

SUSTAINABILITY COURSE INVENTORY

2013-2014

The Sustainability Course Inventory was prepared by the University of Pennsylvania Green Campus Partnership Sustainability Team. This guide will be updated bi-yearly. Please direct any comments, updates, revisions or suggestions to sustainability@upenn.edu with “Penn Sustainability Course Inventory” in the subject line.

Please consider the environment before choosing to print this document.

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INTRODUCTION

Through its research, teaching, and operational practices, Penn is dedicated to promoting a sustainable culture and implementing environmentally-conscious policies. In 2007, President Gutmann signed the American College and University President's Climate Commitment (ACUPCC) and in 2009, Penn's *Climate Action Plan* was released. These actions were meant to demonstrate Penn's dedication to long-term sustainability and set concrete goals for the University.

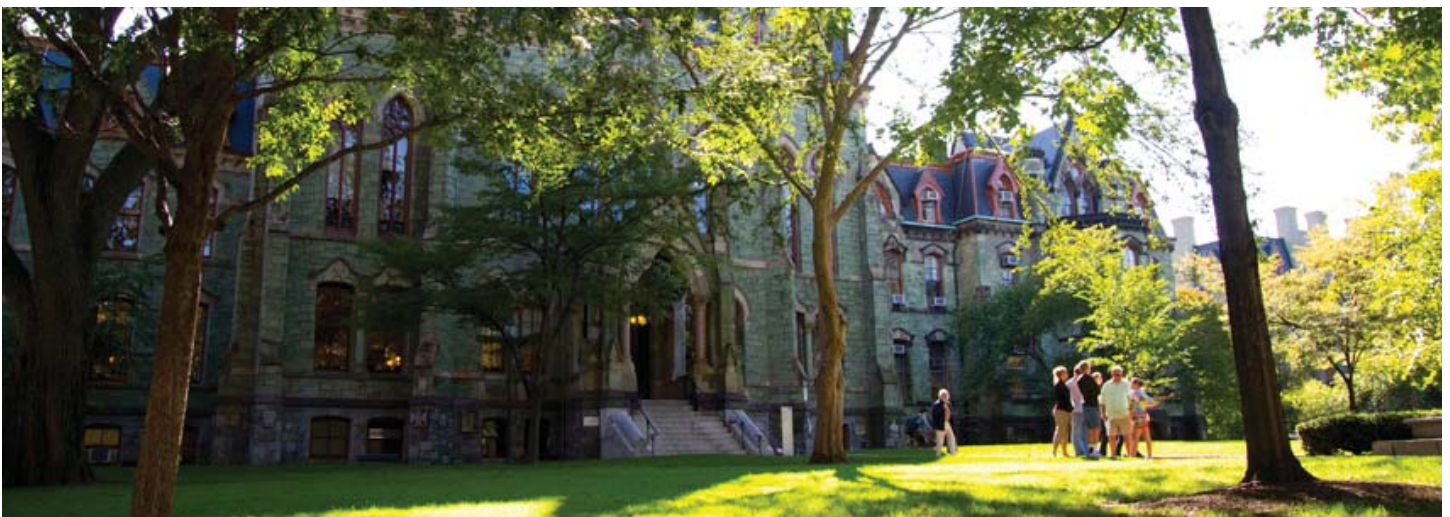
The Academic goal in the *Climate Action Plan* is to make climate change and sustainability a part of the curriculum and educational experience available to all students and the larger Penn community. This inventory is a step towards this goal of expanding the awareness and availability of information about sustainability courses at Penn.

This inventory is a comprehensive listing of all of the sustainability courses that the University of Pennsylvania plans to offer in the 2013-2014 academic year. The guide is organized alphabetically by school and then by department. Please consult the course catalog for full descriptions of the courses and *Penn InTouch's* course registration site to confirm that the course is currently being offered.

Classes are categorized by whether or not they are “sustainability-focused” or “sustainability-related.”

-  Sustainability-focused classes look at a particular issue through the lens of sustainability, or concentrate on the concept of sustainability itself.
-  Sustainability-related courses incorporate sustainability as a distinct part of the course, or cover a single sustainability principle or issue.

These definitions were developed by the Association for the Advancement of Sustainability in Higher Education (AASHE) as a part of their Sustainability Tracking, Assessment and Rating System (STARS).



METHODOLOGY

This inventory was compiled using the information on the 2013-2014 Penn Registrar website, and each course listing was reviewed to see if the description mentioned sustainability or a sustainability concept or issue. If the description provided enough detail, the course was recorded and classified as either sustainability-focused or sustainability-related at that time. If the description was not detailed enough to make a classification, professors were contacted about obtaining the syllabus and for more information about the course.

For departments that offer classes that are not listed on the main course registrar's website, course lists were sought out on the individual schools' websites.

Sustainability-focused courses cover as a central topic(s) of the course:

- sustainability
- global warming and climate change
- green technology and design
- renewable energy generation
- resource conservation,
- environmental history

Sustainability-related courses touch upon issues related to sustainability throughout the course, or a specific topic within sustainability in at least two class sections. These topics include:

- environmental law and policy
- economics and the environment
- geology
- risk management



COURSE NUMBERS AND ABBREVIATIONS

AAMW	Art & Archaeology of the Mediterranean World	EALC	East Asia Languages & Civilizations
ACCT	Accounting	ECON	Economics
AFST	African Studies Program	EDUC	Education
AFRC	Africana Studies	ESE	Electrical & Systems Engineering
AMCS	Applied Math & Computational Science	EAS	Engineering and Applied Science
ANAT	Anatomy	ENGL	English
ANCH	Ancient History	ENM	Engineering Mathematics
ANEL	Ancient Near East Languages	ENVS	Environmental Studies
ANTH	Anthropology	EPID	Epidemiology
ARAB	Arabic	FNCE	Finance
ARCH	Architecture	FNAR	Fine Arts
ARTH	Art History	FOLK	Folklore
ASAM	Asian American Studies	FREN	French
ALAN	Asian Languages	GAS	Graduate Arts & Sciences
ASTR	Astronomy & Astrophysics	GSWS	Gender, Sexuality & Women's Studies
BCHE	Biochemistry (Undergraduate)	GCB	Genomics and Computational Biology
BMB	Biochemistry and Molecular Biophysics (Graduate)	GRMN	Germanic Languages
BE	Bioengineering	GAFL	Government Administration
BIOE	Bioethics (Medical Ethics)	GEOL	Geology
BIOM	Biomedical Graduate Studies	GREK	Greek
BIBB	Biological Basis of Behavior	HEBR	Hebrew
BIOL	Biology	HSOC	Health and Societies
BIOT	Biotechnology	HCMG	Health Care Management
BSTA	Biostatistics	HIST	History
BPUB	Business & Public Policy	HPR	Health Policy Research
CAMB	Cell and Molecular Biology	HSPV	Historic Preservation
CBE	Chemical & Biomolecular Engineering	HSSC	History and Sociology of Science
CHEM	Chemistry	IMUN	Immunology
CHIN	Chinese	INSR	Insurance & Risk Management
CINE	Cinema Studies	IPD	Integrated Product Design
CPLN	City & Regional Planning	INTR	International Relations
CLST	Classical Studies	ITAL	Italian
COGS	Cognitive Science	JPAN	Japanese
COLL	College	JWST	Jewish Studies
COMM	Communications	KORN	Korean
COML	Comparative Literature & Literary Theory	LARP	Landscape Architecture and Regional Planning
CIS	Computer & Information Science	LATN	Latin
CIT	Computer & Information Technology	LALS	Latin American and Latino Studies
CRIM	Criminology	LAW	Law
DEMG	Demography	LGST	Legal Studies & Business Ethics
DTCH	Dutch	LING	Linguistics
DYNM	Organizational Dynamics	LGIC	Logic, Information and Computation
EESC	Earth and Environmental Science	MGMT	Management
		MKTG	Marketing
		MKSE	Market and Social Systems

MSSP	Master in Social Policy
MSE	Materials Science and Engineering
MATH	Mathematics
MEAM	Mechanical Engineering and Applied Mechanics
MSCI	Military Science
MUSA	Urban Spatial Analytics
MUSC	Music
NANO	Nanotechnology
NELC	Near Eastern Languages & Civilizations
NGG	Institute of Neurological Science
NPLD	Nonprofit/NGO Leadership
NSCI	Naval Science
NURS	Nursing
OPIM	Operations & Information Management
PERS	Persian
PHRM	Pharmacology
PHIL	Philosophy
PPE	Philosophy, Politics, and Economics
PHYS	Physics
PRTG	Portuguese
PSCI	Political Science
PSYC	Psychology
PUBH	Public Health Studies
REAL	Real Estate
RELS	Religious Studies
ROML	Romance Languages
RUSS	Russian
SCND	Scandinavian Languages
STSC	Science Technology & Society
SLAV	Slavic Languages including other Eastern European Languages
SWRK	Social Policy and Practice
SOCI	Sociology
SAST	South Asia Studies
SPAN	Spanish
STAT	Statistics
TCOM	Telecommunications
THAR	Theater Arts
TURK	Turkish
URBS	Urban Studies
VLST	Visual Studies
YDSH	Yiddish

- (A) Course offered in fall term only.
- (B) Course offered in spring term only.
- (C) One-term course offered either term.
- (D) Two terms. Student may enter either term. Credit is given for either term.
- (E) Two terms. Student must enter first term. Credit is given only on the completion of both terms.
- (F) Two terms. Student may enter either term. Credit is given only on the completion of both terms.
- (G) Two terms. Student must enter first term. Credit is given for first term without the second term.
- (H) Course offered fall even-numbered years.
- (I) Course offered fall odd-numbered years.
- (J) Course offered spring even-numbered years.
- (K) Course offered spring odd-numbered years.
- (L) Course offered in summer term only.
- (M) Course not offered every year

