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

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<th>Emphasis</th>
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<th>Elective 1</th>
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<td>ENV S 324</td>
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<td>Soc 345</td>
<td>Soc 382</td>
<td>Anthr 336</td>
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These are just example programs, any 15 credits satisfying the stated requirements are acceptable.
Elective Courses Approved for the Minor in Sustainability

Agricultural and Biosystems Engineering (A B E)

A B E 380. Principles of Biological Systems Engineering. (3-0) Cr. 3. S. A B E 216 (or equivalent) and MATH 266 or 267. 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.

A B E 388. Sustainable Engineering and International Development. (Cross-listed with C E, E E). (2-2) Cr. 3. F. 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.

A B E 480. Engineering Analysis of Biological Systems. (Cross-listed with ENSCI). (2-2) Cr. 3. F. Prereq: A B E 380 or permission of the instructor Systems-level engineering analysis of biological systems. Economic and life-cycle analysis of bioresource production and conversion systems. Global energy and resource issues and the role of biologically derived materials in addressing these issues.

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


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. Whole Building Energy Performance Modeling. (3-0) Cr. 3. S. Prereq: ARCH 202, 245, 341. Open to non-majors by permission of instructor. Architectural design, design evaluation and technical analysis using energy performance modeling tools. Emphasis will be given to whole building energy efficiency including passive and active systems integration.

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.

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.

Major Teaching Department: ENSCI
BIOL 382. Environmental Systems II: Analysis of Environmental Systems. (Cross-listed with EN-SCI.) (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. S. 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

Civil Engineering

C E 388. Sustainable Engineering and International Development. (Cross-listed with ABE, EE). (2-2) Cr. 3. F. S. 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.

Community and Regional Planning

C R P 201. Making the Metropolis. (3-0) Cr. 3. S. F.S. Examination of the evolution of American urban centers from the colonial era to the present. Considers the demographic changes and social movements underway in urban America and explores how an understanding of the history of cities provides us with knowledge that we can use to improve our cities today.

C R P 291. World Cities and Globalization. (3-0) Cr. 3. F. World cities and globalization in developed and developing countries. Topics include globalization, world cities and regions, uneven economic development, the international division of labor, multinational corporations, international environmentalism, tourism, popular culture and place-based identity.

C R P 293. Environmental Planning. (Cross-listed with ENV S). (3-0) Cr. 3. F. Comprehensive overview of the field of environmental relationships and the efforts being made to organize, control, and coordinate environmental, aesthetic, and cultural characteristics of land, air, and water.
C R P 320. Urban Form. (3-0) Cr. 3. Alt. S., offered odd-numbered years. Prereq: C R P 253 or C R P 270, or permission of instructor Examines how urban form is shaped, what constitutes good urban form, and what are the trends in emerging urban forms. Descriptive, explanatory and normative theories of urban form, and the relationships between urban form and social, economic, political, cultural, and institutional forms.

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 C R P 525). (3-0) Cr. 3. Alt. F., offered odd-numbered years. 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.

C R P 429. Planning in Developing Countries. (3-0) Cr. 3. S. Graduate classification Introduction to issues in planning and governance in an international setting. Problems and strategies may include population movement and change, economic globalization, urban growth, rural development, and housing.

C R P 445. Transportation Policy and Planning. (3-0) Cr. 3. F. Prereq: C E 350 or equivalent. Note: CRP 545 prerequisite: Graduate Classification Comprehensive overview of key policy issues related to transportation planning and investment in the United States and abroad. Policy issues explored include safety, environmental impact, sustainable communities, and economic development. Policy analysis and planning are studied in conjunction with each policy issue explored. Issues of concern to state, metropolitan, and local governments.


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

Economics


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


Electrical Engineering

EE 388. Sustainable Engineering and International Development. (Cross-listed with ABE, CE). (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.

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

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 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

Major Teaching Department: NREM

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 242. Societal Impacts on Food Systems. (3-0) Cr. 3. S. Description of food systems from farming practices to global marketing. Exploration of the impacts of food system choices on personal health, the environment and global society.

