

Requirements for the Interdisciplinary Minor in Sustainability

The minor in Sustainability may be earned by completing a total of 15 credits including two required courses and nine elective credits from an approved list. Of the nine elective credits at least six credits must be at the 300 level or higher. The minor must include at least 9 credits that are not used to meet any other department, college, or university requirement. Courses taken for a minor may not be taken on a pass-not pass basis.

Required courses:

T SC 220 Globalization and Sustainability. (Cross-listed with ANTHR, ENV S, GLOBE, MAT E, M E, SOC.) (3-0) Cr. 3. An introduction to understanding the key global issues in sustainability. Focuses on interconnected roles of energy, materials, human resources, economics, and technology in building and maintaining sustainable systems. Applications discussed will include challenges in both the developed and developing world and will examine the role of technology in a resource-constrained world.

Graduation Messages: Cannot be used for technical elective credit in any engineering department.

ANTHR 230. Globalization and the Human Condition. (3-0) Cr. 3. An introduction to understanding key global issues in the contemporary world. Focuses on social relations, cultural practices and political-economic linkages among Africa, the Americas, Asia, Europe and the Pacific.

Depending on interests, students may chose to focus the upper division courses in a particular major or track in order to prepare for more specialized work in a given area, or to select courses from a broad range of fields, preparing them to be effective members of interdisciplinary teams addressing sustainability problems.

Some Example Minor Programs

Emphasis	Required	Required	Elective 1	Elective 2	Elective 3
Agriculture 1	T SC 220	ANTHR 230	GEOL 160	AGRON 342	AGRON 450
Agriculture 2	T SC 220	ANTHR 230	NREM 120	ENV S 324	BIOL 355
Planning	T SC 220	ANTHR 230	C R P 425	C R P 484	Dsn S 491
Ecology 1	T SC 220	ANTHR 230	Biol 355	Biol 471	Biol 484
Ecology 2	T SC 220	ANTHR 230	Agron 120	NREM 452	NREM 471
Earth Science	T SC 220	ANTHR 230	Geol 101	Geol 324	Env S 334
Engineering	T SC 220	ANTHR 230	ME 388	ME 389	ME 433
Design	T SC 220	ANTHR 230	Arch 245	L A 302	C R P 417
Environment	T SC 220	ANTHR 230	Env S 324	EnSci 381	EnSci 382
Humanities	T SC 220	ANTHR 230	Env S 334	Engl 355	Soc 382
T SC	T SC 220	ANTHR 230	ENV S 324	T SC 341	T SC 343
Social Science I	T SC 220	ANTHR 230	Econ 380	Econ 385	Soc 411
Social Science II	T SC 220	ANTHR 230	Soc 345	Soc 382	Anthr 336

These are just example programs, any 15 credits satisfying the stated requirements are acceptable.

Elective Courses Approved for the Minor in Sustainability

Agricultural Engineering

A E 388. Sustainable Engineering and International Development. (Cross-listed with C E, E E, M E, MAT E.) (2-2) Cr. 3. F. *Prereq: Junior classification in engineering.* Multi-disciplinary approach to sustainable engineering and international development, sustainable development, appropriate design and engineering, feasibility analysis, international aid, business development, philosophy and politics of technology, and ethics in engineering. Engineering-based projects from problem formulation through implementation. Interactions with partner community organizations or international partners such as nongovernment organizations (NGOs). Course readings, final project/design report.

Major Teaching Department: C E

Agronomy

AGRON 120. Introduction to Renewable Resources. (Cross-listed with ENV S, NREM.) (3-0) Cr. 3. F.S. Overview of soil, water, plants, and animals as renewable natural resources in an ecosystem context. History and organization of resource management. Concepts of integrated resource management.

Major Teaching Department: NREM

AGRON 160. Water Resources of the World. (Cross-listed with GEOL, MTEOR, ENV S.) (3-0) Cr. 3. S. Study of the occurrence, history, development, and management of world water resources. Basic hydrologic principles including climate, surface water, groundwater, and water quality. Historical and current perspectives on water policy, use, and the role of water in society and the environment.

Major Teaching Department: GEOL

AGRON 325. Biorenewable Systems. (Cross-listed with A E, AN S, BSE, BUSAD, ECON, TSM.) (3-0) Cr. 3. F. *Prereq: Econ 101, Chem 163 or higher, Math 140 or higher.* Converting biorenewable resources into bioenergy and biobased products. Biorenewable concepts as they relate to drivers of change, feedstock production, processes, products, co-products, economics, and transportation/logistics.

Major Teaching Department: TSM

AGRON 342. World Food Issues: Past and Present. (Cross-listed with ENV S, FS HN, T SC.) (3-0) Cr. 3. F.S. *Prereq: Junior classification.* Zdorkowski, Ford. Issues in the agricultural and food systems of the developed and developing world. Emphasis on economic, social, historical, ethical and environmental contexts. Causes and consequences of overnutrition/undernutrition, poverty, hunger and access/distribution. Explorations of current issues and ideas for the future. Team projects.