001-399 Undergraduate Courses

400-499 Mixed Courses primarily for undergraduate students

500-599 Mixed Courses primarily for graduate students (Permission of the instructor is normally required by undergraduates in 500-series courses)

600-999 Courses open only to graduate students



Sustainability- Focused

Sustainability- Related

INTEGRATING SUSTAINABILITY ACROSS THE CURRICULUM COURSES

The *Integrating Sustainability Across the Curriculum* (ISAC) program began at Penn in the Spring of 2012. Professors applied to the program and participated in a one-day workshop aimed at integrating sustainability into existing and new courses. The group discussed key sustainability concepts (limits to growth, feedback and amplification effects, the relationship between social equity and sustainability, behavior change, etc.), and participated in exercises to explore the concepts in a group learning setting. Student interns were paired with two faculty members each and worked during the Summer of 2012 to help implement the workshop concepts and goals into the revision of an existing class or the creation of an entirely new class. The redesigned courses will be offered in the 2013/2014 academic year and are listed below:

PARTICIPATING CLASSES/ PROFESSORS

ARCH 431/ 531: Construction I / Franca Trubiano

This course explores basic principles and concepts of architectural technology and describes the interrelated nature of structure, construction and environmental systems. *[Intern: Mary Tsai]*

CHEM 012: Environmental Chemistry / Marsha Lester

Theoretical and conceptual background of core issues and questions in population, community, and ecosystem ecology. Topics include physiological ecology, demography, the growth and regulation of natural populations, species interactions, and biogeochemical cycling. *[Intern: Meg Schneider]*

COMM 123: Critical Approaches to Popular Culture / Felicity Paxton

Popular culture has been dismissed as “just entertainment” and condemned as propaganda. This course considers these critiques, as well as the idea that popular culture offers valuable material for the study of social life. We will consider the meaning and impact of popular culture; who makes distinctions between high, middlebrow, and low or mass culture; and how power and resistance structure the production and consumption of popular texts. This year’s class includes new content on American consumerism. *[Intern: Lauren Kaufmann]*

ECON 001: Introduction to Microeconomics / Rebecca Stein

Introduction to economic analysis and its application. Theory of supply and demand, costs and revenues of the firm under perfect competition, monopoly and oligopoly, pricing of factors of production, income distribution, and theory of international trade. *[Intern: Sam Hougie]*

ENVS 400: Landscape Sustainability / Douglas Jerolmack

Processes humans use to control their surrounding landscapes may exacerbate potential environmental problems and threaten landscape sustainability. Intended for a non-technical audience with an interest in sustainability within or outside the Earth and Environmental Science department, this course aims to inform future decision-makers on the importance of understanding underlying environmental processes before taking action. *[Intern: Meg Schneider]*

INTEGRATING SUSTAINABILITY ACROSS THE CURRICULUM COURSES

EDUC: Educating for Sustainability / Elizabeth MacKenzie

As the urgency of creating a more sustainable society becomes increasingly apparent, we must explore ways to educate students at every level (K-8, 9-12, and beyond) on the rationale, the philosophy, and the process of creating sustainable systems in all fields and every subject. This course will give students the opportunity to engage in an Academically-Based Community Service course while linking them with graduate students participating in sustainability education internships at the Huey School in West Philadelphia. *[Intern: Tyler Hall]*

ENV5 325: Sustainable Goods / James Hagan

The study of sustainability has been identified as a critical issue for society and industry and is evolving to examine how society should conduct itself in order to survive. This issue impacts the consumer goods that we use in our lives, the processes involved to make these goods, and the raw materials that we extract to create these goods. The questions examined in this course are: Can these goods be made, obtained, and consumed in a fashion that allows our current quality of life to be maintained (or enhanced) for future generations? Can these processes be sustainable? *[Intern: Lauren Kaufmann]*

GRMN: Utopian Visions / Bethany Wiggin

From utopian literature beginning with Thomas More to the history of the environmental movement to early American utopian communities to today's various attempts at creating ecotopias, the ideologies that have arisen out of utopia thought and the improvement of the human condition are propelling the sustainability movement forward in more ways that may be initially apparent. This course will cover these connections between ideal and applied utopian visions. *[Intern: Tyler Hall]*

LALS 233/ HIST 233: From Coca to Cocaine / Ann Farnsworth

This course compares a set of practices that center on coca leaf production in indigenous communities where coca cultivation has been sustained over long centuries on the one hand, with a set of patently unsustainable practices linked to the "drug war" in the Americas on the other. Participants will read scholarly work in history and anthropology and explore what historians and other scholars might contribute to discussions about legalization. *[Intern: Elise Jun]*

URBS 290: Metropolitan Nature: Urban Sustainability / Michael Nairn

The course explores a variety of issues concerning nature's role in the contemporary urban world with a focus on urban sustainability. At its core, sustainability is a radical concept. Sustainability demands a systems view of both the economy and environment and understanding the management of their interactions. The course focuses on the ecological aspects of the emerging field of ecological economics fostering an understanding of the ecological principles of urban sustainability. *[Intern: Mary Tsai]*

SCHOOL OF ARTS AND SCIENCES

AFST 620/ ENVS 620: Topics on African Environmental Issues

This course aims to explore Africa's natural environment and the impact of human activities on it. Each semester the course will offer an overview of Africa's environment as it relates to water issues or the environmental impact of development projects, natural resource extraction and consumption. [B / Staff]

ANTH 133/ LALS 133: Native Peoples and the Environment

The relationship between the activities of native peoples and the environment is a complex and contentious issue. This seminar will examine the myth of the ecologically noble savage, the myth of the pristine environment, the alliance between native peoples and green politics, and the contribution of native peoples to appropriate technology, sustainable development and conservation of biodiversity. [M / Erickson]

BIOL 017: The Biology of Food

Intensive exposure to current issues and solutions in contemporary human interactions with the environment. Global in scope, but focused on case histories. Emphasis on providing biological and sociological background for a given major environment- human interaction, and state-of-the-art suggested solutions. [B / Poethig]

BIOL 140/ BIOL 440: Humans and the Environment

Intensive exposure to current issues and solutions in contemporary human interactions with the environment. Global in scope, but focused on case histories. Emphasis on providing biological and sociological background for a given major environment/human interaction, and state-of-the-art suggested solutions. [A / Janzen]

BIOL 240: Ecology: from Individuals to Ecosystems

The study of living organisms in their natural environment, spanning the ecological physiology of individuals, the structure of populations, and interactions among species, including the organization of communities and ecosystem function. [A / Helliker]

BIOL 325: Marine Biology

An introduction to marine biology and oceanography. Topics will include chemical and physical oceanography, a survey of form, function and phylogeny of algae, invertebrates and vertebrates, and an examination of ecological and evolutionary principles as applied to marine organisms and ecosystems. [J / Petraitis]

BIOL 400: Field Botany

Students will learn to identify plants in the field using keys and manuals; lab exercises will also include the use of quantitative techniques for measuring plant populations and characterizing plant communities. Students will also learn how to collect and prepare herbarium specimens. [I / Rhoads/ Block]

BIOL 414: Advanced Ecology

Theoretical and conceptual background of core issues and questions in population, community, and ecosystem ecology. Topics include physiological ecology, demography, the growth and regulation of natural populations, species interactions, and biogeochemical cycling. [H / Petraitis / Casper]

SCHOOL OF ARTS AND SCIENCES

BIOL 415/ ENVS 416: Freshwater Ecology

Survey of the physical, chemical and biological properties of freshwater ecosystems, both riverine and lentic, natural and polluted. [B / Arscott]

CHEM 012: Environmental Chemistry

Theoretical and conceptual background of core issues and questions in population, community, and ecosystem ecology. Topics include physiological ecology, demography, the growth and regulation of natural populations, species interactions, and biogeochemical cycling. [C / Lester]

DYNM 555: Leadership & Sustainability: How to Engage in Collaborative Innovation

The objective of this course is to engage students in an experience of collective innovation and apply that innovation to potentially alleviate a sustainability problem in the Penn community. They will be asked to immerse themselves into the social system, after which they will look for prototype innovation solutions to emerge. These prototype solutions will then be ready for implementation subject to university review. [C / Nuessle / Garofalo]

DYNM 663: Green Skepticism: Communicating and Implementing Sustainable Business

The business case for sustainability has been made many times, yet skepticism about the need for change remains widespread. People often must also see the connection between small tasks they are being asked to do and the big picture of global sustainable business in order to start implementing sustainability practices. The course focuses on understanding sustainability-driven changes in the global business landscape, what those changes mean for business fundamentals, and communicating and implementing sustainable business strategies and initiatives. [C / Heller]

DYNM 667: Building a Business Case for Sustainability

What are the systemic changes that an organization must undergo in order to become sustainable? We will examine the issues of sustainability using Peter Senge's work on learning organizations, the Swedish sustainability model, The Natural Step, and Russell Ackoff's idealized design as our frameworks for building a business case for sustainability within an organization or department. [C / Barstow]

DYNM 759: Sweden: Sustainable Development & The Natural Step

The focus of this seminar in Stockholm, Sweden is on The Natural Step framework for sustainable development. From a business perspective, The Natural Step framework enables corporations to intelligently and profitably, integrate environmental considerations into strategic decisions and daily operations. We will meet and work with members of the Natural Step Framework and explore how best to engage our own organizations and communities in adopting sustainable development policies and practices. [L / Barstow]

ECON 001: Introduction to Microeconomics

Introduction to economic analysis and its application. Theory of supply and demand, costs and revenues of the firm under perfect competition, monopoly and oligopoly, pricing of factors of production, income distribution, and theory of international trade. [A / Stein]

SCHOOL OF ARTS AND SCIENCES

EESC 095: Risk Communication and the Environment

Humans are particularly adept at modifying and shaping our environment, but with each advance in science, technology, and medicine comes an element of risk. The magnitude of this threat is often difficult to understand and communicate. This seminar will cover the risks we face on a daily basis, and why we accept some risks while rejecting others. [M / Osterhoudt]

ENVS 098: The Next Millennium: Would Technology Help Us Resolve the Environmental Dilemma?

