asia, S.E. Asia, Central Asia, N. Africa, and sub-Saharan Africa. Use of maps to depict geographical patterns and processes.

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

Instructors: Connolly, J. (PI) ; Fedman, D. (PI) ; Felt, D. (PI) ; Kunjo, F. (PI) ... more instructors for HISTORY 106A »

Schedule for HISTORY 106A

HISTORY 106B: Global Human Geography: Europe and Americas

Patterns of demography, economic and social development, geopolitics, and cultural differentiation. Use of maps to depict geographical patterns and processes.

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

Instructors: Lewis, M. (PI)

Schedule for HISTORY 106B

HISTORY 142: Darwin in the History of Life

(Same as HISTORY 42. History majors and others taking 5 units, register for 142.) Origins and impact of evolutionary theory from the nineteenth century to the present. Early theories of fossils, the discovery of deep time and uniformitarian geology, debates over evolution vs. extinction, the origin of life, and human origins; the rise of anthropology and racial theory; the changing challenge of creationism, the abuse of evolution in eugenics and Nazi racial hygiene; and new discoveries in the realm of extreme life, evo-devo, neocatastrophism, and the new technological frontier of biomimicry.

Terms: not given this year | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter or Credit/No Credit

HISTORY 206: History and Geography of Contemporary Global Issues

The historical background and geographical context of contemporary global issues and events. Texts are a world atlas and regular reading of *The New York Times* and *The Economist*. Topics vary according to what is happening in the world. Student presentations.

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

Instructors: Lewis, M. (PI)

Schedule for HISTORY 206

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

HISTORY 208A: Science and Law in History (HISTORY 308A)

How the intertwined modern fields of science and law, since the early modern period, together developed central notions of fact, evidence, experiment, demonstration, objectivity, and proof.

Terms: not given this year | Units: 4-5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

HISTORY 231A: Charles Darwin and the Global 19th Century (HISTORY 331A)

Uses the writings, life, and legacy of Charles Darwin as a\n\nvehicle for exploring the nature of global change in the nineteenth\n\ncentury. Examines the relationship between modern science,\n\nimperialism, and world travel by tracking Darwin's experiences and those\n\nof his contemporaries, focusing both of the emergence of evolutionary\n\ntheory as well as the popular reception and political controversies\n\nsurrounding Darwin's work.

Terms: Aut | Units: 4-5 | Grading: Letter (ABCD/NP)

HISTORY 243C: 18th-Century Colonial Science and Medicine (HISTORY 343C)

Explores the global exchange of knowledge, technologies, plants, peoples, disease, and medicines. Colonial sciences and medicines were important militarily and strategically for positioning emerging nation states in global struggles for land and resources. Considers primarily French, British, and Dutch in the West Indies, but also takes examples from Iberian, Jesuit, and other traditions in China and India. Readings treat science and medicine in relation to voyaging, colonialism, slavery, plants, and environmental exchange.

Terms: Spr | Units: 4-5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

Instructors: Schiebinger, L. (PI)

Schedule for HISTORY 243C

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 adaption 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 245E: Health and Society in Africa (HISTORY 347E)

The history of disease, therapeutic and diagnostic systems, and the definition of health in precolonial, colonial, and postcolonial Africa. The social and political histories of specific epidemics, including sleeping sickness, influenza, TB, mental illness, and AIDS. The colonial contexts of epidemics and the social consequences of disease.

Terms: not given this year | Units: 4-5 | UG Reqs: GER:DBSocSci, GER:ECGlobalCom | Grading: Letter (ABCD/NP)

HISTORY 254: Popular Culture and American Nature

Despite John Muir, Aldo Leopold, and Rachel Carson, it is arguable that the Disney studios have more to do with molding popular attitudes toward the natural world than politicians, ecologists, and activists. Disney as the central figure in the 20th-century American creation of nature. How Disney, the products of his studio, and other primary and secondary texts see environmentalism, science, popular culture, and their interrelationships.

Terms: not given this year | Units: 5 | Grading: Letter (ABCD/NP)

HISTORY 255: Martin Luther King, Jr.: The Social Gospel and the Struggle for Justice

The religious and political thought of Martin Luther King, Jr., using the documentary resources of the King Institute at Stanford. His social gospel Christianity and prophetic message of radical social transformation. Readings include the forthcoming *The Papers of Martin Luther King, Jr., Volume VI: Advocate of the Social Gospel*.

Terms: not given this year | Units: 5 | UG Reqs: GER:DBHum | Grading: Letter or Credit/No Credit

HISTORY 283: The New Global Economy, Oil, and Islamic Movements in the Middle East (HISTORY 383)

The integration of the Middle East into the world capitalist market on a subordinate basis and the impact on economic development, class formation, and politics. Alternative theoretical perspectives on the rise and expansion of the international capitalist market combined with case studies of Egypt, Iraq, and Palestine.

Terms: not given this year | Units: 4-5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

HISTORY 309E: History Meets Geography

Focus is on developing competence in GIS computer applications and applying it to historical problems. Previous experience with GIS not required. Recommended: complete the GIS tutorial in Branner Library before the course starts.

Terms: not given this year | Units: 4-5 | Grading: Letter (ABCD/NP)

HISTORY 443A: Human Origins: History, Evidence, and Controversy (HISTORY 243S)

Research seminar. Debates and controversies include: theories of human origins; interpretations of fossils, early art, and the oldest tools; the origin and fate of the Neanderthals; evolutionary themes in literature and film; visual rhetoric and cliché in anthropological dioramas and phyletic diagrams; the significance of hunting, gathering, and grandmothering; climatological theories and neocatastrophic geologies; molecular anthropology; the impact of racial theories on human origins discourse. Background in human evolution not required.

Terms: not given this year | Units: 4-5 | Grading: Letter (ABCD/NP)

HISTORY 60S: Beyond the Nation: International Social Movements in the U.S. from World War I to World War II

Anarchism, socialism, feminism, pacifism, Pan-Africanism. These and other international social movements thrived in the United States between World War I and World War II, a period usually characterized as "isolationist." How did these movements' members, including Emma Goldman, Jane Addams, W.E.B. DuBois, and John DosPassos, articulate their goals both to themselves and to a broader public that was often suspicious of "internationalism"? Sources include speeches and manifestos, national and international newspapers letters, novels, film, archival documents, and international decrees.

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

HISTORY 61S: California Politics since the 1960s

The rise of modern political conservatism and its interplay with liberalism and the liberal state. Metropolitan development, civil rights, the welfare state, law and order, and immigration. Grassroots, spatial, cultural, institutional, and biographical approaches to political history. The methodological challenges of writing academic history about the recent past. Media sources, public ballot proposition campaign materials, political speeches and essays, oral histories, government documents,court cases, maps, photographs, film, television, and music.

Terms: Aut, offered once only | 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)

HRP 214: Scientific Writing

Step-by-step through the process of writing and publishing a scientific manuscript. How to write effectively, concisely, and clearly. Preparation of an actual scientific manuscript. Students are encouraged to bring a manuscript on which they are currently working to develop and polish throughout the course.

Terms: Win | Units: 2-3 | Grading: Medical Satisfactory/No Credit

Instructors: Sainani, K. (PI)

Schedule for HRP 214

HRP 216: Analytical and Practical Issues in the Conduct of Clinical and Epidemiologic Research

Topics include: advanced aspects of study design and data analyses; development of health measurement instruments; methods of summarizing literature and quantifying effect sizes; and multivariable nature of health events in human populations. 3 units requires a term paper. Prerequisites: 225, and 258 or 261, or consent of instructor.

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

Instructors: Popat, R. (PI)

Schedule for HRP 216

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

HRP 223: Epidemiologic Analysis: Data Management and Statistical Programming

The skills required for management and analysis of biomedical data. Topics include importing and exporting data from multiple database systems, visualizing and cleaning data, data management for multicenter projects, and data security. Introduction to applied statistical programming relevant to epidemiologic and clinical research. No previous programming experience required.

Terms: Aut | Units: 2-3 | Grading: Medical Satisfactory/No Credit

Instructors: Balise, R. (PI)

Schedule for HRP 223

HRP 225: Design and Conduct of Clinical and Epidemiologic Studies

Intermediate-level. The skills to design, carry out, and interpret epidemiologic studies, particularly of chronic diseases. Topics: epidemiologic concepts, sources of data, cohort studies, case-control studies, cross-sectional studies, sampling, estimating sample size, questionnaire design, and the effects of measurement error. Prerequisite: A basic/introductory course in statistics or consent of instructor.

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

Instructors: Popat, R. (PI)

Schedule for HRP 225

HRP 226: Advanced Epidemiologic and Clinical Research Methods

The principles of measurement, measures of effect, confounding, effect modification, and strategies for minimizing bias in clinical and epidemiologic studies. Prerequisite: 225 or consent of instructor.

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

Instructors: Popat, R. (PI)

Schedule for HRP 226

HRP 228: Genetic Epidemiology

Provides framework for physicians, epidemiologists, and other scientists to interpret the literature and incorporate genetic information into human disease research. Topics include: common genetic measures, approaches to finding disease genes, study design and analysis issues, genome-wide association studies, and applications of new genomic technologies. Includes reading seminal papers in genetic epidemiology.