Nonmajor Graduate Credit

Topics: H. Honors Section. (Honors Program students only.)

Major Teaching Department: AGRON

AGRON 404. Global Change. Dual-listed with 504; (Cross-listed with ENSCI, ENV S, MTEOR.) (3-0) Cr. 3. S. *Prereq: Four courses in physical or biological sciences or engineering; junior standing.* Recent changes in global biogeochemical cycles and climate; models of future changes in the climate system; impacts of global change on agriculture, water resources and human health; ethical issues of global environmental change.

Nonmajor Graduate Credit

Major Teaching Department: MTEOR

AGRON 446. International Issues and Challenges in Sustainable Development. (Cross-listed with GLOBE, INTST.) Cr. 4. S. *Prereq:* 3-credit biology course, Sophomore or higher classification, permission of Instructor. Interdisciplinary study and analysis of agricultural, biophysical, environmental, sociological, economical, political, and historical factors affecting sustainable development of communities and countries from art and science perspectives. International field experience with foreign language training required. A program fee is charged to students for international study abroad.

Major Teaching Department: AGRON

AGRON 450. Issues in Sustainable Agriculture. (Cross-listed with ENV S.) (3-0) Cr. 3. F. Zdorkowski. Agricultural science as a human activity; contemporary agricultural issues from agroecological perspective. Comparative analysis of intended and actual consequences of development of industrial agricultural practices.

Major Teaching Department: AGRON

Anthropology

ANTHR 336. Global Development. Dual-listed with 536; (3-0) Cr. 3. Alt. F., offered 2011. *Prereq:* *Anthr 201 or 306.* Cross-cultural analysis of current development practices from an anthropological perspective; focus on international aid, development institutions, agrarian reform, indigenous knowledge, humanitarianism and human rights; introduction to main theories of political and economic anthropology.

Architecture (courses denote by † are restricted to majors in architecture)

ARCH 245. Building Science and Technology I.† (2-2) Cr. 3. F. *Prereq:* *Completion of the pre-professional program and admission into the professional program.* Integrated architectural technology course with environmental sustainability as an emphasis. Introduction to environmental forces that describe the function of buildings in terms of human comfort and patterns of occupancy in relationship to architectural expression/form: sun, light, heat, cooling, humidity and ventilation, comfort, perception. Introduction to common architectural materials, their physical properties, and integration into light and heavy construction subsystems. Model building codes, gravitational and climatic forces, and simplified methods of analysis for the preliminary design of building systems. Introduction to structural performance and preliminary design. Typical framing schemes and principles of equilibrium.

ARCH 341. Building Science and Technology II.† (3-4) Cr. 5. S. *Prereq:* *245; Math 142; Phys 111.* Integrated architectural technology with environmental sustainability as an emphasis. A further understanding of the impact of environmental forces on design decisions. Understanding of heat transfer, thermal comfort and energy efficient design. Analytical rules of thumb and calculation methods that contribute to a design synthesis for the whole building that evaluates towards a net zero energy balance. Introduction to complex, composite and innovative building materials and wood frame members and systems. Structural performance and preliminary design of low-to medium-rise steel frame members and systems, long span steel systems, and masonry walls and systems. Principles of equilibrium and material behavior.

ARCH 342. Building Science and Technology III.† (3-4) Cr. 5. F. *Prereq:* *341.* Technical topics which ground architectural design decisions and concepts with environmental sustainability as an emphasis. Examination of a design process that incorporates building climatology and the control of thermal, luminous, and acoustic environments. Investigation of the materials and integrated systems found in complex construction assemblies. Determination and utilization of appropriate forms of material assemblies and structural systems for large-scale construction. Structural performance and preliminary design of low- to medium-rise reinforced concrete and pre-stressed concrete members and systems. Wind and seismic lateral forces, and the principles of equilibrium and material behavior.

ARCH 343. Building Science and Technology IV.[†] (3-4) Cr. 5. S. *Prereq:* 342. Technical topics which ground architectural design decisions and concepts in the physical world and the human perception thereof and have environmental sustainability as an emphasis. An overview of architectural environmental control systems in response to occupant comfort, patterns of use, health, and safety regulations. Analytical rules of thumb and calculation methods necessary to provide integrated design synthesis of technical systems within architecture. Use and design of mechanical, electrical, plumbing, fire safety, transportation, and conveying systems and subsystems. Project delivery: Safety related building codes; transportation systems within the building; life cycle cost analysis. Investigation of more complex and/or less common structural forms and systems.

ARCH 351. Solar Home Design. (Cross-listed with DSN S.) (3-0) Cr. 3. S. *Prereq:* 202. Architectural design and technical analysis of residential structures with emphasis on energy construction and solar energy utilization.

Major Teaching Department: ARCH

ARCH 445. Building Science and Technology V.[†] (2-2) Cr. 3. F. *Prereq:* 343. Technical topics which ground architectural design decisions and concepts in the physical world and the human perception thereof and have environmental sustainability as an emphasis. Synthesis of material, environmental, structural and systems design and related design modeling and simulation.