Over the last century we have witnessed the dominance of man over nature. Now, at the beginning of a new millennium, questions and concerns about our actions and perceptions are being raised. Can today's technology and new knowledge about our environment and human nature assure our survival? How can we use the next hundred years to reconstruct and restore our future? [C / Bokreta / Santiago-Aviles]

ENVS 200: Introduction to Environmental Earth Science

This course aims to obtain a scientific understanding of the entire Earth system by describing its component parts (lithosphere, hydrosphere, atmosphere, biosphere) and their interactions, and describe how they have evolved, how they function, and how they may be expected to respond to human activity. The challenge of this field is to develop the capability to predict changes that will occur in the next decade to century, both naturally and in response to human activity. [C / Plante]

ENVS 204: Global Climate Change

Public perceptions and attitudes concerning the causes and importance of global warming have changed. We will explore the progress that has been made in understanding of the human and natural drivers of climate change, climate processes and attribution, and estimates of projected future climate change. We will assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation. [M / Horton / Marinov]

ENVS 301: Environmental Case Studies

A detailed, comprehensive investigation of selected environmental problems. Guest speakers from the government and industry will give their accounts of various environmental cases. Students will then present information on a case study of their choosing. [C / Calabria]

ENVS 312/ ENVS 640: Ocean-Atmosphere Dynamics and Implications for Future Climate Change

This course covers the fundamentals of atmosphere and ocean dynamics in the context of climate change in the 21st century. Large-scale atmospheric and oceanic circulation, the global energy balance, the global hydrological cycle will be covered, as well as fluid dynamics, hydrostatic law, buoyancy and convection, Hadley and Ferrel cells in the atmosphere, thermohaline circulation, Sverdrup ocean flow, and modes of climate variability. [B / Marinov]

SCHOOL OF ARTS AND SCIENCES

ENVS 325: Sustainable Goods / James Hagan

The study of sustainability has been identified as a critical issue for society and industry and is evolving to examine how society should conduct itself in order to survive. This issue impacts the consumer goods that we use in our lives, the processes involved to make these goods, and the raw materials that we extract to create these goods. The questions examined in this course are: Can these goods be made, obtained, and consumed in a fashion that allows our current quality of life to be maintained (or enhanced) for future generations? Can these processes be sustainable? *[Intern: Lauren Kaufmann]*

ENVS 400: Environmental Studies Seminar: Landscape Sustainability

Processes humans use to control their surrounding landscapes may exacerbate potential environmental problems and threaten landscape sustainability. Intended for a non-technical audience with an interest in sustainability within or outside the Earth and Environmental Science department, this course aims to inform future decision-makers on the importance of understanding underlying environmental processes before taking action. *[B/ Jerolmack]*

ENVS 400: Environmental Studies Seminar Estuary Sustainability

Estuaries form a transition zone between river and ocean environments and result in unique ecosystems. However, nearly half the population of the country lives within 100 miles of the coast, which results in unsafe drinking water, shellfish bed closures, harmful algal blooms, loss of habitat, and a host of human health and natural resource impacts. This course will explore the challenges that threaten our most important estuaries, and the realm of regulatory and voluntary-based solutions that are currently being offered as potential fixes. *[A / Pepino]*

ENVS 404/ HSOC 404: Urban Environments: Speaking About Lead in West Philadelphia

Lead poisoning can cause learning disabilities, impaired hearing, behavioral problems, and at very high levels, seizures, coma and even death. This course covers the epidemiology of lead poisoning, the pathways of exposure, and methods for community outreach and education. Penn students collaborate with middle school and high school teachers in West Philadelphia to engage middle school children in exercises that apply environmental research relating to lead poisoning to their homes and neighborhoods. *[A / Pepino]*

ENVS 408/ HSOC 408: Urban Environments: The Urban Asthma Epidemic

Asthma is a pediatric chronic disease is undergoing a dramatic and unexplained increase. In this class, students learn about the epidemiology of urban asthma, the debate about the its probable causes, and the nature and distribution of environmental factors that are potential triggers of asthma episodes. Penn students will collaborate with the Children's Hospital of Philadelphia (CHOP) on a clinical research study entitled the Community Asthma Prevention Program. Students will also co-teach asthma classes with CHOP parent educators. *[B / Pepino]*

ENVS 410: Clean Water - Green Cities

This course will provide an overview of civil engineering, environmental sciences, urban hydrology, landscape architecture, green building, public outreach and politics. It will discuss watershed health as a result of cumulative human practices and current water and land management practices and its problems, and how to manage this system in a sustainable manner. Topics discussed include drinking water quality and protection, green infrastructure, urban impacts of climate change, watershed monitoring, and public education. *[M / Neukrug]*

SCHOOL OF ARTS AND SCIENCES

ENVS 494 Toward Environmental Sustainability on Penn's Campus

This course will examine Penn's environmental footprint and what is being done to reduce that footprint. Students will document existing efforts, and benchmark against other universities. Topics explored and addressed include storm-water management, greenhouse gas inventories, green purchasing practices, LEED buildings, access to public transit, environmental management systems, pollution prevention, and life-cycle analysis. Students will develop ideas for further progress toward sustainability and present their proposals to the college President. [A / Garofalo]

ENVS 604/ ENVS 414: Conservation and Land Management

Using protected lands in the Delaware Valley, this field-based course will explore various strategies for open-space conservation and protection. Students will be introduced to land management techniques used to restore or preserve land trust properties in accordance with goals set for their use or protection. Sustainable land uses such as community supported agriculture, ecovillages, and permaculture design will be covered. Emphasis will be placed on developing skills to determine conservation and restoration priorities. [M / Harper]

ENVS 611: Environmental Law

This course will provide an introduction to environmental law and the legal process by which environmental laws are implemented and enforced. The course will examine the common law roots of environmental regulation, important Constitutional principles, significant environmental laws and approaches, and emerging theories of citizen's rights and the government's role in environmental law and regulation. Students will learn how to read and analyze court decisions and elements of legal thinking to actual cases and current problems. [B / Keene]

ENVS 612/ ENVS 412: Economics and the Environment

This course provides a comprehensive introduction to basic economic tools and methods as they are applied to environmental issues, including pollution control, resource depletion, the global commons, intergenerational equity, and policy decision-making. [M / Handy]

ENVS 613/ ENVS 413: Business and the Natural Environment

This course explores changes taking place at the interface of business, society, and the natural environment. We will look at corporations that are creating a "double bottom line" by strategizing about the ecological and economic impact of their decisions. We will learn about industrial designers who are rethinking everything from shoes to buildings with the environment in mind. We will consider new alliances among business, activists and regulators. [B / Heller]

ENVS 615: Professional Case Studies in Environmental Analysis and Management

This course will provide students with hands-on experience working with local environmental professionals on projects in the Delaware Valley region. [M / Laskowski]

SCHOOL OF ARTS AND SCIENCES

ENVS 616: Managing Environmental Risks in an Uncertain World

How do government policy-makers make decisions about potential threats to health and the environment in the face of uncertain scientific information? This course examines how public policy decisions regarding environmental risk are made and how effective those decisions are. It will also include an overview of the principles and methods used in evaluating human health and environmental risks; and how scientific uncertainty, risk perceptions, economics, public participation, special interests, and politics influence environmental policy decisions. [L / Chu]

ENVS 617: Innovative Environmental Management Strategies

This course will evaluate innovative environmental management strategies used by corporations, governments, the public, and NGOs including approaches such as the concept of pollution prevention, environmental management systems, green buildings, green product design, product labeling, environmental education, the power of information, market-based techniques, and industrial ecology. This course will address which approaches work best and identify critical elements needed to ensure the best approaches to specific problems. [M / Laskowski]

ENVS 620: How to Quantify Sustainable Practices in Business and Manufacturing

This course is designed to survey the various sustainability tools currently available to evaluate business performance. We will concentrate on the Triple Bottom line views of sustainability, Life Cycle Assessment, Environmental Product Declarations, ISO standards, and Green Construction, as well as US Green Building Council LEED requirements and expectations of retailers for environmental information with regard to consumer packaged goods. Special sessions will review the business drivers and market pull for sustainable products and practices. [B / Baer]

ENVS 622: Environmental Enforcement

This course is an introduction to the role of enforcement in federal, state and local environmental regulatory programs with emphasis on federal enforcement actions. The course will provide students with an introduction to the American Legal System and legal concepts, like standing, jurisdiction, and burden of proof. A major recurring theme will be of the role of the environmental professional in the enforcement context. [A / Lisa]

ENVS 623: Crossing Borders: Policy, Regulatory and Management Issues in Transboundary Environmental Protection

The goal of the course is to provide students with an introduction to the role of enforcement in federal, state and local environmental regulatory programs with an emphasis on federal enforcement actions. The course will provide students with an introduction to the American Legal System and legal concepts. A theme of all classes, presentations and assignments will be the role of the environmental professional in the enforcement context. [B / Feldman]

ENVS 625: Overview of Environmental Justice: Issues, Actions and Visions for the Future

Environmental Justice has become a critical and controversial issue in this country. Communities around the United States have increasingly expressed concerns related to the siting, permitting and cleanup of hazardous waste sites in minority and low-income areas. This course will provide an overview of the history, guiding principles, and issues of concern regarding Environmental Justice and will examine the approaches taken by communities, EPA, state and local government over the years to address these concerns. [B / Harris / Thompson]