Terms: Spr | Units: 2 | Grading: Medical Satisfactory/No Credit

Instructors: Popat, R. (PI)

Schedule for HRP 228

HRP 230: Cancer Epidemiology

Descriptive epidemiology and sources of incidence/mortality data; the biological basis of carcinogenesis and its implications for epidemiologic research; methodological issues relevant to cancer research; causal inference; major environmental risk factors; genetic susceptibility; cancer control; examples of current research; and critique of the literature. 3 units requires paper or project. Prerequisite: 225, or consent of instructor.

Terms: Win | Units: 2-3 | Grading: Medical Option (Med-Ltr-CR/NC)

Instructors: Kurian, A. (PI) ; West, D. (PI)

Schedule for HRP 230

HRP 231: Epidemiology of Infectious Diseases

Principles of the transmission of the infectious agents (viruses, bacteria, rickettsiae, mycoplasma, fungi, and protozoan and helminth parasites). The role of vectors, reservoirs, and environmental factors. Pathogen and host characteristics that determine the spectrum of infection and disease. Endemicity, outbreaks, and epidemics of selected infectious diseases. Principles of control and surveillance.

Terms: not given this year | Units: 3 | Grading: Medical Option (Med-Ltr-CR/NC)

HRP 236: Epidemiology Research Seminar

Weekly forum for ongoing epidemiologic research by faculty, staff, guests, and students, emphasizing research issues relevant to disease causation, prevention, and treatment. May be repeated for credit.

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

Instructors: Henderson, V. (PI) ; Sieh, W. (PI) ; Whittemore, A. (PI)

Schedule for HRP 236

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

HRP 240: Rethinking Global Health (MED 230)

Challenges for those seeking to improve global health: contending with a dynamic balance between infectious and chronic non-communicable disease that differs across and within countries; issues relating to the proximate and more removed causes of disease and illness, including nutrition, infrastructure, governance, economic development, and environmental changes; diverse proposed responses with arguments for particular courses of action appealing to cost-effectiveness, egalitarian, and rights-based principles. Course goal is to begin to make sense of these challenging issues, requiring data and evidence derived via multiple methodologies, critical thinking, and sound reas... more description for HRP 240 »

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

HRP 299: Directed Reading in Health Research and Policy

Epidemiology, health services research, preventive medicine, medical genetics, public health, economics of medical care, occupational or environmental medicine, international health, or related fields. May be repeated for credit. Prerequisite: consent of instructor.

Terms: Aut, Win, Spr, Sum | Units: 1-18 | Repeatable for credit | Grading: Medical Satisfactory/No Credit

Instructors: Baker, L. (PI) ; Bhattacharya, J. (PI) ; Bundorf, M. (PI) ; Coram, M. (PI) ... more instructors for HRP 299 »

Schedule for HRP 299

HUMBIO 113: The Biologies of Humans and Plants

The biological interdependence of humans and plants, particularly the ways in which people have imposed selection pressures and ecological change on one another. Topics include: evolution and basic plant structure; plant characteristics and genetic variants allowing domestication; effects of plant domestication on human biology; plants in traditional and contemporary diets; and human influences on plant biology through genetic manipulation and environmental change. Class meetings center on discussing journal articles.

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

HUMBIO 116: Controlling Climate Change in the 21st Century (EARTHSYS 147, EARTHSYS 247)

Global climate change science, impacts, and response strategies. Topics: scientific understanding of the climate system; modeling future climate change; global and regional climate impacts and vulnerability; mitigation and adaptation approaches; the international climate policy challenge; and decarbonization of energy and transportation systems.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBNatSci | 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)

Instructors: Garcia, R. (PI)

Schedule for HUMBIO 121E

HUMBIO 122M: Challenges of Human Migration: Health and Health Care of Migrants and Autochthonous Populations (PEDS 212)

An emerging area of inquiry. Topics include: global migration trends, health Issues/aspects of migration, healthcare and the needs of immigrants in the US, and migrants as healthcare providers: a new area of inquiry in the US. Class is structured to include: lectures lead by the instructor and possible guest speakers; seminar, discussion and case study sessions led by students.

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

Instructors: Rodriguez, E. (PI)

Schedule for HUMBIO 122M

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)

Instructors: Jacobson, M. (PI) ; Stefanick, M. (PI)

Schedule for HUMBIO 125

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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

Instructors: Alles, W. (PI) ; Stefanick, M. (PI)

Schedule for HUMBIO 126

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)

Instructors: Murray, A. (PI) ; Staves, K. (TA)

Schedule for HUMBIO 129

HUMBIO 151: Introduction to Epidemiology

Principles of epidemiology: the distribution and determinants of disease; the control of health problems; and the medical detective work required to understand disease outbreaks. Case studies from developed and developing countries to explore the use of epidemiological techniques in describing disease dynamics of human, emerging and zoonotic (animal to human) diseases such as SARS, plague, HIV, and influenza; the impacts of changes in policy, law, and behavior on disease control and eradication, such as hepatitis vaccination; and modern challenges in epidemiology such as global disease transmission, environmental change, and bioterrorism threats.

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

Instructors: Salkeld, D. (PI) ; Bagge, W. (TA)

Schedule for HUMBIO 151

HUMBIO 152: Viral Lifestyles

Contemporary topics related to microorganism. Relevance of microorganisms to disciplines beyond molecular biology and medicine. Public health implications of human/viral interactions, and the human behaviors that bring about such interactions. The ecological role played by viruses and their role in environmental health. Prerequisite: familiarity with biological systems, evolutionary biology, and microbiology.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

HUMBIO 153: Parasites and Pestilence: Infectious Public Health Challenges

Parasitic and other pestilence of public health importance. Pathogenesis, clinical syndromes, complex life cycles, and the interplay among environment, vectors, hosts, and reservoirs in historical context. Public health policy initiatives aimed at halting disease transmission. World Health Organization tropical disease targets including river blindness, sleeping sickness, leishmaniasis, schistosomiasis, mycobacterial disease (tuberculosis and leprosy), malaria, toxoplasmosis, dracunculiais, and intestinal helminthes. Guest lecturers with expertise in disease control. Prerequisite: Human Biology core or equivalent, or consent of instructor.

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

Instructors: Smith, D. (PI)

Schedule for HUMBIO 153

HUMBIO 155H: Humans and Viruses I (MI 155H)

Introduction to human virology integrating epidemiology, molecular biology, clinical sciences, social sciences, history, and the arts. Emphasis is on host pathogen interactions and policy issues. Topics: polio and vaccination, smallpox and eradication, yellow fever and history, influenza and genomic diversity, rubella and childhood infections, adenovirus and viral morphology, ebola and emerging infection, lassa fever and immune response.

Terms: Aut | Units: 6 | Grading: Letter (ABCD/NP)

Instructors: Siegel, R. (PI)

Schedule for HUMBIO 155H

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

HUMBIO 156: Global HIV/AIDS (MED 256)

Public health, policy, and research issues. Identify resources at Stanford, and from government, NGOs, and pharmaceutical, advocacy, and international organizations. Sources include biomedical, social, and behavioral sciences. Emphasis on student projects which feature methodologies in the development and design of Operational Research and Implementation Science in AIDS/TB and Malaria in response to PEPFAR and Global Fund programs. Guest lectures. Prerequisite: Human Biology core or equivalent, or consent of instructor.

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

Instructors: Katzenstein, D. (PI)

Schedule for HUMBIO 156

HUMBIO 159: Genes and Environment in Disease Causation: Implications for Medicine and Public Health (HRP 238)

The historical, contemporary, and future research and practice among genetics, epidemiology, clinical medicine, and public health as a source of insight for medicine and public health. Genetic and environmental contributions to multifactorial diseases; multidisciplinary approach to enhancing detection and diagnosis. The impact of the Human Genome Project on analysis of cardiovascular and neurological diseases, and cancer. Ethical and social issues in the use of genetic information. Prerequisite: basic course in genetics; for undergraduates, Human Biology core or equivalent or consent of instructor.

Terms: not given this year | Units: 2-3 | Grading: Medical Option (Med-Ltr-CR/NC)

HUMBIO 166: Food and Society: Exploring Eating Behaviors in Social, Environmental, and Policy Context

The array of forces that affect the foods human beings eat, and when, where, and how we eat them, including economics, business, agriculture, law, politics, trade, ideology, culture, biology, and psychology. The impact of current policies, and actions that might be taken to improve human nutrition and health. Macro-scale influences on food, nutrition, and eating behavior.

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

HUMBIO 174: Foundations of Bioethics

Classic articles, legal cases, and foundational concepts. Theoretical approaches derived from philosophy. The ethics of medicine and research on human subjects, assisted reproductive technologies, genetics, cloning, and stem cell research. Ethical issues at the end of life. Prerequisite: Human Biology core or equivalent, or consent of instructor.

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

HUMBIO 17SC: Darwin, Evolution, and Galapagos (ANTHRO 10SC)

Lessons from the study of flora and fauna in Galapagos from Darwin's time to today. Adaptation, sexual selection, speciation, andadaptive radiation. The challenges the Galapagos Islands pose for conservation.

