Appendix 1: UM Sustainability Certificate course list

Students must take at least 18 credits from the following courses. They must take at least 1 core course. Additional courses can be chosen to align with their major or minor, or with particular interests (e.g., energy, green buildings, etc.). The list accordingly includes courses specific to various areas of study that may require one or more prerequisites.

Core Courses

BIL103 Introduction to Ecology
3 credits Fall & Spring Semester
Overview of ecological and evolutionary principles; Relationships of organisms to living and non-living aspects of their environment; human impact on ecosystems. PREREQUISITE: NOT FOR CREDIT IN THE BIOLOGY MAJOR OR MINOR.

ECS111 Introduction to the Earth’s Ecosystem
3 credits Fall & Spring Semester
Earth’s ecosystem and the interactions of humans with it. Concepts in ecology, environmental science and policy. Two field trips. Team-taught.

ECS113 Introduction to Environmental Policy
3 credits Fall Semester
Theories and case studies from various fields, including anthropology, economics, ethics, geography, political science and psychology, will be used to explore the multiple perspectives that influence group and individual perceptions of environmental issues. PREREQUISITE: ECS 111

ECS310 Sustainable Living
3 credits Spring Semester
Sustainable Living explores ways of living that can be sustained for thousands of years, without further damage to earth, ocean and atmosphere. Topics covered include renewable energy, agricultural practices, water issues, green building, low carbon transportation and healthy living/eating. Students advocate for sustainable practices of their choice in writing and in oral/visual presentations. Frequent field trips. PREREQUISITE: ECS 111 OR PERMISSION OF INSTRUCTOR.

GEG371 Environmental Geography: Current Issues
3 credits Offered By Announcement Only
Topics selected from a wide range of current environmental problems from a geographical perspective. Students will become familiar with a wide range of ecological processes as well as the human forces that currently modify them. PREREQUISITE: ONE COURSE IN EITHER PHYSICAL GEOGRAPHY OR ECOLOGY OR PERMISSION OF INSTRUCTOR.
GSC103 Evolution of the Modern Earth’s Environment
3 credits Fall & Spring Semester & First Summer Session

GSC105 The Global Environment
3 credits Fall Semester
Ongoing problems in earth systems: global warming, ozone depletion, energy shortages, air and water pollution, radioactivity.

POL322 Environmental Politics and Policy
3 credits Fall Semester & First Summer Session
Examines the federal government’s policies toward the National Forests and public grasslands; water supply policies and politics of the Everglades and Far West; global warming; U.S. air and water pollution policies and politics as well as those related to waste management; U.S. energy policies; and trade and the environment.
PREREQUISITE: POL 201 OR POL 203.

Additional courses

SCHOOL OF ARCHITECTURE
Architecture
ARC223 Architecture and the Environment
3 credits Fall Semester
Architectural response to natural environmental requirements. Focus on climate, control, natural energy use, ecosystems, energy flow, environmental intervention, case studies of indigenous buildings.
PREREQUISITE: ARC 102, 122.

COLLEGE OF ARTS AND SCIENCES
Anthropology
APY307 Human Adaptation
3 credits Spring Semester
Human biological adaptation to different environments and stress is examined anthropologically within an evolutionary framework. Mechanisms of adaptation to temperature extremes and other climatic variables, high altitude, disease, nutritional stress, urbanization, extraterrestrial conditions, and other environmental challenges are described in relation to biological and behavioral variations among human populations. The limits of human performance and human adaptive potential in the present and future are explored.

APY345 Ancient Civilizations of Mesoamerica
3 credits Spring Semester
Major pre-Columbian cultures of Mesoamerica, from Olmec to Aztec periods, with emphasis on ancient Maya.
PREREQUISITE: APY 201 AND THREE ADDITIONAL CREDITS IN ANTHROPOLOGY.
APY360 Anthropology of Food
3 credits Fall Semester
Evolution of human diet, basic nutrition, food taboos, effects of domestication, effects of diet on skeletal remains, analysis of your own food habits, and the impact of certain foods on the bio-cultural evolution of our species.
PREREQUISITE: ANY 200 LEVEL ANTHROPOLOGY COURSE OR PERMISSION OF INSTRUCTOR

APY387 Cultural Evolution
3 credits Spring Semester
Evolution of social systems and technologies, from hunting and gathering bands through industrial states.
PREREQUISITE: APY 202 AND THREE ADDITIONAL CREDITS IN ANTHROPOLOGY.