SCHOOL OF ARTS AND SCIENCES

ENVS 627: The Delaware River: An Environmental Case Study

The Delaware River and Estuary offer an opportunity to examine efforts to protect the environment in a multi-state, economically and ecologically complex area. This course will review environmental protection efforts, the stressors on the environment, and attempts to balance environmental protection with economic, employment, and other needs. It will address scientific issues, relationships between air and water, transportation and sprawl issues, the balancing of water quality and quantity, the institutions responsible for managing this complex system, and what goals and indicators of progress are used by these organizations. [B / Collier]

ENVS 631/ ENVS 431: Current EPA Regulatory Practices and Future Directions

The regulatory approach continues to be the foundation of environmental protection in the US. This course provides an overview of key environmental laws and regulations, and the processes used to write permits, conduct inspections and take enforcement actions. Current issues in major regulatory programs will be reviewed and future directions will be discussed. [A / Laskowski]

ENVS 634: Closing the Loop on Climate Change

This course will explore opportunities to address the challenges of climate change through closed-loop approaches for materials and land. Alternative views of the drivers of climate changing and the relative contributions of various sectors of the U.S. economy will be presented. Implications of climate change, including costs of mitigation and adaptation, rising energy prices, land use and waste management issues, and local policies and actions will be discussed. The course will identify policy needs, and practical solutions for greenhouse gas reductions. [C / Chu]

ENVS 635: Major Global Environmental Problems of Today and How We Must Deal With Them Tomorrow

This course will provide an overview of the major global environmental problems facing the world today, how to best manage these problems, and how they are connected. It will examine the role of sustainability and globalization, frameworks for assessing and managing the issues, and the role of the major players/ stakeholders in the situation, and touch on such issues as intergenerational aspects and the potential long-term irreversibility. [B / Laskowski]

ENVS 637/ ENVS 437: Global Water Issues

Water-related illnesses are estimated by some to kill up to 5000 people per day worldwide and many of these casualties are children. This course will explore the causes of this global crisis and what is being done to address the issue. It will provide an overview of international agreements, wastewater and water supply issues, technological advances, political/financial/cultural and other barriers to success, and what students can do to become involved in resolving the issues. [A / Laskowski]

ENVS 638: Global Water Policy and Governance

At the turn of the century, the United Nations established Millennium Development Goals to assist developing countries with targets for water and sanitation: “by the year 2015 to reduce by one half the percent of the world’s population that does not have access to safe water and adequate sanitation.” This course explores the policies and actions being taken to meet these targets. It will address water governance issues such as financing, community leadership, and capacity building for water/sanitation in developing countries. [A / Laskowski]

SCHOOL OF ARTS AND SCIENCES

ENVS 639: Policy to Practical in Environmental Management: Water Issues

This course explores some of the most challenging national and global water-related topics, including the UN Millennium Development Goal of halving the number of people worldwide who do not have adequate drinking water and sanitation; the control of polluted runoff from farms and urban areas; the management of multi-state water pollution programs; and assessment of the impacts of low-level toxics in water. [C / Laskowski]

ENVS 647: Urban Ecology

Urban Ecology provides an examination of the ways humans and other animals interact in shared and contiguous environments. A focus of the course will be the impact of urbanization on our natural resources. Topics include historical and ethical perspectives of wildlife, general ecological principles, biodiversity and endangered species management, eco-tourism and environmental sustainability. [C / Bathala]

ENVS 652: God, Gold & Green: Themes and Classics in American Environmental Thought

Urban Ecology provides an examination of the ways humans and other animals interact in shared and contiguous environments. A focus of the course will be the impact of urbanization on our natural resources. Topics include historical and ethical perspectives of wildlife, general ecological principles, biodiversity and endangered species management, eco-tourism and environmental sustainability. [C / Blaine]

ENVS 656: Environmental Futures

As global population and affluence increases, the world is faced with severe environmental issues. Many studies have projected disastrous impacts on the environment, human health, and the economy, but how accurate are those projections? What needs to happen to make these projections more optimistic? Strategic planning, environmental indicators, pollution prevention, innovative technologies, and the importance of quality science will be addressed. [B / Laskowski]

ENVS 662: Green Design and the City

Can our cities become examples of sustainable design? Does inner city revitalization tie into sustainability? Are there successful examples? This seminar will focus on how existing cities attempt to integrate green design principles within them. Urban design and transportation, infill construction and adaptive reuse of existing buildings, the reuse of brownfield sites will be covered and types of construction that constitute green buildings will be discussed. [B / Berman]

ENVS 664: Sustainable Design

This seminar will focus on how physical design can improve sustainability. It will be broken down into: Green Buildings, Green Urbanism, and Smart Growth Planning. We will begin by looking at which types of construction actually constitute Green Buildings and which of these are the most effective. Our look at Green Urbanism will focus on existing cities and towns, covering how urban design and transportation can promote sustainability. Finally, Smart Growth planning concepts and a survey of New Urbanism will be discussed, including how these closely allied approaches are attempts to guide new growth in a more sensitive manner. [C / Berman]

SCHOOL OF ARTS AND SCIENCES

ENVS 674: Assessment and Remediation of the Environment Using Biological Organisms

This course is an introduction to current and emerging techniques for analyzing environmental contamination and remediation of damaged environments. This course is for students interested in policy/law, as well as those pursuing a more science-oriented field. The first portion of the course will address bioindicators--the use of living systems to assess environmental contamination. The second portion of the course will introduce techniques for bioremediation--the use of living organisms to restore contaminated environments. [M / Vann]

FOLK 575/ ENGL 584/ ENVS 575/ HSSC 575: Environmental Imaginaries

Behind public controversies over development, are an array of collectively wrought fictions that relate people to their material surroundings. How are these fictions produced, enacted, and materialized in such diverse sites as Appalachian strip mines, Sea World, nature walks and permit hearing? Moving from theories of world making, multiple realities, and aesthetic ecologies through ethnographic literature on culture and environment, this seminar will explore the production of environmental imaginaries access of modern genres and practices. [M / Hufford]

GEOL 096: Field Approaches to Understanding the Earth & Environmental Science

Understanding landscapes and the relationships between the natural world and society is fundamental to an exhaustive range of other disciplines. The goal of this course is to expose students to the science of reading landscapes and disciplines that are founded in observation and hypothesis testing in the field. Field trips will cover topics of plate tectonics, bedrock and surface geology, geomorphology, hydrology, environmental geology, pollution and field ecology. [A / Scatena]

GEOL 100: Introduction to Geology

An introduction to processes and forces that form the surface and the interior of the Earth. Topics include changes in climate, the history of life, as well as earth resources and their uses. [A / Omar]

GEOL 305/ GEOL 545: Earth Surface Processes

This course is a treatment of the processes of erosion and deposition that shape landscapes. Only simple physical principles are ultimately needed understanding landscape patterns including drainage networks, river channels and deltas, desert dunes, and submarine channels, reconstructing past environmental conditions using the sedimentary record, and the management of rivers and landscapes under present and future climate scenarios. [B / Jerolmack]

GEOL 418: Geochemistry

This course provides a comprehensive introduction to theory and applications of chemistry in the earth and environmental sciences. Theory covered will include nucleosynthesis, atomic structure, acid-base equilibrium, thermodynamics, oxidation reduction reactions. Applications will emphasize oceanography, atmospheric sciences and environmental chemistry, as well as other topics depending on the interests of the class. [M / Omar]

SCHOOL OF ARTS AND SCIENCES

GEOL 419: Coasts

This course examines the coasts of the world, how they have developed in the past, how they operate and are managed at present, and how they may in the future in the face of climate change. The challenge of coastal science is to develop the capability to predict changes that will occur in the next decade to century from external (e.g. hurricanes) and internal (e.g. sediment dynamics) processes. In this course, students will acquire hands-on experience through practical fieldwork and applied laboratory research methodology. [C / Horton]

GEOL 421: Elemental Cycling in Global Systems

Humans have an enormous impact on the global movement of chemical materials. Biogeochemistry has grown to be the principal scientific discipline to examine the flow of elements through the global earth systems and to examine human impacts on the global environment. This course will introduce and investigate processes and factors controlling the biogeochemical cycles of elements with and between the hydrosphere, lithosphere, atmosphere and biosphere. Students will apply principles learned in lectures by building simple computer-based biogeochemical models. [B / Plante]

GEOL 503: Earth Systems and Earth Hazards

This course will examine the hazards that arise from living on an active planet from a large-scale systems standpoint. We will briefly survey the Earth's major systems, emphasizing energy generation, storage, and flow within the Earth, and then proceed to an examination of the hazards that result. This will include earthquakes and tsunamis, volcanic eruptions, river and coastal flooding, and hurricanes, tornadoes, and other major storms. The course will touch briefly on global warming and other current topics. [B / Phipps]

GEOL 508: The Geology and Geography of Energy Resources

This course will survey the way geology controls the formation and location of energy resources. Questions we'll address include, How are oil and gas fields formed?, Why does the Middle East have so much oil?, What are the best locations in the US for wind and solar energy generation, and why. We will discuss hydrocarbon, nuclear, solar, wind, and tidal energy sources. [M / Phipps]

GEOL 515: Evolution/Revolution of Land Ecosystems

Origin and diversification of land ecosystems. Interaction between plants and animals. Effects of past climatic change and other external factors. The importance of past changes in land ecosystems to our understanding of current global change. [M / Dimichele / Wing]

GEOL 528: Aqueous Geochemistry

This course covers the chemical quality of surface and subsurface waters, both natural and polluted. The focus is on the chemistry of soil and groundwater. Topics covered include organic contaminants, adsorption, precipitation, oxidation-reduction, heavy metals, contaminant transport, and reaction modeling. [M / Andrews]