Terms: not given this year | Units: 2 | 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 2A: Genetics, Evolution, and Ecology

Introduction to the principles of classical and modern genetics, evolutionary theory, and population biology. Topics: micro- and macro-evolution, population and molecular genetics, population dynamics, and community ecology, emphasizing the genetics of the evolutionary process and applications to human populations.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

HUMBIO 2B: Culture, Evolution, and Society

Introduction to the evolutionary study of human diversity. Hominid evolution, the origins of social complexity, social theory, and the emergence of the modern world system, emphasizing the concept of culture and its influence on human differences.

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

HUMBIO 3A: Cell and Developmental Biology

The principles of the biology of cells: principles of human developmental biology, biochemistry of energetics and metabolism, the nature of membranes and organelles, hormone action and signal transduction in normal and diseased states (diabetes, cancer, autoimmune diseases), drug discovery, immunology, and drug addiction. Prerequisite: college chemistry or completion of the HumBio chemistry lecture series during the fall quarter. Required evening midterm for 3A, Monday, 7-9:00 PM. See syllabus for date.

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

HUMBIO 3B: Behavior, Health, and Development

Research and theory on human behavior, health, and life span development. How biological factors and cultural practices influence cognition, emotion, motivation, personality, and health in childhood, adolescence, and adulthood.

Terms: Win | Units: 5 | UG Reqs: GER:DBSocSci | 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

HUMBIO 84Q: Social Justice, Responsibility, Health

Preference to sophomores. Reducing health disparities among segments of the US population is an over-arching goal of the Centers for Disease Control and Prevention (CDC). Evidence for and cause of existing health disparities; criteria for calling a health disparity unjust; and assignment of responsibility for maintaining or recovering good health. Service Learning Course (certified by Haas Center).

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

HUMBIO 86Q: Love as a Force for Social Change

Preference to sophomores. Biological, psychological, religious, social and cultural perspectives on the concept of love. How love is conceptualized across cultures; love as the basis of many religions; different kinds of love; the biology of love; love as sickness; love and sex; the languages of love including art, literature, music, and poetry. Emphasis is on writing. Oral presentation. A requirement of this class is participation in public blogs.

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

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)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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

ILAC 271: Brazilian Presence: Landscape, Life and Literature

This course explores Brazil's literature and its representation of the country's diverse regional cultures and ecology. The course offers an in-depth discussion of Brazilian society, presenting fundamental texts that portray Brazilian landscape with its diverse eco-regions, people and culture. The program includes major authors such as Euclides da Cunha and his description of the Amazon in the early 1900s; the travels of anthropologist Claude Levi-Strauss and his contact with Caduveo, Nhambiquara, Bororo and Tupi indigenous tribes; Mario de Andrade's novel, Macunaima and its ironical representation of Brazilian identity and miscegenation; Guimaraes Rosa's short stories th... more description for ILAC 271 »

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

Instructors: Librandi Rocha, M. (PI)

Schedule for ILAC 271

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)

IPS 203: Issues in International Economics

Topics in international trade and international trade policy: trade, growth and poverty, the World Trade Organization (WTO), regionalism versus multilateralism, the political economy of trade policy, trade and labor, trade and the environment, and trade policies for developing economies. Prerequisite: ECON 51, ECON 166.

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

Instructors: Aturupane, C. (PI)

Schedule for IPS 203

IPS 206A: Politics and Collective Action (POLISCI 331S, PUBLPOL 304A)

Classic theories for why collective action problems occur and how they can be solved. Politics of aggregating individual decisions into collective action, including voting, social protest, and competing goals and tactics of officials, bureaucrats, interest groups, and other stakeholders. Economic, distributive, and moral frameworks for evaluating collective action processes and outcomes. Applications to real-world policy problems involving collective action.

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

IPS 210: The Politics of International Humanitarian Action

The relationship between humanitarianism and politics in international responses to civil conflicts and forced displacement. Focus is on policy dilemmas and choices, and the consequences of action or inaction. Case studies include northern Iraq (Kurdistan), Bosnia, Rwanda, Kosovo, and Darfur.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

IPS 262: Contemporary Issues in Nuclear Energy Policy

Current nuclear energy trends related to economic growth and carbon-free energy production to reduce global warming. Topics include: trends, promise, and perils; environment; proliferation; and international security. Policy considerations for nuclear safety and safeguards, environmentally responsible management from raw uranium to spent fuel, international security and nonproliferation, economic competition with other energy sources, domestic and foreign politics, and international law and treaties. International guest expert lecturers.

Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credit

IPS 263: Energy and Climate Cooperation in the Western Hemisphere (EARTHSYS 132, EARTHSYS 232, INTNLREL 146A)

Current political dynamics in major western hemisphere fossil fuel producers in N. America, the Andean region, the Southern Cone of S. America, and Trinidad and Tobago. The potential for developing sustainable alternative energy resources in the western hemisphere for export particularly biofuels, and its impact on agricultural policy, environmental protection, and food prices. The feasibility of creating regional energy security rings such as the proposed N. American Energy Security and Prosperity Partnership.

Terms: not given this year | Units: 4 | Grading: Letter or Credit/No Credit

IPS 271: Sanela Diana Jenkins International Human Rights Colloquium (INTNLREL 110, POLISCI 204, POLISCI 304)

This one-unit seminar will comprise 10 international and domestic human rights scholars, judges and activists who have made significant contributions to international justice, women and children¿s rights, environmental rights and indigenous rights. It is open to all Stanford undergraduate and graduate students. Students in the seminar will be encouraged to present their ongoing research and to develop new research projects (individually and collaboratively). Students wishing to do significant research and reading in the context of the seminar may, in consultation with one of the instructors, sign up for independent study. Law students are first required to be enrolled i... more description for IPS 271 »

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

Instructors: Stacy, H. (PI) ; Steinberg, R. (PI)

Schedule for IPS 271

LAW 212: Introduction to Social Entrepreneurship

Introduction to Social Entrepreneurship examines the challenges of starting, counseling and funding an early stage social venture through the eyes of the entrepreneur, investor, attorney and community leader. It explores the intricacies of managing and sustaining growth, the changing role of corporate governance, and leveraging private sector partnerships and resources. It also explores innovative public / private sector partnerships and the challenges and opportunities of engaging diverse partners with differing agendas. The course includes guest speakers from the fields of law and business assisting organizations as well the practitioners who run them. Throughout, stude... more description for LAW 212 »

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

LAW 338: Land Use

In the context of a private property system, land use planning and land use control raise interesting philosophical and political questions. This course focuses on the pragmatic aspects of contemporary land use law and policy and explores the following: nuisance as a land use tool and foundation for modern land use law; use and abuse of the "police power" (the legal basis for land use control); zoning flexibility; vested property rights, development agreements, and takings; redevelopment; growth control; and direct democracy. Throughout, the course explores how land use decisions affect environmental quality and how land use decision-making addresses environmental impacts... more description for LAW 338 »

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

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 440: Biotechnology Law and Policy

This course is an interdisciplinary exploration of many of the legal and policy issues raised by the biotechnology industry. It is also intended to give law students and scientists the opportunity to learn more about each other's disciplines by working together. The course covers issues of patenting, corporate organization and financing, conflicts of interest, regulatory approvals, health care financing issues, and tort liability, as well as examining the prospects for and implications of the biotechnology revolution. The course includes materials and presentations for non-scientists on background knowledge about the science and technologies involved, as well as materials... more description for LAW 440 »

Terms: Spr | 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 focuess 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 expect... 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

LAW 622A: Environmental Law Clinic: Clinical Practice

Students enrolled in the Clinic provide legal assistance to national, regional and grassroots non-profit organizations on a variety of environmental issues, with a focus on complex natural resource conservation and biodiversity matters at the interface of law, science and policy. Working under the direct supervision of practicing environmental attorneys, Clinic students help screen new matters and potential clients; formulate strategies; research and develop factual and legal issues; and prosecute administrative and litigation proceedings. During the term, students may meet with clients, opposing counsel or agency decision makers; review administrative records; develop ... more description for LAW 622A »

Terms: Aut, Win | Units: 4 | Repeatable for credit | Grading: Law Honors/Pass/R credit/Fail

LAW 622B: Environmental Law Clinic: Clinical Methods

Students enrolled in the Clinic provide legal assistance to national, regional and grassroots non-profit organizations on a variety of environmental issues, with a focus on complex natural resource conservation and biodiversity matters at the interface of law, science and policy. Working under the direct supervision of practicing environmental attorneys, Clinic students help screen new matters and potential clients; formulate strategies; research and develop factual and legal issues; and prosecute administrative and litigation proceedings. During the term, students may meet with clients, opposing counsel or agency decision makers; review administrative records; develop ... more description for LAW 622B »

Terms: Aut, Win | Units: 4 | Repeatable for credit | Grading: Law Honors/Pass/R credit/Fail