ARCH 575. Contemporary Urban Design Theory. (Cross-listed with DSN S.) (3-0) Cr. 3. S. *Prereq:* *Senior classification or graduate standing.* Current urban design theory and its application to urban problems. Credit counts toward fulfillment of Studies in Architecture and Culture requirements.

ARCH 597. Seminar on the Built Environment III: Theory. (3-0) Cr. 3. F. *Prereq:* *Senior classification or graduate standing.* Multidisciplinary overview of contemporary theories concerned with the production of the built environment. Particular attention to urbanism as a discourse that relates social interactions and power structures to material space.

Biology

BIOL 204. Biodiversity. (Cross-listed with ENV S.) (4-0) Cr. 2. S. *Prereq:* *One course in life sciences.* Survey of the major groups of organisms and biological systems. Definition, measurements, and patterns of distribution of organisms. Sources of information about biodiversity. Not intended for major credit in the biological sciences. Half semester course.

Major Teaching Department: BIOL

BIOL 355. Plants and People. (3-0) Cr. 3. S. *Prereq:* *Credit in 211 and 211L.* Uses of plants and fungi by humans and the importance of plants in the past, present and future. Discussion of fruits, vegetables, grains, herbs, spices, beverages, oils, fibers, wood, medicines, and drugs, in the context of their agricultural, cultural, and economic roles in modern societies. Emphasis on origins and worldwide diversity of culturally important plants, their characteristics, and uses.

BIOL 381. Environmental Systems I: Introduction to Environmental Systems. (Cross-listed with ENSCI, ENV S, MICRO.) (2-1) Cr. 3. F. *Prereq:* *12 credits of natural science including biology and chemistry.* Introduction to the structure and function of natural environmental systems. Systems approach to the analysis of material and energy flows in natural environmental systems and the primary environmental factors controlling these systems.

Nonmajor Graduate Credit

Major Teaching Department: ENSCI

BIOL 382. Environmental Systems II: Analysis of Environmental Systems. (Cross-listed with ENSCI.) (2-4) Cr. 4. S. *Prereq: EnSci 381.* Continuation of EnSci 381. Systems approach to the analysis of material and energy flows in natural environmental systems and the primary environmental factors controlling these systems.

Nonmajor Graduate Credit

Major Teaching Department: ENSCI

BIOL 471. Introductory Conservation Biology. Cr. 3. *Prereq: Biol 312.* Examination of conservation issues from a population and community perspective. The role of genetics, demography, and environment in determining population viability, habitat fragmentation, reserve design, biodiversity assessment, and restoration ecology.

BIOL 472. Community Ecology. (2-2) Cr. 3. S. *Prereq: Biol 312.* The effect of interspecific interactions on the structure and dynamics of natural and managed communities; including concepts of guild structure and trophic web dynamics and their importance to the productivity, diversity, stability, and sustainability of communities. The implications of interspecific interactions in the management of wild species will be emphasized with illustrative case histories of interactions between plants, invertebrates, and vertebrates.

Nonmajor Graduate Credit

BIOL 484. Ecosystem Ecology. (Cross-listed with ENSCI.) (3-0) Cr. 3. S. *Prereq: Combined 12 credits in biology and chemistry.* Introduction of the study of ecosystems and the factors that influence their properties and dynamics. Conceptual foundations for ecosystem studies. Quantitative analyses of accumulations, transformations, and fluxes of nutrients, water, and energy within and among ecosystems.

Major Teaching Department: BIOL

Biological Systems Engineering

BSE 380. Principles of Biological Systems Engineering. (3-0) Cr. 3. S. *Prereq: 216, Ch E 357 or ME 436.* Unit-operation analysis of biological systems, through the study of mass, energy, and information transport in bioresource production and conversion systems. Quantification and modeling of biomass production, ecological interactions, and bioreactor operations.

Community and Regional Planning

C R P 417. Urban Revitalization. Dual-listed with 517; (Cross-listed with DSN S.) (3-0) Cr. 3. Alt. S., offered 2012. *Prereq: 253 or 270.* Planning methods available to further revitalization and preservation efforts, with particular attention to housing and neighborhoods. Relationship between neighborhood change and urban development process; public policy implications.

Major Teaching Department: C R P

C R P 425. Growth Management. Dual-listed with 525; (Cross-listed with DSN S.) (3-0) Cr. 3. Alt. F., offered 2011. *Prereq: Junior classification.* Review of techniques used to manage growth-related change and to implement plans. Capital investment strategies; public land acquisition and protection; development impact analysis; impact mitigation, including impact fees; phased growth systems; urban, suburban and rural relationships; and land preservation.

Major Teaching Department: C R P

C R P 484. Sustainable Communities. Dual-listed with 584; (Cross-listed with DSN S, ENV S.) (3-0) Cr. 3. Alt. S., offered 2013. *Prereq: Junior classification.* The history and theory of sustainable community planning. Procedural and substantive dimensions. Case studies of communities engaged in sustainability planning. Use and development of indicators.