GEOL 618: Fundamentals of Air Pollution

This course covers aspects of air pollution at the local, regional and global levels. It focuses on the source, fate and transport of air pollutants, and the environmental and health effects of air pollutants. Additional issues covered include air quality criteria, and engineering controls. [C / Andrews]

SCHOOL OF ARTS AND SCIENCES

GEOL 631: Reconstructing Former Sea Levels

The Intergovernmental Panel on Climate Change (IPCC) recently re-emphasized the importance of sea level as a barometer of climate and drew attention to the potentially devastating consequences of future climate change. However, the IPCC also highlighted the uncertainty with which the driving mechanisms of recent sea-level change are understood, and the disconnect between long-term geological and recent observational trends. In this course we will begin to fill this important knowledge gap. [B / Horton]

GEOL 636: Quantitative Paleoclimatology

This course provides a comprehensive, rigorous survey of our knowledge of the Earth's climate system from ancient to modern. Topics to be covered will include geological evidence for past climate changes, with an emphasis on quantitative methods using geochemistry and geophysics; the basis of earth system modeling; statistical climatology; climate change detection; time-series analysis in climatology. [M / Staff]

GEOL 637: Recent Climate Change

Increases in "greenhouse gases" produced through human activity appear to be affecting the Earth's climate. This course will examine climate change over the last 500 years. We will examine the available instrumental records over this time period as well as proxy climate records such as ice core, tree ring, sediment cores, coral cores and others. [A / Staff]

GEOL 640: Environmental Investigations and Reporting

Practical applications in environmental and hydrological investigations including sampling techniques, evaluation and reporting of data, critical analysis and interpretation of results. Planning and implementing a site characterization and remedial investigation. Research and reporting on these environmental settings and the fate and transport of chemical parameters. [A / Sauder / Mastropaolo]

GEOL 652: Physical Geology for Environmental Professionals

Study of the genesis and properties of earth materials (minerals, rocks, soil, water); consideration of volcanic, erosional, glacial, and earthquake processes along with the characterization of the earth's deep interior crustal and near-surface structure. [A / Doheny]

GEOL 655: Engineering Geology

Engineering properties of earth materials; engineering testing, classification and use of earth materials; geologic and geophysical investigations and monitoring; geologic hazards; planning and use of the geologic environment. [B / Calabria]

GEOL 656: Fate and Transport of Pollutants

This course covers basic groundwater flow and solute transport modeling in one-, two- and three-dimensions. After first reviewing the principles of modeling, the student will gain hands-on experience by conducting simulations on the computer. [A / Mastropaolo]

GEOL 667: Landfill Design

Topics for this course include: landfill regulations (Federal/State); permitting; siting considerations; environmental assessment; geotechnical issues; hydrogeologic investigations; landfill component design (QA/QC); linear systems; leachate collection; final cover; gas control; monitoring; surface water management; and operational, closure, post-closure considerations. [C / Calabria]

SCHOOL OF ARTS AND SCIENCES

GRMN: Utopian Visions / Bethany Wiggin

From utopian literature beginning with Thomas More to the history of the environmental movement to early American utopian communities to today's various attempts at creating ecotopias, the ideologies that have arisen out of utopia thought and the improvement of the human condition are propelling the sustainability movement forward in more ways that may be initially apparent. This course will cover these connections between ideal and applied utopian visions. *[Intern: Tyler Hall]*

HSOC 003/ STSC 003: Technology and Society

This course surveys the ways technology has shaped societies and their relations with the natural world. We will examine the origins and impact of technical developments throughout human history. We will pay attention to the aesthetic, religious and mythical dimensions of technological change, the circumstances in which innovations emerge and their effect on social order, the environment and the ways humans understand themselves. *[B / Cowan / Ensmenger]*

HSOC 312/ STSC 312: Weapons of Mass Destruction

The course explores the historical development of traditional weapons of mass destruction, such as chemical, nuclear and biological agents, in addition to newer and seemingly non-traditional weapons such as land mines and civilian aircraft. Through case studies in technology and public health, students will evaluate the medical, scientific, environmental, and cultural ramifications of these weapons and their effect on human health and society by analyzing the rise of the military-industrial-academic-complex in twentieth century America. *[C / Lindee]*

HIST 137: Europeans & Environment

This course explores interactions between Europeans and the environment within and outside Europe, focusing on the past five centuries. Themes include ecological circulation, exchange, and transformation; ties between environmental management and political, economic, and social power; and globalization. Topics include: representations of nature; the role of "New World" products in shaping "European" cuisine and fashion; the relationship between European imperialism, resource extraction, and economic growth; and conflicts between political and ecological boundaries in debates over forests, pollution, and water management. *[C / Pritchard]*

HIST 209/ URBS 103: Industrial Metropolis

Although most U.S. cities are no longer thought of as industrial cities, metropolitan areas are all products of industrial economies, technologies, and social systems. This course explores the ways in which industrialization and deindustrialization have shaped North American cities over the past two centuries. Major themes include economic geography, ecology, labor and production, suburbanization, outsourcing, energy, and cities' place in the world economy. *[A / Vitiello]*

HSOC 179/ ENVS 179/ HIST 320/ STSC 179: Environmental History

Environmental history studies the interactions between humans and the natural world. This course explores this interaction through case studies and topics nationally and globally, such as energy, disease, human migration and settlement, animals, technological changes, urban and suburban development, conservation and politics. *[B / Greene]*

SCHOOL OF ARTS AND SCIENCES

HSSC 271/ ENVS 271: Law, Environment and Technology

This course will survey episodes in the history of the US that illustrate technology's central role in shaping environments. The course will consider environments, wilderness to city, and the uses of the law to mediate conflicts in those environments through negotiation of treaties; lobbying legislative bodies; influencing regulators to stiffen or weaken regulations; drawing police authorities into the fray; and seeking favorable rulings from the courts. *[M / Staff]*

HSSC 272/ ENVS 272: Energy in American History

Energy is at the center of many discussions of today's world. This course will examine changes in energy sources, use, and technologies across American history in order to help students understand how the U.S. and the world arrived at its present situation with regard to energy and to understand the complex technological, environmental, social, economic, and political challenges implicit in any effort to modify the current trajectories of energy use. *[M / Staff]*

LALS 233/ HIST 233: From Coca to Cocaine

This course compares coca leaf production in indigenous communities where coca cultivation has been sustained over long centuries on the one hand, with a set of patently unsustainable practices linked to the "drug war" in the Americas on the other. Participants will read scholarly work in history and anthropology and explore what historians and other scholars might contribute to discussions about legalization. *[B / Farnsworth]*

PHIL 079: Environmental Ethics

In this course we will investigate some of the ethical issues that arise from our relationship with the environment. We will supplement our discussions by considering how the latest scientific results affect environmental thinking and policy. Topics covered will include: human responsibilities toward the environment, how our responsibilities toward the environment relate to other ethical considerations, and whether non-human species and ecosystems have intrinsic value- what should conservationists conserve? *[M / Staff]*

PHYS 016: Energy, Oil, and Global Warming

Dependence on fossil fuels for energy has undesirable economic, environmental, and political consequences, and is likely to be our greatest challenge this century. We cover the physical principles of energy, its production, consumption, and consequences. We examine alternative modes of energy generation, their physical and technological aspects, and societal, environmental and economic impacts over the construction and operational lifetimes. *[C / Bernstein]*

PSCI 154: Politics of Global Environment

This course explores the emerging politics of global ecological decay and restoration occurring at the individual, local, nation state, and international levels. *[C / Staff]*

SOCI 007/ URBS 265/ GSWS 007: Population and Society

The course is an introduction to the study of population and demography, including fertility, mortality, migration, and family formation and structure. We will consider the social, economic, and political implications of current trends including: population explosion, baby bust, migration, population aging, race, diversity in household composition and family structure, environmental degradation, and the link between population and development/poverty. *[C / Staff]*

SCHOOL OF ARTS AND SCIENCES

URBS 225/ ARCH 255/ ENVS 255: Sustainability in Action

The term Sustainability loosely organizes a diverse mix of issues relating to the science, politics, and business of how humans can endure on Earth. Sustainability is about carrying capacity and the decisions that affect it. Ultimately, the study of Sustainability requires an introduction to environmental science, energy production, settlements, economic development, social justice, policy, and international relations, which this course will cover. [M / Hughes/ Billhymer]

URBS 290: Metropolitan Nature: Urban Sustainability

The course explores a variety of issues concerning nature's role in the contemporary urban world with a focus on urban sustainability. At its core, sustainability is a radical concept. Sustainability demands a systems view of both the economy and environment and understanding the management of their interactions. The course focuses on the ecological aspects of the emerging field of ecological economics fostering an understanding of the ecological principles of urban sustainability. [A / Nairn]

URBS 390: Urban Agriculture

Urban Agriculture is a growing global trend. This course examines urban agriculture as an issue of sustainability, social justice, public health, and vacant land. It explores the potential of urban agriculture in both the Global North and South to provide a safe and secure source of food to city residents. Major topics include sustainable agricultural practices, operational and spatial requirements, distribution systems, and access to fresh food. Philadelphia is used as a living laboratory to explore these topics. [L / Nairn]

URBS 417: Cities and Sustainability: Policies and Projects for Making Cities Greener

Cities and Sustainability endeavors to expose students to the methods of implementing environmentally sustainable policies in big cities across the United States. The course will begin with an overview of the various tools at the disposal of American municipalities, exploring the various ways that policies are adopted and then implemented. The course will also review sustainable development and transportation policy as well as agency management. This course is geared towards providing advocates with the tools they need to promote sustainable policies. [M / Ben-Amos]

URBS 463/ URBS 663/ ENVS 463 Brownfield Remediation: The Historical, Scientific, and Policy Dimensions of Brownfields in Old Industrial Cities