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

LAW 622C: Environmental Law Clinic: Clinical Coursework

Students enrolled in the Clinic provide legal assistance to national, regional and grassroots non-profit organizations on a variety of environmental issues, with a focus on complex natural resource conservation and biodiversity matters at the interface of law, science and policy. Working under the direct supervision of practicing environmental attorneys, Clinic students help screen new matters and potential clients; formulate strategies; research and develop factual and legal issues; and prosecute administrative and litigation proceedings. During the term, students may meet with clients, opposing counsel or agency decision makers; review administrative records; develop ... more description for LAW 622C »

Terms: Aut, Win | Units: 4 | Repeatable for credit | Grading: Law Honors/Pass/R credit/Fail

LAW 623: Advanced Environmental Law Clinic

The Advanced Environmental Law Clinic provides an opportunity for students who have already taken the Environmental Law Clinic to continue intense individual project work on cases or matters in which they have previously been involved. Advanced students will work closely with the supervising clinic attorney on their designated projects and are expected to take increasing responsibility for managing the necessary work and representation of clients. In addition, advanced students are expected to serve as mentors to less experienced clinic students enrolled in the basic Environmental Law Clinic course and will thereby receive additional training in basic team building and su... more description for LAW 623 »

Units: 2-7 | Repeatable for credit | Grading: Law Honors/Pass/R credit/Fail

LAW 626: Legislative Simulation: The Cap and Trade Debate

Terms: Aut | Units: 3 | Grading: Law Mandatory P/R/F

MATH 224: Topics in Mathematical Biology

Mathematical models for biological processes based on ordinary and partial differential equations. Topics: population and infectious diseases dynamics, biological oscillators, reaction diffusion models, biological waves, and pattern formation. Prerequisites: 53 and 131, or equivalents.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

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

MATSCI 302: Solar Cells

Theory of conventional p-n junction and excitonic solar cells. Design, fabrication, and characterization of crystalline silicon, amorphous silicon, CdTe, CIGS, and tandem and organic solar cells. Emerging solar cell concepts such as intermediate band gap and bioinspired solar cells. Emphasis is on the materials science aspects of solar cells research. Module design and economic hurdles that must be overcome for solar cell technology to generate a significant fraction of the world¿s electricity. Group project to explore one solar cell approach in depth. SCPD offering.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

MATSCI 303: Principles, Materials and Devices of Batteries

Thermodynamics and electrochemistry for batteries. Emphasis on lithium ion batteries, but also different types including lead acid, nickel metal hydride, metal air, sodium sulfur and redox flow. Battery electrode materials, electrolytes, separators, additives and electrode-electrolyte interface. Electrochemical techniques; advanced battery materials with nanotechnology; battery device structure. Prerequisites: undergraduate chemistry.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

MATSCI 316: Nanoscale Science, Engineering, and Technology

Sample application areas: renewable energy including nanoscaled photovoltaic cells, hydrogen storage, fuel cells, and nanoelectronics. Nanofabrication techniques including: self-assembly of amphiphilic molecules, block copolymers, organic-inorganic mesostructures, colloidal crystals, organic monolayers, proteins, DNA and abalone shells; biologically inspired growth of materials; photolithography, electron beam lithography, and scanning probe lithography; and synthesis of carbon nanotubes, nanowire, and nanocrystals. Other nanotechnology topics may be explored through a group project. SCPD offering.

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

ME 185: Electric Vehicle Design

This project based class focuses on the design and prototyping of electric vehicles. Students learn the fundamentals of vehicle design in class and apply the knowledge as they form teams and work on projects involving concept, specifications, structure, systems, integration, assembly, testing, etc. The class meets once a week to learn about the fundamentals, exchange their experiences, and coordinate between projects. The teams of 3-5 will work on their projects independently.

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

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 221: Green Design Strategies and Metrics

Foundation in sustainable product design principles, reinforced by conceptual design projects. Discuss what aspects of sustainability matter most for different products. Application of dozens of strategies to improve product sustainability. Frameworks, measurements, and decision-making tools to navigate the complexities of designing greener products. Life-cycle analysis, materials, energy use, biomimicry, product-service systems, persuasive design, design for end-of-life, and systems thinking.

Terms: not given this year | Units: 2 | Grading: Letter or Credit/No Credit

ME 222: Design for Sustainability

Lecture/lab. Role of design in building a sustainable world. How to include sustainability in the design process considering environmental, cultural, and social impacts. Focus is on a proactive design approach, and the tools and techniques needed to translate theory into artifact.

Terms: not given this year | Units: 2-3 | Repeatable for credit | Grading: Letter or Credit/No Credit

ME 24N: Designing the Car of the Future

Preference to freshmen. Automotive design drawing from all areas of mechanical engineering. The state of the art in automotive design and the engineering principles to understand vehicle performance. Future technologies for vehicles. Topics include vehicle emissions and fuel consumption, possibilities of hydrogen, drive-by-wire systems, active safety and collision avoidance, and human-machine interface issues.

Terms: not given this year | Units: 3 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/No Credit

ME 257: Turbine and Internal Combustion Engines (ME 357)

Principles of design analysis for aircraft gas turbines and automotive piston engines. Analysis for aircraft engines performed for Airbus A380 type aircraft. Design parameters determined considering aircraft aerodynamics, gas turbine thermodynamics, compressible flow physics, and material limitations. Additional topics include characteristics of main engine components, off-design analysis, and component matching. Performance of automotive piston engines including novel engine concepts in terms of engine thermodynamics, intake and exhaust flows, and in-cylinder flow.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 260: Fuel Cell Science and Technology

Emphasis on proton exchange membrane (PEM) and solid oxide fuel cells (SOFC), and principles of electrochemical energy conversion. Topics in materials science, thermodynamics, and fluid mechanics. Prerequisites: MATH 43, PHYSICS 55, and ENGR 30 or ME 140, or equivalents.

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

Instructors: Cha, S. (PI)

Schedule for ME 260

ME 314: Good Products, Bad Products (ME 214)

The characteristics of industrial products that cause them to be successes or failures: the straightforward (performance, economy, reliability), the complicated (human and cultural fit, compatibility with the environment, craftsmanship, positive emotional response of the user), the esoteric (elegance, sophistication, symbolism). Engineers and business people must better understand these factors to produce more successful products. Projects, papers, guest speakers, field trips.

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

Instructors: Beach, D. (PI)

Schedule for ME 314

ME 370A: Energy Systems I: Thermodynamics

Thermodynamic analysis of energy systems emphasizing systematic methodology for and application of basic principles to generate quantitative understanding. Availability, mixtures, reacting systems, phase equilibrium, chemical availability, and modern computational methods for analysis. Prerequisites: undergraduate engineering thermodynamics and computer skills such as Matlab.

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

ME 370B: Energy Systems II: Modeling and Advanced Concepts

Development of quantitative device models for complex energy systems, including fuel cells, reformers, combustion engines, and electrolyzers, using thermodynamic and transport analysis. Student groups work on energy systems to develop conceptual understanding, and high-level, quantitative and refined models. Advanced topics in thermodynamics and special topics associated with devices under study. Prerequisite: 370A.

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

ME 370C: Energy Systems III: Projects

Refinement and calibration of energy system models generated in ME 370B carrying the models to maturity and completion. Integration of device models into a larger model of energy systems. Prerequisites: 370A,B, consent of instructor.

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

ME 371: Combustion Fundamentals

Heat of reaction, adiabatic flame temperature, and chemical composition of products of combustion; kinetics of combustion and pollutant formation reactions; conservation equations for multi-component reacting flows; propagation of laminar premixed flames and detonations. Prerequisite: 362A or 370A, or consent of instructor.

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

Instructors: Zheng, X. (PI)

Schedule for ME 371

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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.\nPlease find instructions and applications at https://dschool.stanford.edu/groups/largetransformations/.

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

ME 399: Fuel Cell Seminar

Interdisciplinary research in engineering, chemistry, and physics. Talks on fundamentals of fuel cells by speakers from Stanford, other academic and research institutions, and industry. The potential to provide high efficiency and zero emissions energy conversion for transportation and electrical power generation.

Terms: not given this year | Units: 1 | Grading: Satisfactory/No Credit

MED 108Q: Human Rights and Health

Preference to sophomores. History of human-rights law. International conventions and treaties on human rights as background for social and political changes that could improve the health of groups and individuals. Topics such as: regional conflict and health, the health status of refugees and internally displaced persons; child labor; trafficking in women and children; HIV/AIDS; torture; poverty, the environment and health; access to clean water; domestic violence and sexual assault; and international availability of drugs. Possible optional opportunities to observe at community sites where human rights and health are issues. Guest speakers from national and internationa... more description for MED 108Q »

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

MED 262: Economics of Health Improvement in Developing Countries (ECON 127)

Application of economic paradigms and empirical methods to health improvement in developing countries. Emphasis is on unifying analytic frameworks and evaluation of empirical evidence. How economic views differ from public health, medicine, and epidemiology; analytic paradigms for health and population change; the demand for health; the role of health in international development. Prerequisites: ECON 50 and 102B.