Major Teaching Department: C R P

C R P 491. Environmental Law and Planning. Dual-listed with 591; (Cross-listed with DSN S, ENV S, L A.) (3-0) Cr. 3. S. *Prereq:* 6 credits in natural sciences. Environmental law and policy as applied in planning at the local and state levels. Brownfields, environmental justice, water quality, air quality, wetland and floodplain management, and local government involvement in ecological protection through land use planning and other programs.

Major Teaching Department: C R P

Design Studies

DSN S 351. Solar Home Design. (Cross-listed with ARCH.) (3-0) Cr. 3. S. *Prereq:* Arch 202. Architectural design and technical analysis of residential structures with emphasis on energy construction and solar energy utilization.

Major Teaching Department: ARCH

DSN S 491. Environmental Law and Planning. Dual-listed with 591; (Cross-listed with C R P, ENV S, L A.) (3-0) Cr. 3. S. *Prereq:* 6 credits in natural sciences. Environmental law and policy as applied in planning at the local and state levels. Brownfields, environmental justice, water quality, air quality, wetland and floodplain management, and local government involvement in ecological protection through land use planning and other programs.

Major Teaching Department: C R P

Economics

ECON 380. Environmental and Resource Economics. (Cross-listed with ENV S.) (3-0) Cr. 3. *Prereq:* 101. Natural resource availability, use, conservation, and government policy, including energy issues. Environmental quality and pollution control policies.

Major Teaching Department: ECON

ECON 385. Economic Development. (Cross-listed with GLOBE.) (3-0) Cr. 3. *Prereq:* 101, 102. Current problems of developing countries, theories of economic development, agriculture, and economic development, measurement and prediction of economic performance of developing countries, alternative policies and reforms required for satisfying basic needs of Third World countries, interrelationships between industrialized countries and the developing countries, including foreign aid.

Nonmajor Graduate Credit

Major Teaching Department: ECON

English

ENGL 355. Literature and the Environment. (Cross-listed with ENV S.) (3-0) Cr. 3. *Prereq:* 250. Study of literary texts that address the following topics, among others: the relationship between people and natural/urban environments, ecocriticism, and the importance of place in the literary imagination.

Nonmajor Graduate Credit

Major Teaching Department: ENGL

Environmental Science

ENSCI 201. Introduction to Environmental Issues. (Cross-listed with ENV S.) (2-0) Cr. 2. F.S. Discussion of current and emerging environmental issues such as human population growth, energy use, loss of biodiversity, water resources, and climate change.

Major Teaching Department: ENV S

ENSCI 381. Environmental Systems I: Introduction to Environmental Systems. Dual-listed with 581; (Cross-listed with BIOL, ENV S, MICRO.) (2-1) Cr. 3. F. *Prereq: 12 credits of natural science including biology and chemistry.* Introduction to the structure and function of natural environmental systems. Systems approach to the analysis of material and energy flows in natural environmental systems and the primary environmental factors controlling these systems.

Nonmajor Graduate Credit

Major Teaching Department: ENSCI

ENSCI 382. Environmental Systems II: Analysis of Environmental Systems. Dual-listed with 582; (Cross-listed with BIOL.) (2-1) Cr. 3. S. *Prereq: EnSci 381.* Continuation of EnSci 381. Systems approach to the analysis of material and energy flows in natural environmental systems and the primary environmental factors controlling these systems.

Nonmajor Graduate Credit

ENSCI 404. Global Change. Dual-listed with 504; (Cross-listed with AGRON, ENV S, MTEOR.) (3-0) Cr. 3. S. *Prereq: Four courses in physical or biological sciences or engineering; junior standing.* Recent changes in global biogeochemical cycles and climate; models of future changes in the climate system; impacts of global change on agriculture, water resources and human health; ethical issues of global environmental change.

Nonmajor Graduate Credit

Major Teaching Department: MTEOR

ENSCI 484. Ecosystem Ecology. (Cross-listed with BIOL.) (3-0) Cr. 3. S. *Prereq: Combined 12 credits in biology and chemistry.* Introduction of the study of ecosystems and the factors that influence their properties and dynamics. Conceptual foundations for ecosystem studies. Quantitative analyses of accumulations, transformations, and fluxes of nutrients, water, and energy within and among ecosystems.

Major Teaching Department: BIOL

Environmental Studies

ENV S 101. Environmental Geology: Earth in Crisis. (Cross-listed with GEOL.) (3-0) Cr. 3. F.S. An introduction to geologic processes and the consequences of human activity from local to global scales. Discussion of human population growth, resource depletion, pollution and waste disposal, global warming and ozone depletion, desertification, and geologic hazards such as earthquakes, landslides, flooding, and volcanism.

Major Teaching Department: GEOL

ENV S 108. Introduction to Oceanography. (Cross-listed with GEOL.) (3-0) Cr. 3. F. Introduction to study of the oceans. Ocean exploration. Waves and currents. Shape, structure, and origin of the ocean basins. Sedimentary record of oceanic life. Composition of seawater and its significance for life. Ocean circulation and its influence on climate. Life of the oceans, including coral reefs. Use and misuse of ocean resources. Anthropogenic impacts on the oceanic environment.