APY430 Anthropology of Sustainability
3 credits Fall Semester
PREREQUISITE: APY 202 OR PERMISSION OF THE INSTRUCTOR

APY435 Anthropology of Nature and Environment
3 credits Spring Semester
PREREQUISITE: APY 202 OR PERMISSION OF INSTRUCTOR

APY440 Environmental Archaeology
3 credits Offered By Announcement Only
Theory and methodologies in the reconstruction of Quaternary environments from the archaeological record. Techniques of geoarchaeology, zooarchaeology, and paleoethnobotany.
PREREQUISITE: APY 201 AND THREE CREDITS IN BIOLOGY OR MARINE SCIENCE OR PERMISSION OF INSTRUCTOR.

Biology
BIL220 Evolution and Disease
3 credits Fall & Spring Semester
Evolutionary insights on the origins and emergence of diseases, drug resistance, and how diseases have shaped human evolution.
PREREQUISITE: ONE YEAR OF MAJORS’ GENERAL BIOLOGY WITH LABORATORY

BIL232 Populations, Resources and the Environment
3 credits Offered By Announcement Only
Populations and their interrelationships with the environment. Human demographics, and natural resource issues including compatible development and landscape changes.
PREREQUISITE: ONE YEAR OF GENERAL BIOLOGY WITH LABORATORY.

BIL236 Ecology Lab
1 credit Fall & Spring Semester
Lab and field exercises in ecology. Some Saturday field trips required.
PREREQUISITE: PREREQUISITE OR COREQUISITE: BIL 235.

BIL332 Ecology and Land Use in the Galapagos
3 credits Fall Semester
Principles and concepts of wildlife conservation and management.
PREREQUISITE: BIL 250 OR PERMISSION OF INSTRUCTOR
BIL433 Conservation in Practice
3 credits Fall Semester
PREREQUISITE: BIL 432 OR PERMISSION OF INSTRUCTOR

BILS39 Wildlife Resource Philosophy and Policy
3 credits Offered By Announcement Only
Attitudes, philosophy, and policies that govern management of wildlife resources worldwide. Methods to influence public support for implementation of sound wildlife resource management.
PREREQUISITE: BIL 332.

Ecosystem Science and Policy
ECS201 Seminar Series in Contemporary Environmental Issues I
1 credit Fall Semester
Current environmental topics involving interaction of science and policy.

ECS202 Seminar Series in Contemporary Environmental Issues II
1 credit Spring Semester
Current environmental topics involving interaction of science and policy.

ECS301 Tools for Environmental Decision-Making: The Quantitative Perspective
3 credits Fall Semester
Quantitative decision-making techniques and methodologies.
PREREQUISITE: ECS 111, 112.

ECS302 Perspectives on Environmental Decision Making
3 credits Fall & Spring Semester
Analytical techniques to assess human impacts on the environment. Team-taught by faculty from law, ethics, anthropology and economics with experience in local, regional and global environmental management issues.
PREREQUISITE: JUNIOR STANDING OR PERMISSION OF THE INSTRUCTOR

ECS433 Conservation in Practice
3 credits Fall Semester
PREREQUISITE: BIL 432/ ECS 432 OR PERMISSION OF INSTRUCTOR

ECS501 Interdisciplinary Environmental Theory
3 credits Fall Semester
Theoretical approaches in environmental and social science fields, including conservation biology, ecology, geography, economics, sociology, anthropology, philosophy, and interdisciplinary approaches. Themes include human ecology, historical ecology, landscape ecology, environmental law and ethics, perception of risk and uncertainty, vulnerability and adaptation, and environmental valuation.
PREREQUISITE: SENIOR OR GRADUATE STANDING IN ECS

Geography
GEG370 Conservation of Resources
3 credits Offered By Announcement Only
Problems of resource availability in an urban-industrial society.
PREREQUISITE: ANY 100 OR 200-LEVEL GEOGRAPHY COURSE.
GEG522 Urbanization in the Developing World  
3 credits Spring Semester  
Patterns and processes in large cities in the developing world are examined.  
PREREQUISITE: ANY 100 OR 200 LEVEL COURSE IN GEOGRAPHY OF PERMISSION FROM INSTRUCTOR.