This course gives an overview of the genesis of brownfields and of the various efforts that our society is taking to try to solve, or at least ameliorate them. The course will cover the general constitutional and statutory framework within which we approach the problems of orphan, polluted sites and the disposal of contemporary solid wastes, and the principal actions that have been taken by federal and state governments to address remediation and redevelopment of these sites. [M / Keene]

SCHOOL OF DESIGN

ARCH 431/ 531: Construction I

This Course explores basic principles and concepts of architectural technology and describes the interrelated nature of structure, construction and environmental systems. [A / Trubiano]

ARCH 533: Environmental Systems I

An introduction to the influence of thermal and luminous phenomenon in the history and practice of architecture. Issues of climate, health and environmental sustainability are explored as they relate to architecture in its natural context. [A / Malkawi]

ARCH 534: Environmental Systems II

This course examines the environmental technologies of larger buildings, including heating, ventilating, air conditioning, lighting, and acoustics. Modern buildings are characterized by the use of these systems that not only have their own characteristics, but interact dynamically with one another, the building skin and occupants. Questions about building size, shape, and construction become more complex with the introduction of sophisticated feedback and control systems that radically alter their environmental behavior and resource consumption. [B / Braham]

ARCH 708: Environmental Design Laboratory

An intensive, 6-week design laboratory. The lab will build on the simulation and analysis techniques developed in the sequence of required course and electives to fully develop performance-based design of building projects. The location of the lab may be at Penn or abroad. [L / Staff]

ARCH 734: Dimensions of Sustainability

Building is an inherently exploitative act: we take resources from the earth and produce waste and pollution through construction and operation. We have an ethical responsibility to minimize these negative impacts. As creative professionals, we have a unique ability to go farther than simply being “less bad.” We can learn to imagine designs that heal the damage and regenerate our environment. This course explores the evolving approaches to ecological design - from neo-indigenous to eco-tech to LEED to biomimicry to living buildings. [B / Martin]

ARCH 751: Ecology, Technology, and Design

This course will examine the ecological nature of design at a range of scales, from the most intimate aspects of product design to the largest infrastructures, from the use of water in bathroom to the flow of traffic on the highway. The immediate goal of the course will be to identify useful and characteristic modes of analyzing the systematic, ecological nature of design work, from the concept of the ecological footprint to market share. [A / Braham]

ARCH 752: Integrated Building Design

The interrelationships of environmental control systems will be explored by means of building type studies. Innovative systems will be emphasized. Projects such as residential, educational and commercial buildings, office and assembly buildings, and facilities for research and manufacturing will be analyzed in details. The Operational characteristics of buildings will be studied with regard to occupancies and their needs. The relationship between energy conservation and the principles of initial building cost versus life cycle costs will be discussed. [B / Malkawi]

SCHOOL OF DESIGN

ARCH 753: Building Performance Simulation

The course provides students with an understanding of building design simulation methods, hands-on experience in using computer simulation models, and exploration of the technologies, underlying principles, and potential applications of simulation tools in architecture. Students gain hands-on experience using computer models. [A / Malkawi]

ARCH 754: Performance Design Workshop

The workshop applies simulation techniques developed in Building Performance Simulation and diagramming techniques developed in ecology, technology and design to a series of discrete design projects at different scales. The emphasis is on refinement and optimization of performance based design. [B / Yi]

CPLN 530: Introduction to Land Use Planning

Overview of the methods and tools for managing land use and shaping the built environment. Explores principles of successful plan creation emanating from theory and case studies. [A / Daniels]

CPLN 531: Introduction to Environmental Planning & Policy

Overview of national programs for protecting the environment, managing natural resource areas, preserving biodiversity, and remediating brownfields, in an overall framework based on sustainability. Covers basic principles of geology, hydrology, limnology, and climatology, Oregon's Land Use Transportation Air Quality (LUTRAQ) connection, environmental impact assessment, environmental justices. [A / Daniels]

CPLN 550: Introduction to Transportation Planning

Exploration of the technological and design aspects of urban transportation systems including discussion of land use patterns, facilities operations, congestion, and environmental issues. Highlights current policy debates revolving around mobility issues, federal and state legislation, and metropolitan organization responsibilities. [A / Weinberger]

CPLN 622: Community Development and Public Health

This course covers how the built environment affects public health, and how a renewed union between public health and city planning issues can improve communities' health. [B / Hillier]

CPLN 631: Planning for Land Conservation

An introduction to the tools and methods for preserving private lands. Emphasis is on land preservation in growth management strategies. [B / Daniels]

CPLN 641: Progressive Development

Using a case study approach, this course will teach students how to plan, develop, and finance a variety of progressive real estate development forms including affordable, senior, and workforce housing; transit-oriented development; urban mixed-use development; green and LEED certified office, retail, and housing projects; sustainable master-planned communities; and public-private partnerships. [B / Landis]

CPLN 675: Land Use and Environmental Modeling

This course will introduce students to various computerized and GIS-based land use and environmental planning models, including: CURBA, SLEUTH, and UrbanSim; Basins; CommunityViz and IndexPlanBuilder; and VISUM (transport model). [B / Landis]

SCHOOL OF DESIGN

CPLN 677: Land Conservation Finance

This course examines how private, non-profit land trusts and state, federal, and local governments can pay for conservation easements and land acquisition in order to protect valuable resources and manage growth. Topics include: purchase of conservation easements and land, taxes, funding referenda, sale of bonds, borrowing funds from banks, fund raising, foundation grants, installment purchase agreements, like-kind exchanges, bargain sales, and purchase and resale of land. [A / Staff]

CPLN 730: Urban Sustainability Planning

This course will introduce students to cutting edge ideas and current best practices in the area of urban sustainability policy and implementation. Topics to be covered include urban greening; water and wastewater conservation; energy conservation; travel reduction; heat island reduction; waste reduction; and climate change mitigation. [B / Hsu]

HSPV 538: Fundamentals of the American Landscape

The course presents the history of common American landscapes and surveys of the field of cultural landscape studies. The cultural-landscape perspective is a unique lens for understanding holistically the historical evolution of the built environment and the abstract economic, political and social processes that shape the places where most Americans spend most of their time. The course will focus on the forces and patterns behind the shaping of recognizably “American” landscapes, whether urban, suburban, or rural. [M / Mason]

HSPV 556: Documentation and Conservation of the Historic Landscape

“Landscape conservation” is a growing concern in contemporary preservation circles. It is a multi-faceted issue, drawing on the fields of landscape architecture, horticulture, architectural history, regional planning, and archaeology. This course aims to provide a comprehensive overview, a look at the state-of-the-art, including philosophical issues, attempts at international and national guidelines, evaluative/survey systems, technical investigation techniques, and selected case studies. Students will be asked to analyze and develop a preliminary conservation plan for a selected site in the Philadelphia area. [M / Staff]

HSPV 572: Preservation Through Public Policy

An exploration of the intersection between historic preservation, design, and public policy. That exploration is based on the recognition that a network of law and policy at the federal, state and local level has profound impact on the ability to manage cultural resources, and that the pieces of that network, while interconnecting, are not necessarily mutually supportive. The fundamental assumption of the course is that the preservation professional must understand the capabilities and deficiencies of this network in order to be effective. The course will look at a range of relevant and exemplary laws and policies existing at all levels of government, examining them through case studies and field exercises. [B / Hollenberg]

LARP 501/ 502/ 601/ 602/ 701/ 702: STUDIO I-VI

These semester-long, intense studios cover a variety of issues and fundamentals of landscape architecture. Topics, professors, and locations vary by year and project. [Staff]

LARP 511/ 512/ 611/ 612: WORKSHOP I-IV

These semester-long, intense workshops cover a variety of issues in landscape architecture. Topics include ecology and materials, landform and planting design, site engineering and water management, and advanced landscape construction. [Staff]

SCHOOL OF DESIGN

LARP 535: Theory I: Case Studies in Landscape Architecture

Students will acquire familiarity with major episodes of landscape architecture through a study of selected key sites and their designers, and to understand the historical contexts for their creation and continuing interpretation; and to advance the profession of landscape design by a critical understanding of built works from different times and cultures. [A / Giannetto]

LARP 540: Theory II: Topics in Contemporary Landscape Architecture

This course builds upon Theory I by focusing upon recent, contemporary built works, their designers, and the issues that these raise for professional theory and practice today. It also addresses the topic of how we talk about - how we criticize recent built work: what criteria do we invoke, what modes of description can we adopt, and what kind of commentary or conclusions are we concerned to elaborate as a result? [B / Giannetto]

LARP 750: Topics in Construction, Horticulture and Planting Design

This course explores varies in topic from semester to semester and explores relevant topics in construction, horticulture and planting design as they relate to contemporary landscape architecture. Topics have included Building New Urban Landscapes, Urban Horticulture, Designing and Managing Landscape Plantings in Stressful Environments, and Sustainable Large Scale Planting of Trees, Shrubs, Perennials and Grasses. [C / Staff]

LARP 760: Topics in Ecological Design

This course explores topics in ecological design and new technologies as they relate to contemporary landscape architecture. The course explores topics such as ecology, sustainability, habitat restoration, hydrology, green roof and green architecture technology, land reclamation, ecological restoration in urban areas, soil technology, and other construction techniques of ecologically dynamic, functioning landscapes. [C / Staff]

LARP 770/ COML 776/ ITAL 371/ LARP 370: Topics in Landscape Architecture History and Theory

This course explores central issues in the history and theory of landscape architecture from the Renaissance to the present day. The focus will be upon the cultural context of built works, their relation to conceptual writings and the dialogue between modern professional practice and historical example and method. Topics have included The Role of History in Contemporary Landscape Architecture; Understanding Venice; Sculpture Parks and Sculpture in Parks; Open Spaces & Open Places; Reception, or the After Life of Landscapes; French Landscape Architecture; and Picturesque as Modernism. [C / Hunt / Giannetto]