Major Teaching Department: GEOL

ENV S 120. Introduction to Renewable Resources. (Cross-listed with AGRON, NREM.) (3-0) Cr. 3. F.S. Overview of soil, water, plants, and animals as renewable natural resources in an ecosystem context. History and organization of resource management. Concepts of integrated resource management.

Major Teaching Department: NREM

ENV S 160. Water Resources of the World. (Cross-listed with AGRON, GEOL, MTEOR.) (3-0) Cr. 3. S. Study of the occurrence, history, development, and management of world water resources. Basic hydrologic principles including climate, surface water, groundwater, and water quality. Historical and current perspectives on water policy, use, and the role of water in society and the environment.

ENV S 201. Introduction to Environmental Issues. (Cross-listed with ENSCI.) (2-0) Cr. 2. F.S. Discussion of current and emerging environmental issues such as human population growth, energy use, loss of biodiversity, water resources, and climate change.

Major Teaching Department: ENV S

ENV S 270. Foundations in Natural Resource Policy and History. (Cross-listed with L A, NREM.) (3-0) Cr. 3. Alt. F., offered 2011. The development of natural resource conservation philosophy and policy from the Colonial Era to the present. North American wildlife, forestry, and environmental policy; national parks and other protected lands; federal and state administrative agencies, influence of science. Relationship to cultural contexts, including urban reform and American planning movement. Discussion of common pool resources, public and private lands.

Major Teaching Department: NREM

ENV S 324. Energy and the Environment. (Cross-listed with GEOL, MTEOR.) (3-0) Cr. 3. S. Renewable and non-renewable energy resources. Origin, occurrence, and extraction of fossil fuels. Nuclear, wind, and solar energy. Energy efficiency. Environmental effects of energy production and use, including air pollution, acid precipitation, groundwater contamination, nuclear waste disposal, and global climate change.

Major Teaching Department: GEOL

ENV S 334. Environmental Ethics. (Cross-listed with PHIL.) (3-0) Cr. 3. F. *Prereq: Three credits in philosophy or junior classification.* Thorough study of some of the central moral issues arising in connection with human impact on the environment, e.g., human overpopulation, species extinction, forest and wilderness management, pollution. Several world views of the proper relationship between human beings and nature will be explored.

Nonmajor Graduate Credit

Major Teaching Department: PHIL

ENV S 342. World Food Issues: Past and Present. (Cross-listed with AGRON, FS HN, T SC.) (3-0) Cr. 3. F.S. *Prereq: Junior classification.* Zdorkowski, Ford. Issues in the agricultural and food systems of the developed and developing world. Emphasis on economic, social, historical, ethical and environmental contexts. Causes and consequences of overnutrition/undernutrition, poverty, hunger and access/distribution. Explorations of current issues and ideas for the future. Team projects.

Nonmajor Graduate Credit

Topics: H. Honors Section. (For students in the University Honors Program only.)

Major Teaching Department: AGRON

ENV S 345. Population and Society. (Cross-listed with SOC.) (3-0) Cr. 3. F. *Prereq: Soc 130 or 134.*

Human population growth and structure; impact on food, environment, and resources; gender issues; trends of births, deaths, and migration; projecting future population; population policies and laws; comparison of the United States with other societies throughout the world.

Major Teaching Department: SOC

ENV S 355. Literature and the Environment. (Cross-listed with ENGL.) (3-0) Cr. 3. *Prereq: Engl 250.* Study of literary texts that address the following topics, among others: the relationship between people and natural/urban environments, ecocriticism, and the importance of place in the literary imagination.

Nonmajor Graduate Credit

Major Teaching Department: ENGL

ENV S 380. Environmental and Resource Economics. (Cross-listed with ECON.) (3-0) Cr. 3. *Prereq: Econ 101.* Natural resource availability, use, conservation, and government policy, including energy issues. Environmental quality and pollution control policies.

Major Teaching Department: ECON

ENV S 381. Environmental Systems I: Introduction to Environmental Systems. (Cross-listed with BIOL, ENSCI, MICRO.) (2-1) Cr. 3. F. *Prereq:* 12 credits of natural science including biology and chemistry. Introduction to the structure and function of natural environmental systems. Systems approach to the analysis of material and energy flows in natural environmental systems and the primary environmental factors controlling these systems.

Nonmajor Graduate Credit

Major Teaching Department: ENSCI

ENV S 382. Environmental Sociology. (Cross-listed with SOC.) (3-0) Cr. 3. F.S. *Prereq:* Soc 130, 134, or 3 credits of Env S. Environment-society relations; social construction of nature and the environment; social and environmental impacts of resource extraction, production, and consumption; environmental inequality; environmental mobilization and movements; U.S. and international examples.