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 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


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 402. Responses to Global Resource System Challenges. (1-4) Cr. 3. S. Capstone analysis of critical global resource challenges facing both developed and developing countries. Students will use research skills to investigate specific global resource issues and use communications skills to work as a team to integrate their research, develop an interdisciplinary perspective, and evaluate potential solutions to resource challenges.

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
Integrated Studio Arts (ARTIS)

ARTIS 360. Sustainable Design and Fabrication of Furniture. (0-6) Cr. 3. F.S. An introduction to issues of design and fabrication of furniture focusing on sustainability. Exploration of the effect of consumers on design and how this affects our environment and our global society.

ARTIS 362. Artists, Designer and Sustainable Development. (0-6) Cr. 3. S. Prereq: Junior level standing in the University The artist/designer’s role in sustainable development with a focus on cultural understanding of the collaborating, communities. Class discussion, visual exercises, and the creation of creative collaborative service-learning projects, such as product design, habitat design, and visual arts projects. Pre-orientation for travel to Ghana in ARTIS 363.

ARTIS 363. Studio Abroad: Ghana. (0-6) Cr. 3. SS. Prereq: ARTIS 362 Traveling studio to Ghana, West Africa; an experiential tour of arts and history combined with design focused, collaborative service-learning projects. Projects may include product development, design consultation, sustainable building design, and learning and teaching of visual arts. Student teams will develop projects in partnership with Ghanaians.

Journalism and Mass Communication (JL MC)

JL MC 347. Science Communication. (Dual-listed with JL MC 547). (2-2) Cr. 3. S. Prereq: ADVRT, JL MC, and PR majors: minimum of C+ in JL MC 201. Nonmajors and minors by permission of instructor. Reporting and writing about science and technology topics for general audiences. Outlets for stories include print, broadcast and online media. Story topics include reporting about basic, applied sciences and social sciences, as well as ethical, political and policy issues related to science and technology.

Landscape Architecture (LA)

LA 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

LA 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.

LA 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.
Materials Science and Engineering (MAT E)

MAT E 394. Topics in Sustainable Engineering in Italy. (3-0) Cr. 3. S. Prereq: CHEM 167 or CHEM 177 Fundamentals of sustainable engineering related to biofuels. Basics of food and biofuel chemistry and fluid dynamics. Preparation course for Italy as a case study for food and sustainable engineering. Orientation for summer study abroad program in Torino, Italy. Credit for graduation allowable only upon completion of the following summer’s offering of MAT E 316 taught in Italy, along with additional sustainability lessons/tours.

Mechanical Engineering (ME)

ME 433. Alternative Energy. (3-0) Cr. 3. F. Prereq: Phys 221/222 and Chem 167. Basic principles, performance, and cost analysis of alternative energy systems including biofuels, bioenergy, wind, solar, fuel cells, storage and other alternative energy systems. Performance analysis and operating principles of systems and components, and economic analysis for system design and operation will be taught. Emphasis is on alternative energy technologies needed to meet our future energy needs at various scales ranging from household to city to national levels.

ME 479. Sustainability Science for Engineering Design. (3-0) Cr. 3. S. Prereq: Any engineering design course Scientific principles and quantitative methods concerning sustainability. Analysis of environmental issues associated with engineering design and product manufacturing in an economic and social context. Heuristic and analytical methods for assessing the sustainability of existing or potential product/service designs. Application to a design problem in teams.

ME 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.

ME 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 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 LA, 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: NREM 301 or AEcl 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


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

Russian

RUS 375. Russia Today. (3-0) Cr. 3. Repeatable. A survey of social, political, economic, and cultural topics relevant to contemporary Russia. Readings, discussions and papers in English. Meets International Perspectives Requirement.
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 348. Population and Society.** Cr. 3. Prereq: SOC 134 Trends in hunger, poverty, resource use and development. Assessment of theories, policies, and programs to promote sustainable livelihoods, resource management, and development at local and national levels. Examine solutions through institutional efforts and grassroots social movements.

**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

Technology Systems Management (TSM)

TSM 324. Soil and Water Conservation Management. (2-2) Cr. 3. S. Prereq: MATH 140 or MATH 151 Introduction to engineering and conservation principles applied to the planning of erosion control systems, water control structures, water quality management, and drainage and irrigation systems.

TSM 325. Biorenewable Systems. (Cross-listed with A B E). (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.