GEG530 Resources and Society  
3 credits Offered By Announcement Only  
This course examines the relations between human society and material nature from within a broad theoretical perspective, relating questions of science, culture, and technology to the politics and economics of natural resources, focusing particularly on water, food, and petroleum.  
PREREQUISITE: 300-LEVEL COURSE IN HUMAN GEOGRAPHY OR PERMISSION OF INSTRUCTOR.

Geological Sciences  
GSC106 Geological Influences on Society  
3 credits Spring Semester  

GSC107 Natural Disasters - Hollywood Vs. Reality  
3 credits Spring Semester  
This course will explore the causes, effects and societal responses to disasters. We will look at a variety of natural hazards and related disasters including flooding, volcanoes, landslides, earthquakes, hurricanes, tsunami and drought. Using excerpted segments of "disaster films" in conjunction with scientific treatments, we can identify the causes, frequency, consequences, risks, and public perceptions of natural hazards.  
PREREQUISITE: NONE

GSC515 Applied Environmental Geology  
3 credits Spring Semester  
An advanced undergraduate/graduate course providing knowledge and methods for effective environmental site surveys, to be presented in a weekly 3-hour lecture and discussion. The course will cover policies and regulation including applied practice to comply with safe environmental conduct and valid assessment. Case study, best management practice, and appropriate field equipment and approaches will complement two one-day field trips associated with this course.  
PREREQUISITE: PERMISSION OF INSTRUCTOR OR DEPARTMENT CHAIR.

History  
HIS229 Consumer Society: A Global History  
3 credits Spring Semester

HIS368 Nature and the Environment in American History  
3 credits Offered By Announcement Only  
Shifting attitudes toward nature and the environment in American history; the rise of environmentalism and changes in public policy related to environmental conservation and preservation.
International Studies
INS101 Global Perspectives
3 credits Fall & Spring Semester
Introduces students to the study of international relations focusing on the continuing threat of national and ethnic conflict; terrorism; environmental and health concerns; globalization; economic interdependence, and poverty. Students are provided an overview of the evolution of international affairs in the modern era and are introduced to the various scholarly approaches for an understanding of international affairs.

INS102 Global Economics
3 credits Fall & Spring Semester
The international economy. This course develops the analytical tools underlying “the economic way of thinking” and applies them to two main topics: the environment and international trade.

INS201 Globalization and Change in World Politics
3 credits Fall & Spring Semester
The academic and public policy debates regarding the multiple impacts of the globalization of the world economy on the politics of nation-states and on the dynamics of the international system itself.
PREREQUISITE: INS 101 OR PERMISSION OF INSTRUCTOR.

INS322 Economics of Development and the Environment
3 credits Fall Semester
Structural changes that accompany economic growth that impact the environment and sustainable development.
PREREQUISITE: INS 102 OR ECON 211 AND 212, OR PERMISSION OF INSTRUCTOR.

INS421 Poverty and the Environment
3 credits Spring Semester
The processes by which a growing economy creates wealth in the form of goods and services while simultaneously increasing poverty and pollution.
PREREQUISITE: INS 102 OR PERMISSION OF INSTRUCTOR.

Latin-American Studies
LAS320 Special Topics in Latin American and Caribbean Environment
3 credits Offered By Announcement Only
Topics vary. Interdisciplinary focus on policies and impact on globalization on the environment.
PREREQUISITE: PREREQUISITES VARY - SEE COURSE OFFERINGS FOR DETAILS

LAS321 Latin American Environmental Issues
3 credits Fall Semester
PREREQUISITE: LAS 101 OR PERMISSION OF INSTRUCTOR

LAS520 Interdisciplinary Topics in Latin American and Caribbean Environments
3 credits Fall & Spring Semester
Topics vary. Interdisciplinary focus on policies and impact of globalization on the environment.
PREREQUISITE: LAS 101 AND SENIOR STATUS
LAS521 Latin American Environmental Issues
3 credits Fall Semester
PREREQUISITE: LAS 101 AND SENIOR STATUS, OR LAS 501, OR PERMISSION OF INSTRUCTOR

Political Science
POL323 Global Warming, Politics and the European Union
6 credits First & Second Summer Session
The European Union (EU) and especially France to ecologically modernize their advanced economies. The course will treat the EU effort to fashion an international agreement on climate change. This class is conducted in Paris, France.
PREREQUISITE: THREE (3) CREDITS IN THE SOCIAL SCIENCES.