Major Teaching Department: SOC

ENV S 404. Global Change. (Cross-listed with AGRON, ENSCI, MTEOR.) (3-0) Cr. 3. S. *Prereq:* Four courses in physical or biological sciences or engineering; junior standing. Recent changes in global biogeochemical cycles and climate; models of future changes in the climate system; impacts of global change on agriculture, water resources and human health; ethical issues of global environmental change.

Nonmajor Graduate Credit

Major Teaching Department: MTEOR

ENV S 424. Sustainable and Environmental Horticulture Systems. (Cross-listed with HORT.) (2-0) Cr. 2. F. Inquiry into ethical issues and environmental consequences of horticultural cropping systems and production practices. Emphasis on production systems that are resource efficient, environmentally sound, socially acceptable, and profitable.

Major Teaching Department: HORT

ENV S 491. Environmental Law and Planning. (Cross-listed with C R P, DSN S, L A.) (3-0) Cr. 3. S. *Prereq:* Six credits in natural sciences. Environmental law and policy as applied in planning at the local and state levels. Brownfields, environmental justice, water quality, air quality, wetland and floodplain management, and local government involvement in ecological protection through land use planning and other programs.

Major Teaching Department: C R P

Food Science and Human Nutrition

FS HN 342. World Food Issues: Past and Present. (Cross-listed with AGRON, ENV S, T SC.) (3-0) Cr. 3. F.S. *Prereq:* Junior classification. Issues in the agricultural and food systems of the developed and developing world. Emphasis on economic, social, historical, ethical and environmental contexts. Causes and consequences of overnutrition/undernutrition, poverty, hunger and access/distribution. Explorations of current issues and ideas for the future. Team projects.

Nonmajor Graduate Credit

Topics: H. Honors Section. (Honors Program students only.)

Major Teaching Department: AGRON

Geology

GEOL 101. Environmental Geology: Earth in Crisis. (Cross-listed with ENV S.) (3-0) Cr. 3. F.S. An introduction to geologic processes and the consequences of human activity from local to global scales. Discussion of human population growth, resource depletion, pollution and waste disposal, global warming and ozone depletion, desertification, and geologic hazards such as earthquakes, landslides, flooding, and volcanism.

Major Teaching Department: GEOL

GEOL 108. Introduction to Oceanography. (Cross-listed with ENV S.) (3-0) Cr. 3. F. Introduction to study of the oceans. Ocean exploration. Waves and currents. Shape, structure, and origin of the ocean basins. Sedimentary record of oceanic life. Composition of seawater and its significance for life. Ocean circulation and its influence on climate. Life of the oceans, including coral reefs. Use and misuse of ocean resources. Anthropogenic impacts on the oceanic environment.

Major Teaching Department: GEOL

GEOL 160. Water Resources of the World. (Cross-listed with MTEOR, ENV S, AGRON.) (3-0) Cr. 3. S. Study of the occurrence, history, development, and management of world water resources. Basic hydrologic principles including climate, surface water, groundwater, and water quality. Historical and current perspectives on water policy, use, and the role of water in society and the environment.

Major Teaching Department: MTEOR

GEOL 324. Energy and the Environment. (Cross-listed with ENV S, MTEOR.) (3-0) Cr. 3. S. Renewable and non-renewable energy resources. Origin, occurrence, and extraction of fossil fuels. Nuclear, wind, and solar energy. Energy efficiency. Environmental effects of energy production and use, including air pollution, acid precipitation, groundwater contamination, nuclear waste disposal, and global climate change. Graduation Messages: Geol 324 does not count toward credits required in the Geology major.

Major Teaching Department: GEOL

Global Resource Systems

GLOBE 201. Global Resource Systems. (3-0) Cr. 3. F.S. A comparative analysis of global resources and the various natural and human systems affecting those resources.

GLOBE 301. Resource Systems of Industrialized Nations. (2-2) Cr. 3. S. *Prereq: 201, Econ 101 or 102.* In-depth analysis of the opportunities, constraints and consequences of the resource systems common in industrialized nations. Topics integrate natural resources with land tenure, societal structure, food security, agriculture, shelter, energy and wealth dynamics.

GLOBE 302. Resource Systems of Developing Nations. (2-2) Cr. 3. F. *Prereq: 201, ECON 101 or 102.* In depth appraisal of resource systems common throughout the developing world. Topics integrate natural resources with land tenure, societal structure, food security, agriculture, shelter, energy and wealth dynamics.

GLOBE 446. International Issues and Challenges in Sustainable Development. (Cross-listed with AGRON, INTST.) Cr. 4. S. *Prereq: 3-credit biology course, Sophomore or higher classification, permission of Instructor.* Interdisciplinary study and analysis of agricultural, biophysical, environmental, sociological, economical, political, and historical factors affecting sustainable development of communities and countries from art and science perspectives. International field experience with foreign language training required. A program fee is charged to students for international study abroad.

Major Teaching Department: AGRON

Horticulture

HORT 424. Sustainable and Environmental Horticulture Systems. Dual-listed with 524; (Cross-listed with ENV S.) (3-0) Cr. 3. Alt. S., offered 2013. Inquiry into ethical issues and environmental consequences of horticultural cropping systems, production practices and managed landscapes. Emphasis on systems that are resource efficient, environmentally sound, socially acceptable, and profitable.