Terms: Win | Units: 5 | Grading: Medical Option (Med-Ltr-CR/NC)

MED 274: Design for Service Innovation (HRP 274)

(Same as OIT 344) Open to graduate students from all schools and departments. An experiential course in which students work in multidisciplinary teams to design new services (including, but not limited to, web services) to address the needs of an underserved population of users. Students learn to identify the key needs of the target population and to design services to address these needs. Projects in 2011 will focus on services for young adult survivors of severe childhood diseases such as cystic fibrosis, rheumatoid arthritis, major cardiac repairs, organ transplants, genetic metabolic disorders, and cancer. The first wave of survivors is reaching young adulthood (ages ... more description for MED 274 »

Terms: Spr | Units: 4 | Grading: Medical Option (Med-Ltr-CR/NC)

MED 83Q: Ethical, Legal, and Social Dimensions of Stem Cell Research

Preference to sophomores. Ethical, legal, social, and economic dimensions of stem cell research such as the discovery of human embryonic stem cells and the international landscape of public policy. How stem cells work, their role in the upkeep of the human body, and current and future uses in medicine. Issues at the intersection of science and society such as human-animal hybrids, notions of justice in intellectual property law, distribution of health care, and the major ethical frameworks defining the debate.

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

MED 93Q: The AIDS Epidemic: Biology, Behavior, and Global Responses

Preference to sophomores. How the discovery of the causative agent and the modes of transmission of HIV fueled a quest for prevention, treatments, and a vaccine. Discoveries in biology, biotechnology, epidemiology, and medicine during the last 20 years. Hypotheses about the origins of HIV as a human disease; the spread of AIDS and HIV; social, political, and economic consequences of the epidemic; and national and global responses.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

MGTECON 300: Growth and Stabilization in the Global Economy

This course gives students the background they need to understand the broad movements in the global economy. Key topics include long-run economic growth, technological change, wage inequality, international trade, interest rates, inflation, exchange rates, and monetary policy. By the end of the course, students should be able to read and understand the discussions of economic issues in The Economist, the Wall Street Journal, the New York Times, or the Congressional Budget Office.

Units: 4 | Grading: GSB Letter Graded

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

MGTECON 331: Political Economy of Health Care in the United States

This course provides the legal, instititional, and economic background necessary to understand the financing and production of health services in the US. Potential topics include: health reform, health insurance (Medicare and Medicaid, employer-sponsored insurance, the uninsured), medical malpractice and quality regulation, pharmaceuticals, the corporate practice of medicine, regulation of fraud and abuse, and international comparisons. \n\n\nThis course is cross-listed with the GSB, and the Health Research Policy and Public Policy Departments (Same as MGTECON 331, HRP 391 and PUBLPOL 231).

Units: 4 | Grading: GSB Student Option LTR/PF

MGTECON 332: Analysis of Costs, Risks, and Benefits of Health Care

For graduate students. The principal evaluative techniques for health care, including utility assessment, cost-effectiveness analysis, cost-benefit analysis, and decision analysis. Emphasis is on the practical application of these techniques. Group project presented at end of quarter. Guest lectures by experts from the medical school, pharmaceutical industry, health care plans, and government.

Units: 4 | Grading: GSB Student Option LTR/PF

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 181: Issues in Technology and Work for a Postindustrial Economy

How changes in technology and organization are altering work and lives. Approaches to studying and designing work. How understanding work and work practices can assist engineers in designing better technologies and organizations. Topics include job design, distributed and virtual organizations, the blurring of boundaries between work and family life, computer supported cooperative work, trends in skill requirements and occupational structures, monitoring and surveillance in the workplace, downsizing and its effects on work systems, project work and project-based lifestyles, the growth of contingent employment, telecommuting, electronic commerce, and the changing nature of... more description for MS&E 181 »

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

Instructors: Barley, S. (PI)

Schedule for MS&E 181

MS&E 185: Global Work

Issues, challenges, and opportunities facing workers, teams, and organizations working across national boundaries. Topics include geographic distance, time zones, language and cultural differences, technologies to support distant collaboration, team dynamics, and corporate strategy. Limited enrollment.

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

MS&E 190: Methods and Models for Policy and Strategy Analysis

Guest lectures by departmental practitioners. Emphasis is on links among theory, application, and observation. Environmental, national security, and health policy; marketing, new technology, and new business strategy analyses. Comparisons between domains and methods.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

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)

Instructors: McGinn, R. (PI)

Schedule for MS&E 197

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

MS&E 198: Applied Modeling of Energy and Environmental Markets

Economic principles in models of energy and environmental markets. Spreadsheet examples for developing insights and communicating with decision makers. Market-clearing conditions, controlling emissions through fees, diffusion of new technologies, resource depletion, cartel behavior, and model evaluation. Prerequisites: ECON 50 and spreadsheets, or consent of instructor.

Terms: not given this year | Units: 1 | Grading: Satisfactory/No Credit

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 248: Economics of Natural Resources

Intertemporal economic analysis of natural resource use, particularly energy, and including air, water, and other depletable mineral and biological resources. Emphasis is on an integrating theory for depletable and renewable resources. Stock-flow relationships; optimal choices over time; short- and long-run equilibrium conditions; depletion/extinction conditions; market failure mechanisms (common-property, public goods, discount rate distortions, rule-of-capture); policy options. Prerequisite: 241 or ECON 51.

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

MS&E 249: Economic Growth and Development

What generates economic growth. Emphasis is on theory accompanied by intuition, illustrated with country cases. Topics: the equation of motion of an economy; optimal growth theory; calculus of variations and optimal control approaches; deriving the Euler and Pontriaguine equations from economic reasoning. Applications: former planned economies in Russia and E. Europe; the present global crisis: causes and consequences; a comparative study of India and China. The links between economic growth and civilization; the causes of the rise and decline of civilizations; lessons for the future.

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

MS&E 250A: Engineering Risk Analysis

The techniques of analysis of engineering systems for risk management decisions involving trade-offs (technical, human, environmental aspects). Elements of decision analysis; probabilistic risk analysis (fault trees, event trees, systems dynamics); economic analysis of failure consequences (human safety and long-term economic discounting); and case studies such as space systems, nuclear power plants, and medical systems. Public and private sectors. Prerequisites: ENGR 60 or equivalent, probability, decision analysis, stochastic processes, and convex optimization.

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

MS&E 250B: Project Course in Engineering Risk Analysis

Students, individually or in groups, choose, define, formulate, and resolve a real risk management problem, preferably from a local firm or institution. Oral presentation and report required. Scope of the project is adapted to the number of students involved. Three phases: risk assessment, communication, and management. Emphasis is on the use of probability for the treatment of uncertainties and sensitivity to problem boundaries. Limited enrollment. Prerequisites: MS&E 250A and consent of instructor.

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 271: Global Entrepreneurial Marketing

Skills needed to market new technology-based products to customers around the world. Case method discussions. Cases include startups and global high tech firms. Course themes: marketing toolkit, targeting markets and customers, product marketing and management, partners and distribution, sales and negotiation, and outbound marketing. Team-based take-home final exam. Limited enrollment.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

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 294: Climate Policy Analysis

Design and application of formal analytical methods in climate policy development. Issues include instrument design, technology development, resource management, multiparty negotiation, and dealing with complexity and uncertainty. Links among art, theory, and practice. Emphasis is on integrated use of modeling tools from diverse methodologies and requirements for policy making application. Recommended: background in economics, optimization, and decision analysis.

Terms: alternate years, given next year | Units: 3 | Grading: Letter or Credit/No Credit

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 299: Voluntary Social Systems

Ethical theory, feasibility, and desirability of a social order in which coercion by individuals and government is minimized and people pursue ends on a voluntary basis. Topics: efficacy and ethics; use rights for property; contracts and torts; spontaneous order and free markets; crime and punishment based on restitution; guardian-ward theory for dealing with incompetents; the effects of state action-hypothesis of reverse results; applications to help the needy, armed intervention, victimless crimes, and environmental protection; transition strategies to a voluntary society.

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

MS&E 446: Policy and Economics Research Roundtable (PERR)

Research in progress or contemplated in policy and economics areas. Emphasis depends on research interests of participants, but is likely to include energy, environment, transportation, or technology policy and analysis. May be repeated for credit.

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

MS&E 491: Clean Energy Developement

'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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

MS&E 93Q: Nuclear Weapons, Energy, Proliferation, and Terrorism

Preference to sophomores. What are nuclear weapons; what do they do? How are they different from other weapons? What drives proliferation of nuclear weapons? Why do countries want them? Can they be eliminated? What about Iran and North Korea? What role does nuclear energy play? Can it help combat global climate change? What are the risks of nuclear terrorism? Recommended: a course in international relations, engineering, or physical science.