POL370 Global Energy Politics
3 credits Offered By Announcement Only
PREREQUISITE: POL 201 OR 203

POL531 Global Environmental Politics
3 credits Offered By Announcement Only
Examination of the environment within the context of economic globalization. Contrasts the international trading regime and those regimes designed to protect the environment, with specific attention to the issues of global warming and biodiversity.
PREREQUISITE: POL 203

POL545 Environmental Policymaking
3 credits Spring Semester
Examination of different ethical approaches to the environment; the federal government’s management of natural resources; selected environmental policies; international environmental policy issues. Topics include federal management of national grazing lands, national forests, and minerals in the public domain. Analyzes environmental policies such as air, water, toxic wastes, energy, and environmentally-related issues in international trade and national security.
PREREQUISITE: POL 201 OR POL 203

Sociology
SOC341 Social and Cultural Change
3 credits Offered By Announcement Only
Survey of major theories of change; analysis of the processes and mechanisms of change. Contemporary transitions in the underdeveloped regions of the world.
PREREQUISITE: SOC 101.

SCHOOL OF BUSINESS

Economics
ECO345 Environmental Economics
3 credits Fall Semester
This course determines the appropriate way to regulate economic activity so as to achieve an optimal balance between competing environmental and economic goals. Economic reasoning is used to evaluate causes and consequences of environmental problems. The course rigorously evaluates various types of environmental regulation, including "cap-and-trade," command and control mandates, and pollution taxes. Other specific topics include
public goods, externalities, cost benefit analysis, non-market valuation, and international trade and development and the environment.

PREREQUISITE: ECO 211 & ECO 302

ECO545 Natural Resources Economics II
3 credits Offered By Announcement Only
This course surveys the economics of natural resource use, and is targeted to upper-division undergraduate and graduate students in economics. Topics include the economics of pollution control, the application of cost/benefit analysis to the marine environment, the economics of non-renewable and renewable resource extraction, and international environmental problems.
PREREQUISITE: ECO 345 or MAF 502.

COLLEGE OF ENGINEERING

Civil and Architectural Engineering
CAE240 Environmental Pollution
3 credits Spring Semester
Exploration of contemporary environmental issues. Introduction to engineering approaches for protecting and cleaning up the environment, techniques for assessing the impact of human activity on the environment, strategies for pollution control and implementation of environmental mitigation measures.
PREREQUISITE: SOPHOMORE STANDING.

CAE340 Introduction to Environmental Engineering
3 credits Fall & Spring Semester
Environmental mass and energy balances, introduction to environmental chemistry, air pollution, water pollution, sustainable solid waste management, risk assessment, and global atmospheric change are discussed.
PREREQUISITE: MTH 112, CHM 111 OR 151 OR PERMISSION OF INSTRUCTOR.

CAE430 Water-Resources Engineering I
3 credits Spring Semester
Basic principles of open channel flow. Computation of water surface profiles. Design of hydraulic structures, design of lined and unlined open channels, and design of sanitary sewer systems. Introduction to hydrology and analysis of hydrologic data. Rainfall characteristics and peak runoff models.
PREREQUISITE: CAE 330

CAE530 Water Resources Engineering II
3 credits Fall Semester
Water quality regulations, fate and transport processes, water-quality control in rivers, lakes, wetlands, oceans, and ground water are discussed.
PREREQUISITE: CAE 430

CAE560 Sustainable Construction
3 credits Offered By Announcement Only

PREREQUISITE: SENIOR STANDING IN ARCHITECTURE OR ENGINEERING AND PERMISSION OF INSTRUCTOR

CAE581 Energy-Efficient Building Design
3 credits Offered By Announcement Only
Concepts and methods of energy-efficient and environmentally friendly building design. Topics include energy and sustainable design strategies, climate, passive and active solar design, passive cooling systems, day lighting, and computer simulation of energy flows in buildings. A quantitative understanding of energy fundamentals, examples from practice, and design exercises using computer simulation programs are emphasized.