Major Teaching Department: HORT

Landscape Architecture

L A 270. Foundations in Natural Resource Policy and History. (Cross-listed with NREM, ENV S.) (3-0) Cr. 3. Alt. F., offered 2011. The development of natural resource conservation philosophy and policy from the Colonial Era to the present. North American wildlife, forestry, and environmental policy; national parks and other protected lands; federal and state administrative agencies, influence of science. Relationship to cultural contexts, including urban reform and American planning movement. Discussion of common pool resources, public and private lands.

Major Teaching Department: NREM

L A 302. Ecological Design at the Regional Scale. (1-15) Cr. 6. S. *Prereq:* 301, 381, 465 and Agronomy 156. Application of ecological theories and processes in design and planning at the hundred plus-acre scale specifically focusing on urban and urban fringe landscapes. Apply advanced landscape analysis of soil, water, and vegetation utilizing geographic information systems. Particular focus on stream and wetland restoration, mitigation, and regulations and developing design representations for public use.

L A 417. Urban and Peri-urban Watershed Assessment. Dual-listed with 517; (Cross-listed with ENV S.) (2-3) Cr. 3. *Prereq:* Junior standing, 6 credits of natural science. Assessment and reduction of impacts in urban and peri-urban watershed areas. Course prepares students to work with various analysis methods for vegetation, topography, stormwater and stream condition as well as work with data from other disciplines. Emphasis on communicating with the public. Introductory GIS and GPS technologies are utilized. Learning is largely field-based.

Mechanical Engineering

M E 388. Sustainable Engineering and International Development. (Cross-listed with A E, C E, E E, MAT E.) (2-2) Cr. 3. F. *Prereq:* Junior classification in engineering. Multi-disciplinary approach to sustainable engineering and international development, sustainable development, appropriate design and engineering, feasibility analysis, international aid, business development, philosophy and politics of technology, and ethics in engineering. Engineering-based projects from problem formulation through implementation. Interactions with partner community organizations or international partners such as non-government organizations (NGOs). Course readings, final project/design report.

Major Teaching Department: C E

M E 433. Alternative Energy Conversion. (3-0) Cr. 3. F. *Prereq:* Phys 221/222 and Chem 167. Basic principles, thermodynamics, and performance of practical alternative energy conversion technologies including fuel cells, photovoltaics, wind energy, biomass energy, and non-combustion thermal sources. Performance analysis and operating principles of systems and components, economic analysis for system design and operation. Nonmajor graduate credit.

Nonmajor Graduate Credit

M E 484. Technology, Globalization and Culture. Dual-listed with 584; (Cross-listed with WLC.) (3-0) Cr. 3. F. *Prereq: senior classification for 484; graduate classification for 584.* Cross-disciplinary examination of the present and future impact of globalization with a focus on preparing students for leadership roles in diverse professional, social, and cultural contexts. Facilitate an understanding of the threats and opportunities inherent in the globalization process as they are perceived by practicing professionals and articulated in debates on globalization. Use of a digital forum for presenting and analyzing globalization issues by on-campus and off-campus specialists.

Major Teaching Department: M E

M E 486. Appropriate Technology Design. (3-0) Cr. 3. F. *Prereq: M E 231, M E 270, current enrollment in M E 335; or permission of instructor.* Hands-on design experience utilizing knowledge acquired in core mechanical engineering courses. Emphasis with engineering problem formulation and solution, oral and written communication, team decision-making and ethical conduct. Design projects include engineering considerations in appropriate technology which have multidisciplinary components in economics and sociology. Major Teaching Department: M E

Meteorology

MTEOR 160. Water Resources of the World. (Cross-listed with GEOL, ENV S, AGRON.) (3-0) Cr. 3. S. Study of the occurrence, history, development, and management of world water resources. Basic hydrologic principles including climate, surface water, groundwater, and water quality. Historical and current perspectives on water policy, use, and the role of water in society and the environment.

Major Teaching Department: MTEOR

MTEOR 324. Energy and the Environment. (Cross-listed with ENV S, GEOL.) (3-0) Cr. 3. S. Renewable and non-renewable energy resources. Origin, occurrence, and extraction of fossil fuels. Nuclear, wind, and solar energy. Energy efficiency. Environmental effects of energy production and use, including air pollution, acid precipitation, groundwater contamination, nuclear waste disposal, and global climate change. Graduation Messages: Mteor 324 does not count toward credits required in the meteorology major. Major Teaching Department: GEOL

MTEOR 404. Global Change. Dual-listed with 504; (Cross-listed with AGRON, ENSCI, ENV S.) (3-0) Cr. 3. S. *Prereq: Four courses in physical or biological sciences or engineering; junior standing.* Recent changes in global biogeochemical cycles and climate; models of future changes in the climate system; impacts of global change on agriculture, water resources and human health; ethical issues of global environmental change.