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

NBIO 101: Social and Ethical Issues in the Neurosciences (NBIO 201)

Influences on public debate and policy of scientific advances in the study of the brain and behavior: theories of brain function; philosophical and scientific approaches; advances in the neurosciences, possible uses in medical therapy, and interventions involving genetic screening, genetic selection, enhancement of neurological functioning, and manipulation of behavior; questions related to medical therapy, social policy, and broader considerations of human nature such as consciousness, free will, personal identity, and moral responsibility. May be taken for 2 units without a research paper. Prerequisite: Neuroscience, Biology, or Symbolic Systems major; or Human Biology ... more description for NBIO 101 »

Terms: Spr | Units: 2-4 | Grading: Medical Option (Med-Ltr-CR/NC)

OB 385: Leading Social Change: Educational and Social Entrepreneurship (EDUC 321X)

(Same as OB 385) The course provides an overview of different approaches to leading change in the social sector, drawing primarily, but not exclusively, on case examples in education. While there is a substantial need for innovation and visionary leadership in sectors such as education, social entrepreneurs who want to drive change must appreciate the significant barriers and unique opportunities presented by non-market forces in these sectors. The course will equip students with an appreciation for different mechanisms of change and theories of action as well as some of the challenges of initiating and sustaining meaningful change in social sectors such as education. ... more description for OB 385 »

Terms: not given this year | Units: 4 | Grading: Letter or Credit/No Credit

OIT 333: Entrepreneurial Design for Extreme Affordability

This course is a Bass Seminar. 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 challenges 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://extreme.stanford.edu/index.html for ... more description for OIT 333 »

Units: 4 | Grading: GSB Letter Graded

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

OIT 344: Design for Service Innovation

Design for service innovation is an experiential course in which students work in multidisciplinary teams to design new services (including but not limited to web services) that will address the needs of an underserved population of users. Through a small number of lectures and guided exercises, but mostly in the context of specific team projects, students will learn to identify the key needs of the target population and to design services that address these needs. Our projects this year will focus on services for young adult survivors of severe childhood diseases. For the first time ever, children who have cystic fibrosis, rheumatoid arthritis, major cardiac repairs, org... more description for OIT 344 »

Units: 4 | Grading: GSB Letter Graded

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

OIT 522: Field Trips to Grassroots Innovators in Health Care: Improving Access & Outcomes for the Underserved

Some of the most impressive innovations in health care are developed at hospitals and other non-profit organizations by dedicated health care professionals (drs, nurses, administrators) who are not afraid to roll up their sleeves and work hard to solve an important health care problem they face in their everyday patient encounters. Because of limited financial resources and because they often target underserved market segments, these innovations lack a validated business model and commercialization pathway. In this seminar we will gain hands-on experience of some of these grassroots innovations through field trips to a local public hospital (a candidate hospital is San Fr... more description for OIT 522 »

Units: 2 | Grading: GSB Pass/Fail

OSPAUSTL 10: Coral Reef Ecosystems

Key organisms and processes, and the complexity of coral reef ecosystems. Students explore the Great Barrier Reef from the southern end which demonstrates the physical factors that limit coral reefs, to the northern reef systems which demonstrate key aspects of these high biodiversity ecosystems. Human-related changes. Emphasis is on research experiences and development of analytical skills. Two units only counted for Biological Sciences major.

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

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)

OSPAUSTL 30: Coastal Forest Ecosystems

Prehistory of Australian rainforest and how rainforest structure and biodiversity change with altitude, latitude, and geology. Tropical coastal marine wetlands, mangrove forests, and the relationship between land- and sea-based biota. Biology and ecology of marine plants, mangroves, and tropical salt marsh. Introduction to specialized fields of marine plant biology and ecology including biogeography and evolution, aquatic plant ecophysiology, water quality and bioindicator techniques, pollution and eutrophication, and environmental control of marine plant distribution and productivity. Two units only counted for Biological Sciences major.

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

OSPAUSTL 40: Australian Studies

Introduction to Australian society, history, culture, politics, and identity. Social and cultural framework and working understanding of Australia in relationship to the focus on coastal environment in other program courses. Field trips.

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

OSPAUSTL 50: Targeted Research Project

Prior to arriving in Australia, students establish a link with University of Queensland faculty to develop project ideas that combine personal interests and career goals with opportunities presented by the Australian Coastal Studies program, such as how mangrove roots find sediment rich zones of the shore, or the dynamics of ecotourism in southern and northern coastal Queensland. Project report and presentation in Australia.

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

OSPBEIJ 27: Topics in China's Development

Independent study in one of: finding balance between growth and the environment; finding balance between urban and rural; finding balance between incentives in work and social welfare; China's elections at the grassroots; China's education system; or China's health system.

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

OSPBER 47: Ethics in Medicine and Everyday Life

Ethical conflicts in relation to life situations. Moral questions in the conduct of science. Collaboration of physicians and academics with Nazi medical experiments; Milgram¿s experiments on obedience; Stanford¿s prison experiments; misleading marketing strategies used by the tobacco industry; ethics of placebo controlled clinical trials; decisions related to stem cell research and reproductive technologies.

Terms: Spr | Units: 4 | UG Reqs: GER:ECEthicReas | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

OSPBER 48: Topics in Medicine and Ethics

Independent study with weekly meetings. Topics: comparative analysis of legislation of human fertilization and embryology in the U.S. and UK; history and structure of the health care systems in Germany, Canada, and the U.S.; lives of admirable precepts but dubious practice such as Seneca, the Stoics, and Rousseau; promise and pitfalls of genetically modified plant and animal food. Do ethnic, national, and professional stereotypes serve a function? Primarily in English, but some topics might require German.

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

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 24A: Targeted Research Project in Community Health and Development

Two-quarter sequence for students engaging in Cape Town-sponsored community based research. Introduction to approaches, methods and critical issues of partnership-based, community-engaged research and to the community-based research partners. Qualitative data gathering and analysis methods in community-based research; effective collaboration with community partners and data sources; race and privilege in community-based research. Preparation of research proposals and plans for research carried out during spring quarter through OSPCPTWN 24B.

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

OSPCPTWN 24B: Targeted Research Project in Community Health and Development

Two-quarter sequence for students engaging in Cape Town-sponsored community-based research. Substantive community health or development investigations in collaboration with the Stanford Centre's community partners: Western Cape NGOs or government agencies, or community-based organizations or groups. Students' research supported through methods workshops, sharing of progress and problems, and data and findings presentations. Prerequisite: OSPCPTWN 24A.

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

OSPCPTWN 26: Managing Global Projects

Challenges associated with planning and managing both commercial and governmental/non-profit global projects; theory, methods, and tools to enhance global project outcomes. Student teams model and simulate cross-cultural teams engaged in global projects. Opportunities to participate in research in the Collaboratory for Research on Global Projects involving faculty from Stanford departments and schools; see http://crgp.stanford.edu.

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

OSPCPTWN 31: Theory and Politics of Foreign Aid

Political economy approach to foreign aid. Context of debate on development: differences between developed and less developed countries, concept of poverty, how to measure development. History of foreign aid; main actors and characteristics of official development assistance. Theoretical and empirical impact of aid with regard to economic growth and governance. Benefits and problems associated with aid.

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

OSPCPTWN 32: Learning, Development, and Social Change: Service Learning in the Contemporary South African Contex-

Adult learning and its role in community social action; development; service learning. Micro contexts of people's daily lives and experiences in the context of an emergent democracy; understanding possibilities of community action and mobilisation for social change. Service in a historically marginalised community near Cape Town to understand realities of everyday life in informal settlements, to engage with education in a developmental context, and to gain insight into sociopolitical factors that shape social action and learning.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

OSPCPTWN 43: Public and Community Health in Sub-Saharan Africa

Introduction to concept of public health as compared with clinical medicine. Within a public health context, the broad distribution of health problems in sub-Saharan Africa as compared with U.S. and Europe. In light of South Africa¿s status as a new democracy, changes that have occurred in health legislation, policy, and service arenas in past 16 years. Topics include: sector health care delivery, current distribution of infectious and chronic diseases, and issues related to sexual and reproductive health in South Africa. Site visits to public sector health services and health related NGOs.

Terms: Win | Units: 4 | 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

OSPFLOR 38: Water Resources Engineering in Italy: Ancient Rome, Medieval Siena, and Modern Florence and Venice

Examination of significant examples of water resources development in Italian history as an introduction to the basic concepts of water resources engineering and management. Observation of results of application of basic ideas from hydrology and hydraulics to problems of water supply, waste water disposal and flood control. Topics include aqueducts of ancient Rome, water supply of Siena, flooding in Florence, and high water in Venice.

Terms: Aut | Units: 4-5 | UG Reqs: GER:DBEngrAppSci | Grading: Letter or Credit/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

OSPGEN 70: Indigenous Australia

Culture and ecology of desert Aboriginal people living in a remote region of W. Australia. Students live with their Martu hosts. Issues in greater Australian human prehistory; social, ecological, and political factors that shape contemporary relationships between rural Aborigines, their urban counterparts, and the broader Australian society. Location: Newman, Parnngurr Community, Western Australia.

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

OSPMADRD 32: Health Care Systems Design: Spain, Europe, and the United States

Principles of health care system design; examples from Spain, other European systems, and the United States. Central goals of health care systems in industrialized countries and the demographic, economic, and related challenges facing them. Approaches to system design. Tradeoffs between public sector and private sector approaches; financing issues; provider payment; care management; quality improvement. Operation of physician practices and hospitals. Economic concepts with themes from sociology, political science, demography, and related disciplines.

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

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

OSPMADRD 57: Health Care: A Contrastive Analysis between Spain and the U.S.