LARP 780/ ARCH 411 / ARCH 711 / CPLN 673: Topics in Theory and Design

This course explores advanced ideas in contemporary landscape architectural design and theory. A special link is made between the analysis of built work and text to design practice and the making of projects. Topics have included Contemporary European Landscape Architecture; Active Time in Cinema and Landscape; Metropolitan Landscapes: Design, Leisure, and Regeneration; Nature, Society and Cities; Land, Art and Criticism; Organizational Ecologies: Emergent Forms and Practices in Complex Landscapes; Surrealism and Nature; and Strategies for Building City Landscape. [C / Staff]

SCHOOL OF ENGINEERING

CBE 375: Engineering and the Environment

The principles of green design, life cycle analysis, industrial ecology, pollution prevention and waste minimization, and sustainable development are introduced as a means to identify and solve a variety of emerging environmental problems. Case studies are used to assess the problems and devise rational solutions to minimize environmental consequences. [B / Sheih]

CBE 543/ ESE 560: Sustainable Development/Water Resource Systems

The application of systems methodology to the design of water supply and sanitation projects. The focus is on the designing for sustainability by emphasizing how technical solutions fit within the appropriate social context. [B / Sauder]

CBE 545: Electrochemical Energy Conversion and Storage

Fuel cells, electrolysis cells, and batteries are all electrochemical devices for the interconversion between chemical and electrical energy. These devices have inherently high efficiencies and are playing increasingly important roles in both large and small-scale electrical power generation, transportation, and energy storage. This course will cover the basic electrochemistry and materials science that is needed in order to understand the operation of these devices, their principles of operation, and how they are used in modern applications. [C / Vohs]

EAS 250: Energy Systems, Resources and Technology

The course will present an overview of the global demand for energy, and the resource availability and technology used in its current and future supply. The course will cover how that energy is supplied, the anticipated global growth in energy demand, the resource availability and the role of science and technology in meeting that demand in a world concerned about climate change. The roles of conservation, improved efficiency and renewable energy in meeting future demand in a sustainable, environmentally benign way will be covered. [C / Jackson]

EAS 301/ EAS 505: Climate Policy and Technology

The course will exam Pacala and Socolow's hypothesis that "Humanity already possesses the fundamental scientific, technical and industrial know-how to solve the carbon and climate problem for the next half-century." Fifteen "climate stabilization wedges" i.e., strategies that each have the potential to reduce carbon emissions by 1 billion tons per year by 2054, will be examined in detail. Technology and economics will be reviewed. Socio-political barriers to mass-scale implementation will be discussed. [C / Huemmler]

EAS 306/ EAS 506: Electricity and Systems Markets

The course discusses the existing electricity system from technical, economic, and policy perspectives. Basic power system engineering will be reviewed early in the course. Generation, transmission, distribution, and end-use technologies and economics will be discussed. Additional topics will include system operation, industry organization, government regulation, the evolution of power markets, environmental policy, and emerging technologies. [C / Staff]

SCHOOL OF ENGINEERING

EAS 401/ EAS 501: Energy and Its Impacts: Technology, Ecology, Economics, Sustainability

This course introduces the broad concept of energy, and spans basic principles and applications. A review of energy consumption, use, and resources; ecological impacts, sustainability and design of sustainable energy systems; methods of energy analysis; forecasting; electricity generation systems, energy for transportation; nuclear energy and wastes; renewable energy use; prospects for future energy systems: fusion power, power generation in space. [A / Lior]

EAS 402/ EAS 502: Renewable Energy and Its Impacts

This course introduces major aspects of renewable energy, its foundations in technology, association to economics, and impacts on ecology and society, and spans basic principles and applications. A review of solar, wind, biomass, hydroelectric, geothermal energy, and prospects for future energy systems such as renewable power generation in space are covered. [B / Lior]

EAS 403/ EAS 503: Energy Systems and Policy

This course introduces the major aspects of renewable energy, with its foundations in technology, association to economics, and impacts on ecology and society, and spans from basic principles to applications. A review of solar, wind, biomass, hydroelectric, geothermal energy, and prospects for future energy systems such as renewable power generation in space are covered. [C / Huemmler]

ESE 400: Engineering Economics

This course investigates methods of economic analysis for decision making among alternative courses of action in engineering applications. Topics include: cost-driven design economics, break-even analysis, money-time relationships, rates of return, cost estimation, depreciation and taxes, foreign exchange rates, life cycle analysis, benefit-cost ratios, risk analysis, capital financing and allocation, and financial statement analysis. Case studies apply these topics to actual engineering problems. [C]

ESE 360/ CBE 375: Introduction to Environmental Systems

The principles of green design, life cycle analysis, industrial ecology, pollution prevention and waste minimization, and sustainable development are introduced to engineers of all disciplines as a means to identify and solve a variety of emerging environmental problems. Case studies are used to assess the problems and devise rational solutions to minimize environmental consequences. [B / Staff]

ESE 521: The Physics of Solid State Energy Devices

This course covers fundamental physical principles underlying the operation of traditional semiconducting electronic and optoelectronic devices and extends these concepts to nanoscale electronic and optoelectronic devices. The course builds on the physics of solid state semiconductor devices to develop the operation and application of semiconductors and their devices in energy conversion devices such as solar photovoltaics, thermophotovoltaics, and thermoelectrics. [M / Kagan]

MEAM 502: Energy Engineering

Quantitative introduction to the broad area of energy engineering, from basic principles to applications. The focus is on the science and engineering of power generation. The course includes a review of energy resources and consumption, power cycles, combined cycles, and co-generation, nuclear energy and wastes, solar thermal and photovoltaic energy, and wind power. Additional energy conversion topics including energy storage and geothermal, thermoelectric, hydroelectric and biomass power will be briefly discussed. [A / Lukes]

SCHOOL OF ENGINEERING

MEAM 504: Enhancing Sustainability Through Tribology

The course will cover both theoretical and practical tribology, the science and technology of interacting surfaces in relative motion, including various modes of lubrication, hydrodynamic, elasto-hydradynamic, hydrostatic, mixed, solid and dry, leading to an understanding of friction and various modes of wear. At each stage, the tribological principles learned will be connected to how to improve the efficiency and durability of mechanical equipment and thereby enhance sustainability through energy and materials conservation. [C / Jackson]

MSE 545: Materials for Energy Storage and Generation

This course provides an understanding of the major materials issues for current and emerging energy technologies. It includes a classification of materials for energy applications involving generation, transmission and storage of electricity; current and future uses of fossil fuels, with emphasis on higher efficiency uses of fossil fuels and “all electric” applications (e.g. transportation and power generation) and new materials as technology enablers for future energy sources: nuclear, fuel cells, solar, wind. [A / Murray]

ANNENBERG SCHOOL FOR COMMUNICATION

COMM 123: Critical Approaches to Popular Culture

Popular culture has been dismissed as “just entertainment” and condemned as propaganda. This course considers these critiques, as well as the idea that popular culture offers valuable material for the study of social life. We will consider the meaning and impact of popular culture; who makes distinctions between high, middlebrow, and low or mass culture; and how power and resistance structure the production and consumption of popular texts. This years’ class includes new content on the practice an implications of American consumerism. [A / Paxton]

COMM 385: Media and Social Change

For disenfranchised communities, and advocacy workers, the media represent an enormously powerful tool for propelling messages forward and changing hearts and minds. This course will look at the intersection of two notions: that media have a social responsibility and that media activism represents a powerful way to hold the media accountable to that responsibility. Done effectively, this work can effect real and significant social change. We will examine efforts by the African American, LGBT, women’s communities and the environmental movement. [A / Garry]

SCHOOL OF EDUCATION

EDUC 503: Global Citizenship

This course examines the possibilities and limitations of conceiving of and realizing citizenship on a global scale. The course compares global/local dynamics that emerge across different types of efforts, including: educational development; human rights; humanitarian aid; free trade; micro-finance initiatives; and the global environmental movement. The course will explore research and theoretical work related to global citizenship, social engagement, and international development; and discuss ethical and practical issues that emerge in the local contexts where development initiatives are implemented. [B / Hall]

EDUC 605: Sustainability in Schools

This course looks at the issue of sustainability across financial, operational and programmatic dimensions. Schools need to manage funding sources and expenditures and raise supplemental dollars to underwrite aspects of the mission of the school; integrate sustainability into their operations, such as incorporating sustainability practices into goals and decision-making and goals; and review and incorporate new research and models of educating children about environmental sustainability. The course utilizes the conceptual framework for sustainability developed by the National Association of Independent Schools. [B / Ball]

EDUC: Educating for Sustainability / Elizabeth MacKenzie

As the urgency of creating a more sustainable society becomes increasingly apparent, we must explore ways to educate students at every level (K-8, 9-12, and beyond) on the rationale, the philosophy, and the process of creating sustainable systems in all fields and every subject. This course will give students the opportunity to engage in an Academically-Based Community Service course while linking them with graduate students participating in sustainability education internships at the Huey School in West Philadelphia. [Intern: Tyler Hall]

LAW SCHOOL

LAW 634: Environmental Law

This course focuses on the substance and process of environmental law in the US. Students will become familiar with the basic structure of federal environmental law and regulation to prepare them for legal counseling and advocacy, as well as to be able to engage in policy evaluation and design of environmental law. The course will cover key federal environmental statutes and selected EPA regulations and will focus on the major legal and policy issues underlying environmental statutes, as well as legal methods of statutory interpretation. [B / Orts / first year]

LAW 695: Land Use Law

This course covers land use law, its theoretical basis, its effects of such regulation, and the practicalities of land use and development within the legal framework. Major issues examined are: zoning, the constitutional constraints on land use regulation, and the establishment and enforcement of subdivision and land development controls, including exclusionary zoning, environmental justice, smart growth, and historic preservation. [B / Witt / upper level]