Nonmajor Graduate Credit

Major Teaching Department: MTEOR

Natural Resource Ecology and Management

NREM 120. Introduction to Renewable Resources. (Cross-listed with AGRON, ENV S.) (3-0) Cr. 3. F.S. Overview of soil, water, plants, and animals as renewable natural resources in an ecosystem context. History and organization of resource management. Concepts of integrated resource management.

Major Teaching Department: NREM

NREM 270. Foundations in Natural Resource Policy and History. (Cross-listed with L A, ENV S.) (3-0) Cr. 3. Alt. F., offered 2011. The development of natural resource conservation philosophy and policy from the Colonial Era to the present. North American wildlife, forestry, and environmental policy; national parks and other protected lands; federal and state administrative agencies, influence of science. Relationship to cultural contexts, including urban reform and American planning movement. Discussion of common pool resources, public and private lands.

Major Teaching Department: NREM

NREM 452. Ecosystem Management. (Cross-listed with FOR.) (2-3) Cr. 3. F. *Prereq: Junior classification, and NREM 301 or A Ecl 312.* Principles of planning, regulating, and decision-making associated with public and private lands, with consideration of forest, grassland, wetland, and freshwater aquatic ecosystems. Integrated natural resources management within ecological, social, economic and policy constraints. Nonmajor Graduate Credit
Major Teaching Department: FOR

NREM 471. Agroforestry Systems; Local and Global Perspectives. Dual-listed with 571; (2-3) Cr. 3. Alt. S., offered 2012. *Prereq: 6 credits in biological science at 300 level or above.* Concepts of sustainable land use, agroecological dynamics, and component interactions of agroforestry systems. Agroforestry systems in temperate and tropical regions. Design and evaluation techniques for agroforestry systems. Ecological, socioeconomic and political aspects of agroforestry.

Philosophy and Religious Studies

PHIL 334. Environmental Ethics. (Cross-listed with ENV S.) (3-0) Cr. 3. F. *Prereq: 3 credits in philosophy or junior classification.* Thorough study of some of the central moral issues arising in connection with human impact on the environment, e.g., human overpopulation, species extinction, forest and wilderness management, pollution. Several world views of the proper relationship between human beings and nature will be explored. Nonmajor Graduate Credit
Major Teaching Department: PHIL

Sociology

SOC 345. Population and Society. (Cross-listed with ENV S.) (3-0) Cr. 3. F. *Prereq: 130 or 134.* Human population growth and structure; impact on food, environment, and resources; gender issues; trends of births, deaths, and migration; projecting future population; population policies and laws; comparison of the United States with other societies throughout the world. Major Teaching Department: SOC

SOC 382. Environmental Sociology. (Cross-listed with ENV S.) (3-0) Cr. 3. F.S. *Prereq: Soc 130, 134 or 3 credits of Env S.* Environment-society relations; social construction of nature and the environment; social and environmental impacts of resource extraction, production, and consumption; environmental inequality; environmental mobilization and movements; U.S. and international examples. Major Teaching Department: SOC

SOC 411. Social Change in Developing Countries. (3-0) Cr. 3. S. *Prereq: 130 or 134 plus 3 credits in social sciences.* Social change and development in developing countries; international interdependence; causes and consequences of persistent problems in agriculture, city growth, employment, gender equality, basic needs; local and worldwide efforts to foster social change and international development. Nonmajor Graduate Credit

Technology and Social Change

T SC 341. Technology: International, Social, and Human Issues. (3-0) Cr. 3. F. *Prereq: Junior classification.* An interdisciplinary study of the international significance of technology and of the societal and human issues attending its development and adoption.

T SC 342. World Food Issues: Past and Present. (Cross-listed with AGRON, ENV S, FS HN.) (3-0) Cr. 3. F.S. *Prereq: Junior classification.* Zdorkowski, Ford. Issues in the agricultural and food systems of the developed and developing world. Emphasis on economic, social, historical, ethical and environmental contexts. Causes and consequences of overnutrition/undernutrition, poverty, hunger and access/distribution. Explorations of current issues and ideas for the future. Team projects.

Nonmajor Graduate Credit

Topics: H. Honors Section. (Honors Program students only.)

Major Teaching Department: AGRON

T SC 343. Philosophy of Technology. (Cross-listed with PHIL.) (3-0) Cr. 3. F.S. *Prereq: 6 credits of social science or T SC 341 and 3 credits of social science.* Moral and other philosophical problems related to developments in technology. Topics may include conditions under which technological innovations contribute to human emancipation, relationship of technology and democracy, utility and limits of technical rationality, and problems of ensuring that benefits of technological advance are communally shared. Topics discussed with reference to such issues as contemporary developments in microelectronics, technology transfer to the Third World, etc.

Nonmajor Graduate Credit

Major Teaching Department: PHIL

T SC 474. Communication Technology and Social Change. (Cross-listed with JL MC.) (3-0) Cr. 3. *Prereq: Junior classification.* Examination of historical and current communication technologies, including how they shape and are shaped by the cultural and social practices into which they are introduced.

Major Teaching Department: JL MC