History of health care and evolution of the concept of universal health care based on need not wealth. Contrast with system in U.S. Is there a right to health care and if so, what does it encompass? The Spanish health care system; its major successes and shortcomings. Issues and challenges from an interdisciplinary perspective combining scientific facts with moral, political, and legal philosophy.

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

OSPMADRD 72: Issues in Bioethics Across Cultures

Ethical dilemmas concerning the autonomy and dignity of human beings and other living creatures; principles of justice that rule different realms of private and public life. Interdisciplinary approach to assessing these challenges, combining scientific facts, health care issues, and moral philosophy. Sources include landmark bioethics papers.

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

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)

OSPSANTG 27: Humans and the Environment: The Great Transitions

Environmental conditions and major environmental changes that accompanied the major transitions: the change from hunter-gatherers to agriculture ca. 10000 years ago; the spread of farming over the next 6000 years; the early development of science and technology; the industrial revolution and the first demographic transition; the second demographic transition to low fertility; and the third demographic transition to long lives. Focus on four main dimensions: demography, culture and choice, environment, and technology, using an evolutionary perspective. 3 units may be counted toward Biology major.

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

OSPSANTG 28: Independent Study Projects in Ecology, Evolution, and Demography

Choice of one of the following questions, working with the instructor to narrow the focus and select appropriate resources: Why is there a Birth Dearth in so many industrialized nations today? Discuss the pattern and causes of inequalities between mortality in different economic classes in Chile. What are the known and prospective effects of climate warming on natural populations? What are the known and prospective effects of climate warming on human populations?

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

OSPSANTG 85: Marine Ecology of Chile and the South Pacific

Relationships among physical processes in the ocean, biological productivity, and the exploitation of resources by high-thropic-level predators including human beings. Characterization of ecological patterns; identification of processes operating on marine systems. Open ocean ecosystems, intertidal and benthic regions of the world¿s oceans, and ecological research developed along coastal regions, focusing on Chile¿s 4,000 km coastline.

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

PEDS 231: Medicine for Innovators and Entrepreneurs (IMMUNOL 231)

Interdisciplinary, project-based course in which bioscience, bioinformatics, biodesign, bioengineering students learn concepts and principles to understand human disease and work together to propose solutions to medical problems. Diabetes mellitus is used as a paradigm for understanding human disease. Guest medical school and outside faculty. Field trips to Stanford clinics and biotechnology companies. Prequisite: college level biology.

Terms: not given this year | Units: 3-4 | Grading: Medical Option (Med-Ltr-CR/NC)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

PEDS 250: Social and Environmental Determinants of Health

How race/ethnicity and SES contribute to health disparities, how vulnerable populations are uniquely at health risk, and how the built environment relates to health and wellness. Topics include: gender, age, race/ethnicity, language, education, individual SES and neighborhood SES as related to health; individual and structural race bias; health needs of vulnerable populations (e.g., the homeless, the incarcerated, immigrant populations, children, and uninsured/underinsured); and environmental forces (e.g., urban design/planning, traffic/car culture, green space, housing, food access/culture, law enforcement, and media).

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

PHIL 164A: Central Topics in Philosophy of Science: Causation (PHIL 264A)

(Graduate Students register for 264A.) Establishing causes in science, engineering, and medicine versus establishing them in Anglo-American law, considered in the context of Hume and Mill on causation. May be repeated for credit.

Terms: not given this year | Units: 4 | Repeatable for credit | Grading: Letter or Credit/No Credit

PHIL 167A: Philosophy of Biology (PHIL 267A)

(Graduate students register for 267A.) Evolutionary theory and in particular, on characterizing natural selection and how it operates. We examine debates about fitness, whether selection is a cause or force, the levels at which selection operates, and whether cultural evolution is a Darwinian process.

Terms: not given this year | Units: 2-4 | UG Reqs: GER:DBHum | Grading: Letter or Credit/No Credit

PHIL 167B: Philosophy, Biology, and Behavior (PHIL 267B)

(Graduate students register for 267B.) Continuation of 167A/267A. Further philosophical study of key theoretical ideas in biology, focusing on problems involving explanation of behavior. Topics: evolutionary versus proximate causal explanations of behavior; genetic and other determinisms; and classification and measurement of behavior. Prerequisites: 167A; or one PHIL course and either one BIO course or Human Biology core; or equivalent with consent of instructor.

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

PHIL 178A: The Ethics of Environmental Choices (EARTHSYS 178, EARTHSYS 278, PHIL 278A)

(Formerly PHIL 278/378.) The institutional and individual dimensions of environmental choices. On the institutional side, examine externalities, the tragedy of the commons, sustainable development and environmental policy. On the individual side, discuss individual responsibility, intrinsic value, and moral pluralism. Focus is on decision making including the role of risk analysis, the rate of discount for effects on future generations, cost-benefit analysis, and scientific epistemology.

Terms: not given this year | Units: 4 | UG Reqs: GER:DBHum | Grading: Letter or Credit/No Credit

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)

PHIL 249: Evidence and Evolution (PHIL 349)

The logic behind the science. The concept of evidence and how it is used in science with regards to testing claims in evolutionary biology and using tools from probability theory, Bayesian, likelihoodist, and frequentist ideas. Questions about evidence that arise in connection with evolutionary theory. Creationism and intelligent design. Questions that arise in connection with testing hypotheses about adaptation and natural selection and hypotheses about phylogenetic relationships.

Terms: not given this year | Units: 3-5 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

PHIL 25SI: The Animal-Human Relationship: Interdisciplinary Perspectives

The ethical, scientific, and spiritual problems that arise from the interaction between humans and other animals. Can animals have empathy? What does it mean for an animal to feel pain? How did humans come to dominate other animals? What moral obligations do humans have towards animals? Where do animals fit in religious thought? Is animal research ethical, and is it effective? What role does meat consumption play in modern society? How can the environmental impacts of livestock production be mitigated? Guest lecturers from philosophy, literature, biology, neurology, religious studies, psychology, anthropology, and environmental science.

Units: 1 | Grading: Satisfactory/No Credit

PHIL 30S: Justifying justice at home and abroad

Is the war against Osama bin Laden just or justifiable? Does America have the right to intervene in Libya or Afghanistan? Are Wall Street regulations justified based on the good consequences that result for society? Is health care reform warranted?\n\n\nThe goal of this course is to provide the student with a framework with which to approach, argue about, justify and/or condemn things that take place in the contemporary socio-political arena.\n\n\nMain topics in socio-political philosophy. Rights. Are rights justified based on the good consequences that result for a society that has them; or by virtue of being a rational being one has certain rights. Property. According ... more description for PHIL 30S »

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

PHIL 63S: Introduction to Bioethics

If I am at least partly at fault for my own illness, should I lose priority for treatment? Is there a moral difference between killing and letting die? Focus is on understanding recent issues in applied ethics that arise from the biological and medical sciences. Readings are centralized around human life. Topics may include pre-birth, cloning, killing and letting die, and organ markets.

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

PHYSICS 15: The Nature of the Universe

The structure, origin, and evolution of the major components of the Universe: planets, stars, and galaxies. Emphasis is on the formation of the Sun and planets, the evolution of stars, and the structure and content of the Milky Way galaxy. Topics: cosmic enigmas (dark matter, black holes, pulsars, x-ray sources), star birth and death, and the origins of and search for life in the solar system and beyond.

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

PHYSICS 240: Introduction to the Physics of Energy

Energy as a consumable. Forms and interconvertability. World joule \nbudget. Equivalents in rivers, oil pipelines and nuclear weapons. \nQuantum mechanics of fire, batteries and fuel cells. Hydrocarbon and hydrogen synthesis. Fundamental limits to mechanical, electrical and magnetic strengths of materials. Flywheels, capacitors and high pressure tanks. Principles of AC and DC power transmission. Impossibility of pure electricity storage. Surge and peaking. Solar constant. Photovoltaic and thermal solar conversion. Physical limits on agriculture.

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

PHYSICS 241: Introduction to Nuclear Energy

Radioactivity. Elementary nuclear processes. Energetics of fission and fusion. Cross-sections and resonances. Fissionable and fertile isotopes. Neutron budgets. Light water, heavy water and graphite reactors. World nuclear energy production. World reserves of uranium and thorium. Plutonium, reprocessing and proliferation. Half lives of fission decay products and actinides made by neutron capture. Nuclear waste. Three Mile Island and Chernobyl. Molten sodium breeders. Generation-IV reactors. Inertial confinement and magnetic fusion. Laser compression. Fast neutron production and fission-fusion hybrids. PREREQUISITES: Strong undergraduate background in elementary chem... more description for PHYSICS 241 »

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

PHYSICS 363: Solar and Solar-Terrestrial Physics

Structure, mechanisms, and properties of the Sun's interior and atmosphere. Tools for solar observations; magnetic fields and polarimetry. Solar oscillations and helioseismology. Differential rotation and turbulent convection. Solar MHD, Alfven and magneto-acoustic waves. Solar cycle and dynamo. Magnetic energy release, reconnection, particle acceleration. Solar activity, sunspots, flares, coronal mass ejections; UV, X-ray, and high-energy particle emissions. The interaction of the solar wind with Earth's magnetosphere and its terrestrial effects; space weather. Prerequisite: 221 or equivalent.