LAW SCHOOL

LAW 777: Environmental Lawyering

In this course, students will learn substantive environmental law and practical lawyering. Using case studies and simulations throughout the semester, students will be asked to role-play as environmental attorneys in, among other things: acquiring, financing and selling a business with potential environmental concerns; negotiating with the federal EPA regarding a client's non-compliance with environmental laws; litigating a toxic tort matter; pursuing and defending a citizens' environmental suit; and wrestling with ethical issues. [A / Fox / upper level]

LAW 790: International Environmental Law

The course will focus on the development of international law, institutions, and regimes that respond to international environmental problems. Topics include transboundary air pollution, ozone depletion, climate change, whaling, and fisheries conservation. The course will start with introductions to economic and ethical issues in environmental law, then move to the sources of public international law, and the problem of making that law effective, and how international trade law and institutions affect efforts to protect the environment. [B / Chang / upper level]

LAW 871: Externship: Delaware Riverkeeper

The Delaware Riverkeeper Network (DRN) is a nonprofit committed to restoring the Delaware watershed's natural balance where it has been lost and ensuring its preservation where it still exists. DRN has an active legal clinic that uses environmental laws to enforce legal protections of our waterways and educate law students interested in environmental and public interest law. The extern will take an active role in all aspects of the daily litigation practice at DRN, including case development, research and drafting, court appearances, depositions and discovery, meetings and coordination with other attorneys and advocates. [B]

SCHOOL OF MEDICINE

PUBH 503: Environmental & Occupational Health

This course will provide an introduction to the scientific basis of occupational and environmental health. Content will address issues in the ambient, occupational and global environments as well as tools, concepts and methods used in environmental health. [A/ Emmett]

PUBH 517: Epidemiologic Study of Geography and Health

Geography and physical and social environments have profound effects on public health. Through this class, students will gain a conceptual understanding of: (1) how geography and health are related; (2) how the public health toolbox, including geographic information systems (GIS), can be used to study the places people live, work, and play and how these places either add to or detract from their health through the a multidisciplinary lens of public health, epidemiology, medicine, city planning, and the social sciences. [B/ Branas / Wiebe]

SCHOOL OF MEDICINE



PUBH 530/ NURS 677: Environmental Toxicology: Risk Assessment and Health Effects

This course presents general principals of toxicology and the disposition of toxins in the body. Case studies of the effects of environmental and occupational toxins on individuals will be analyzed. This course is designed for students who desire a strong foundation in toxicological concepts and principals and provides an overview of major toxins in our environment and their association with human health.

SCHOOL OF NURSING



NURS 570/ PUBH 500: Introduction to Public Health

This course will provide a foundational overview of the field of public health and grounding in the public health paradigm. Content will include the history of public health, an introduction to the basic public health sciences including behavioral and social sciences, biostatistics, epidemiology, environmental public health, policy and management and prevention of chronic and infectious diseases and injuries, future directions for public health and an introduction to issues in international health, ethics, context analysis (specifically the notion of urban health), health promotion and disease prevention paradigms. [A / *Buttenheim / Nguyen*]

SCHOOL OF SOCIAL POLICY AND PRACTICE



NPLD 787: Leadership for the New Economy

Recent events have shown that established leadership models need to be revitalized, with competencies centered on building green technologies, creating sustainable energy, preserving the sanctity of water, fostering environmental-friendly policies, and constructing an economics predicated on principles of abundance rather than scarcity. Key topics include decision-making under conditions of uncertainty, building meaningful authority systems, using power creatively, harnessing the latent potential contained within conflicts and partnering with competitors and adversaries. [A / *Staff*]

SCHOOL OF VETERINARY MEDICINE

The Penn School of Veterinary Medicine offers classes related to sustainability, including animal health economics, epidemiology, public health and food production systems. These classes are only open to students currently enrolled at Penn as candidates for the Doctor of Veterinary Medicine (VMD) degree.

Animal Production Systems

This course provides an overview of: (i) management and operational basics of food animal production systems (dairy, beef, swine, poultry, and aquaculture), and (ii) contemporary issues concerning current practice and sustainable future of animal production systems, e.g., food safety & biosecurity, antibiotics & antimicrobial resistance, nutrient management & environmental regulations, and animal welfare & public concerns.

Catastrophic Epidemic Infectious Disease in Animals

Students who complete this course will: 1) Understand that large scale epidemics in domestic (and wild) animals have serious consequences for human health; and 2) appreciate that the consequences of large scale epidemics in domestic (and wild) animals are multiple and pervasive. Disease case studies illustrate, among other things, the range of available disease control strategies and how the actual choice of strategy often has more to do with the demands of society (eg trade, legal issues, animal welfare considerations, political expediency) than science.

Exotoxicology for Veterinarians

This course introduces vet students to ecotoxicology, the science of assessing the effects of toxic substances on ecosystems with the goal of protecting those ecosystems. The course will showcase various aspects of ecotoxicology, such as measuring the effects of pollutants on ecosystems, wildlife serving as monitors of environmental quality, important environmental pollutants such as insecticides, petroleum hydrocarbons and metals, and approaches to rehabilitating damaged ecosystems.

Emerging and Exotic Diseases

This internet-based course is offered through the Association of American Veterinary Medical Colleges through the Center for Food Security and Public Health at Iowa State University. The ability of a veterinarian to suspect and assist in the diagnosis of a foreign animal disease in livestock or companion animals is crucial to safeguarding America's animals and agricultural sector, maintaining food security, and protecting public health. The course also aims to convey a more comprehensive understanding of the role of accredited veterinarians in world agriculture.

Introduction to Poultry, Swine, and Dairy Medicine

This course will cover clinical problem solving for disease diagnosis, treatment and control. In addition, current topics of interest in food animal medicine will be discussed. These include food safety, regulatory medicine, environmental impact, welfare issues and opportunities for food animal veterinarians.

Veterinary Medicine Global Health and Food Security

This course focuses on the diversity of needs and expanding horizons for veterinary medicine in the developing world and will serve to introduce the scope and nature of issues in veterinary public health. Students will be evaluated based on attendance, participation, group exercises and required readings.

WHARTON SCHOOL OF BUSINESS



BEPP 206/ 772/ REAL 206/ 772/ 972: Urban Public Policy and Private Economic Development

This course considers interactions between real estate developers and government and how government policies are used to influence and respond to private activity. As a main case study, we will consider growth controls to deal with urban sprawl, considering what is meant by urban sprawl, why it is considered a problem, by whom, why growth controls are considered a solution to the problem, the possible effects of growth controls on various groups, and the views of developers about both urban sprawl and growth controls. [C / Pack]



BEPP 261/ 761/ 961/ ESE 567/ OPIM 261/ 761: Risk Analysis and Environmental Management

This course introduces students to the complexities of making decisions about threats to human health and the environment. The course explores the role of techniques such as decision analysis, cost benefit analysis, risk assessment and risk perception, we will examine tools such as risk communication, incentive systems, third party inspection, insurance and regulation, and will look at the interactions between analysis, perceptions, and communication. [M / Kunreuther]



BEPP 262: Environmental and Energy Economics and Policy

This course examines environmental and energy issues from an economist's perspective. Topics include analyzing sources of environmental problems and policy intervention; the economic rationale for policies such as environmental taxes, subsidies, and cap-and-trade; and environmental economics such as externalities, valuation of the environment, and cost-benefit analyses. Additional topics include energy and natural resource economics, specifically scarcity pricing and market power in electricity and gasoline markets; the economics of renewable energy and policies to foster its growth; and transportation sector policies such as fuel-economy standards and subsidies for green vehicles. [/ Benthem]



BEPP 305: Risk Management

This course explores how individuals and firms assess and evaluate risk, the tools available to successfully manage risk, and real-world frictions that limit the amount of risk-sharing in the economy. We focus on pure risks that are relevant for individuals and firms, such as mortality and health-related expenses, property damage, product liability, and employee benefits. The course examines a common set of techniques that can be used by individuals and managers in dealing with risk, including risk assumption, prevention, diversification, and transfer via insurance and noninsurance market mechanisms. Our focus is primarily on explaining the products and institutions that we see in the world, which will prepare students for making decisions in their future careers and lives. [C / Gottlieb / Nini / Song]



MKTG 233/ 733: The Social Impact of Marketing

This course explores the ways in which the marketing actions of firms can have an impact on society. Of particular interest are how the consideration of social issues can be integrated into broader marketing strategies and how companies, pro-social organizations, and government agencies can develop joint strategies and credible metrics and reporting practices for assessing social impact, including impact on the environment, health and well-being, culture, and poverty and economic development. [C / Hutchinson]

LGST 215/ 815/ MGMT 213/ 713: Environmental Management: Law & Policy

This course provides an introduction to environmental management with a focus on law and policy as a basic framework. The primary aim of the course is to give students a deeper practical sense of the important relationship between business and the natural environment and to think critically about how best to manage this relationship. [C / Orts]

LGST 220/ 820: International Business Ethics

This course is a multidisciplinary, interactive study of business ethics within a global economy. A central aim of the course is to enable students to develop a framework to address ethical challenges as they arise within and across different countries. Alternative theories about acting ethically in global environments are presented, and critical current issues are introduced and analyzed. [C / Hsieh / Radin]

OPIM 762: Environmental Sustainability and Value Creation

This course approaches environmental issues and sustainable development from the standpoint of business. It emphasizes trends in corporate practices and uses case studies to examine the interactions between the environment and the firm. Value creation focuses on new innovative services and financial products in this fast growing sphere. This course has three objectives: to increase your knowledge as future top decision makers on key environmental questions; to recognize environmental concerns as competitive opportunities; to teach students to think strategically and act entrepreneurially on environmental issues. [C / Staff]