PREREQUISITE: MAE 303 OR PERMISSION OF INSTRUCTOR.

Mechanical Engineering
MAE119 Energy and Environment
3 credits Fall Semester
Conventional energy systems; environmental problems caused by energy carriers and energy consumption; the greenhouse effect, acid rain, and pollution; need for cleaner energy sources; environmental and other characteristics of unconventional energy sources; synthetic energy carriers and their environmental characteristics; possible solutions to energy available and related environmental problems; solar-hydrogen energy system.

PREREQUISITE: FRESHMAN STANDING.

MAE510 Fundamentals of Solar Energy Utilization
3 credits Spring Semester
Fundamentals basic to the design and performance analysis of thermal systems for the capture and utilization of Solar Energy.

PREREQUISITE: MAE 303, MTH 211 AND PHY 207.

MAE520 Air Pollution
3 credits Spring Semester
Course topics include fundamentals of air pollution, air quality, properties of air pollutants, effect of pollutants on the environment, analysis and modeling, diffusion of pollutants, and air pollution control.

PREREQUISITE: MAE 303, 309/CAE 330 OR PERMISSION OF INSTRUCTOR.

MAE540 Energy Conversion
3 credits Spring Semester
Course topics include energy conversion, utilization, present and projected consumption of energy, thermodynamic principles, nuclear energy, fission and fusion reactions, hydroelectric power, and solar energy. Alternative energy sources, the hydrogen economy, and the energy-environment-economy system are also discussed.

PREREQUISITE: SENIOR STANDING IN MECHANICAL AND AEROSPACE ENGINEERING OR PERMISSION OF INSTRUCTOR.

ROSENSTEIL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE

Applied Marine Physics
AMP590 Sustainable Fisheries - Assessment and Conservation
3 credits Spring Semester
This is the second of a three course series. This course will focus on advanced stock assessment techniques using acoustics and optics. It will cover, for example: - History of sampling fish stocks - "from catching to measuring fish” – Measuring with underwater sound and light - Sounds and echoes in marine ecosystem – Survey of fish stocks and their habitat.

PREREQUISITE: MSC 471, OR EQUIVALENT.

**Marine Affairs**

MAF501 Political Ecology of Marine Management
3 credits Spring Semester
Course provides grounding in political ecology as an important theoretical approach to resource policy and management. The social analysis of resource use, social change, and development are discussed. Models of development and concepts of nature related to resource use and policy formation is also included. Within this framework, ethnicity, class, and the politics of conservation are explored.

PREREQUISITE: MAF 505.

MAF510 Environmental Planning and the Environmental Impact Statement
3 credits Spring Semester
Course takes a broad view of environmental planning and analysis while focusing specifically on the preparation of environmental impact statements. Statutory requirements and procedures at the federal level are examined. Judicial opinions are studied that reflect environmental disputes and controversies. The course also considers some of the substantive requirements of environmental impact analyses.

MAF518 Coastal Zone Management
3 credits Fall Semester
Development of a framework for formulation and assessment of coastal zone policy. Analysis of issues and conflicts in coastal zone management (CZM), such as: zoning and planning, coastal and beach protection, ecosystem protection, the federal flood insurance program, adaptations to sea level rise, coastal pollution from land-based sources, and tourism impacts.

MAF520 Environmental Law
3 credits Fall Semester
An introductory course focusing on environmental problems. The study of Regulatory legislation, common law, and administrative law. Topics include toxic substances, air and water pollution, and habitat and species protection.

PREREQUISITE: PERMISSION OF INSTRUCTOR.

**Marine Biology and Fisheries**

MBF575 Current Applications of Ecological Theory
3 credits Offered By Announcement Only
Course examines current applications of ecological theory. Topics include issues of stress ecology, methodologies for evaluating stress responses, methodologies for ecological risk assessment, general systems theory, and human/environmental interactions. Lecture, 3 hours.