Terms: not given this year | Units: 3 | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

POLISCI 1: Introduction to International Relations (INTNLREL 1)

Approaches to the study of conflict and cooperation in world affairs. Applications to war, terrorism, trade policy, the environment, and world poverty. Debates about the ethics of war and the global distribution of wealth.

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

Instructors: Fearon, J. (PI) ; Israel-Trummel, M. (TA) ; Opalo, K. (TA) ; Platas, M. (TA) ... more instructors for POLISCI 1 »

Schedule for POLISCI 1

POLISCI 19SC: Food and Politics

The politics of food production and distribution; organic and sustainable farming; federal farm and free trade policies; genetically modified food; animal ethics; and the political context of famine and obesity.

Terms: not given this year | Units: 2 | Grading: Letter or Credit/No Credit

POLISCI 222R: Culture, Identity, and Diversity

This course explores a naturalistic approach to democratic values. Democratic values are written about as abstractions. But they are not lived in the abstract. They take on their character because they are held (or rejected) by actual individuals who themselves are embedded in particular cultural contexts. The objective of the course is therefore to explore, in an open-ended way, how core democratic values are understood by both those who study them and by those who live them. \n \nThe course explores understandings of equality, identity, multiculturalism, but most especially the nature of tolerance in liberal societies. It examines two bodies of scholarship. One i... more description for POLISCI 222R »

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

PSYCH 165: Peace Studies (POLISCI 111)

Interdisciplinary. The challenges of pursuing peace in a world with many conflicts and rising regional, ethnic, and religious antagonisms. Historical, social, psychological, and moral perspectives. Contributions of academic disciplines to the study of peace. Students explore a conflict and offer contributions to the building of peace. Limited enrollment.

Terms: not given this year | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter or Credit/No Credit

PSYCH 265: Social Psychology and Social Change (EDUC 371X)

The course is intended an exploration of the major ideas, theories, and\n\nfindings of social psychology and their applied status. Special attention will be given to historical issues, classic experiments, and seminal theories, and their implications for topics relevant to education. Contemporary research will also be discussed. Advanced undergraduates and graduate students from other disciplines are welcome.

Terms: Spr | Units: 2-3 | Grading: Letter or Credit/No Credit

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 1AT: Writing & Rhetoric 1: A Mountain for Itself: The Rhetoric of \nWilderness

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 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)

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

PWR 1JB: Writing & Rhetoric 1: From Mad Cow to Mad Corn: The Rhetoric of Food Science and Politics
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. Topics include how activists, nutritionists, food scientists, chemical companies, and legislative bodies articulate their concerns and argue their positions and how agribusiness and government respond to consumer concerns about food produced with the aid of chemicals. See http://ual.stanford.edu/AP/univ_req/PWR/Req.html.
Terms: Aut, Spr | Units: 4 | UG Reqs: Writing1 | Grading: Letter (ABCD/NP)

PWR 1JL: Writing & Rhetoric 1: Rhetoric and Humanitarian Intervention
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. Examination of how media representations of world crises are crafted to persuade us to action, appealing to our senses of justice, pragmatism, outrage, and compassion. See http://www.stanford.edu/dept/undergrad/cgi-bin/drupal_ual/AP_univ_req_PWR_Courses.html
Terms: 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 2JB: Writing & Rhetoric 2: Rhetoric of Ethics in Research and Technology
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. Study of the rhetoric of ethical discourse, including the ethical standards guiding research at Stanford and examples of ethical misconduct. See http://ual.stanford.edu/AP/univ_req/PWR/Courses.html.
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)

RELIGST 162: Spirituality and Nonviolent Urban and Social Transformation (URBANST 126)
A life of engagement in social transformation is often built on a foundation of spiritual and religious commitments. Case studies of nonviolent social change agents including Rosa Parks in the civil rights movement, César Chávez in the labor movement, and WIlliam Sloane Coffin in the peace movement; the religious and spiritual underpinnings of their commitments. Theory and principles of nonviolence. Films and readings. Service learning component includes placements in organizations engaged in social transformation. Service Learning Course (certified by Haas Center).
Terms: not given this year | Units: 5 | Grading: Letter (ABCD/NP)

SIW 115: Health and Environmental Regulatory Policy
(Staff)
Terms: not given this year | Units: 5 | Grading: Letter (ABCD/NP)

SIW 116: International Environmental Policy
(Staff)
Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credit

SIW 121: Economic Analysis of Federal Environmental and Health Regulations

Terms: not given this year | Units: 5 | Repeatable for credit | Grading: Letter or Credit/No Credit

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

SIW 122: Energy, Environment and Security in South Asia

Terms: not given this year | Units: 5 | Repeatable for credit | Grading: Letter or Credit/No Credit

SIW 128: Transitions in Energy Policy Speakers Series

Terms: not given this year | Units: 2 | Grading: Satisfactory/No Credit

SIW 132: Bridging the gap between environmental science and policy

Terms: not given this year | Units: 5 | Grading: Letter or Credit/No Credit

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)

SOC 118: Social Movements and Collective Action (SOC 218)

Why social movements arise, who participates in them, the obstacles they face, the tactics they choose, and how to gauge movement success or failure. Theory and empirical research. Application of concepts and methods to social movements such as civil rights, environmental justice, antiglobalization, and anti-war.

Terms: not given this year | Units: 5 | UG Reqs: GER:DBSocSci | Grading: Letter or Credit/No Credit

STRAMGT 341: Achieving Social Impact

Social Enterprise explores a range of leading issues focused on the challenges and opportunity for impact through social entrepreneurship. Students explore a range of organizations from nonprofits, to for-profits, to hybrid forms of organization, and examine issues from a variety of different perspectives, including those of entrepreneur, CEO, funder, and board member. \n\n\nDesigned to appeal to students who seek to take on leadership roles in social value creation throughout their careers, whether as leaders in the private, nonprofit, or government sectors, or some combination thereof. \n\n\nSocial Enterprise focuses on innovative approaches for creating social value th... more description for STRAMGT 341 »

Units: 4 | Grading: GSB Letter Graded

Sustainability Courses 2010-2011

Sustainability Focused

Sustainability Related

STRAMGT 369: Social Entrepreneurship

This course is about the efforts of private citizens to create effective responses to social needs and innovative solutions to social problems. History is full of examples of this kind of activity, though its character continues to evolve. Social entrepreneurs are increasingly blurring the lines between the sectors, using for-profit and hybrid forms of organization to achieve social objectives. This creates new opportunities for applying business skills in the social sector. Despite its prominence and complexity, this combination of private initiative and public purpose is not well understood. The objectives of this course are: (1) to introduce students to the concepts, p... more description for STRAMGT 369 »

Units: 4 | Grading: GSB Student Option LTR/PF

STRAMGT 567: Social Entrepreneurship and Social Innovation

This course examines individuals and organizations that use entrepreneurial skills and approaches to develop innovative responses to social problems. Entrepreneurship has traditionally been seen as a way of creating wealth for the entrepreneur and for those who back her/his work. Social entrepreneurs employ "entrepreneurial skills," such as finding opportunities, inventing new approaches, securing and focusing resources and managing risk, in the service of creating a social value. As the intensity and complexity of social and environmental problems has grown in recent years social entrepreneurship, defined as innovative, social value creating activity that can occur withi... more description for STRAMGT 567 »

Units: 2 | Grading: GSB Letter Graded

STS 115: Ethical Issues in Engineering (ENGR 131)

Moral rights and responsibilities of engineers in relation to society, employers, colleagues, and clients; cost-benefit-risk analysis, safety, and informed consent; the ethics of whistle blowing; ethical conflicts of engineers as expert witnesses, consultants, and managers; ethical issues in engineering design, manufacturing, and operations; ethical issues arising from engineering work in foreign countries; and ethical implications of the social and environmental contexts of contemporary engineering. Case studies, guest practitioners, and field research. Limited enrollment.

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

URBANST 110: Introduction to Urban Studies

The study of cities and urban civilization. History of urbanization and current issues such as suburbanization, racial discrimination, globalization, terrorism, and the environment. Public policies designed to address these issues.

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

URBANST 163: Land Use Control

Methods of land use control related to the pattern and scale of development and the protection of land and water resources. Emphasis is on the relationship between the desired land use goal and geographical landscape, physical externalities, land use law, and regulatory agencies. Topics include the historical roots of modern land use controls; urban reforms of the 19th century; private ownership of land; zoning; local, state, and federal land use regulation; and land trusts preservation. Smart growth, environmental impact consideration, private property rights, and special purpose agencies are related to current issues.

Terms: Spr | Units: 4 | UG Reqs: GER:DBSocSci | Grading: Letter or Credit/No Credit

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

URBANST 165: Sustainable Urban and Regional Transportation Planning

Environmental, economic, and equity aspects of urban transportation in 21st-century U.S. Expanded choices in urban and regional mobility that do not diminish resources for future generations. Implications for the global environment and the livability of communities.

Terms: not given this year | Units: 4-5 | UG Reqs: GER:DBSocSci | Grading: Letter (ABCD/NP)