PREREQUISITE: PERMISSION OF THE INSTRUCTOR.

**Marine Geology and Geophysics**

MGG533 Environmental Geology
3 credits Offered By Announcement Only

**Marine Science**
MSC118 Current Weather Topics
1 credit Spring Semester
Weather and Climate-related phenomena such as hurricanes, severe storms, global warming, and acid rain. (Notes and analysis materials provided)

MSC300 Water Resources: History, Management, and Policy
3 credits First & Second Summer Session
This course is intended to develop an overview of the issues and problems surrounding the management of aquatic resources in the broadest sense including water quality of natural waters, drinking water, water pollution, water quantity and supply issues, watershed management, wetland protection, and coastal management. We will explore the available strategies to wisely manage the various aquatic resources, policy options and their socio-economic aspects, legal frameworks, and institutional arrangements. The examples and cases discussed in the course will largely come from China, Vietnam, and the US.

MSC345 Economics of Natural Resources and the Environment
3 credits Spring Semester
A comprehensive overview of the economics of national, international, and global environmental problems. A unifying theme throughout is sustainable development defined as "maximizing the net benefits of economic development while maintaining the services and quality of natural resources over time". We will use economic reasoning to examine causes and consequences of environmental and resource problems, and measures for dealing with them.
PREREQUISITE: ECO 211

MSC400 Water Quality Assessment and Environmental Forensics
3 credits First & Second Summer Session
This course is intended to provide the scientific basis for understanding water quality issues and how water pollution can adversely affect the health of humans and ecosystems. Following basic introduction to the scientific concepts we will investigate numerous case studies using a forensic approach to unravel the mystery surrounding "how, why, and who" was responsible for specific water pollution cases that caused adverse human and/or ecological health effects. The course will have a capstone research project that will involve both laboratory and field investigations into a specific pollution problem.

MSC410 Marine Conservation Science
3 credits Offered By Announcement Only
Nature of marine biodiversity, what threatens it, and what can be done to recover the biological integrity of estuaries, coastal seas, and oceans. Topics include: distinctive aspects of marine populations and ecosystems; threats to marine biological diversity, singly and in combination; place-based management of marine ecosystems; and the human dimensions of marine conservation.
PREREQUISITE: MSC 230.
RSMAS-General
RSM510 Environmental Ethics
3 credits Fall Semester
This course will introduce students to a variety of key issues and concepts in environmental ethics. The course will be a joint scientific and philosophic collaboration, exploring the ethical dimensions of controversial and emerging issues in biotechnology and the environment. After students are exposed to the scientific background of various actual case studies focusing on current environmental and social impact, the ethical and philosophical issues raised by the discussions will be explored using the tools and methods of analytic philosophy. The course will develop the student’s ability to construct and evaluate philosophical arguments in the field of environmental ethics, and to reason philosophically on numerous questions in contemporary applied ethics. PREREQUISITE: ALTHOUGH THERE ARE NO PHILOSOPHY PREREQUISITES FOR THIS COURSE, PERMISSION OF INSTRUCTOR IS REQUIRED.

RSM520 Climate and Society
3 credits Spring Semester
This course is designed to provide students from different disciplinary backgrounds with an overview of physical processes, general concepts and policy debates surrounding climate issues.

RSM570 Carbon and Climate
3 credits Offered By Announcement Only
This course is designed to provide students from different disciplinary backgrounds with an overview of the underlying processes, concepts, and policy debates surrounding the issue of carbon emissions and climate change. Individual faculty from RSMAS and elsewhere will lecture on cutting-edge research areas. Topics covered include: climate modeling and climate policy. PREREQUISITE: GRADUATE OR SENIOR STANDING AT RSMAS, OR PERMISSION OF INSTRUCTOR.

SCHOOL OF NURSING AND HEALTH STUDIES

Healthcare Sciences
HCS309 Health and Environment
3 credits Fall & Spring Semester
This course examines health issues, scientific understanding of causes and possible future approaches to control of the major environmental health problems. Topics include how the body reacts to environmental pollutants; physical, chemical, and biological agents of environmental contamination; vectors for dissemination; susceptible populations; the scientific bases for policy decisions and emerging global environmental health problems. PREREQUISITE: HCS 206