UF UNIVERSITY of FLORIDA

School of Natural Resources and Environment
A university-wide program in ecology, environmental science, and sustainability

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Info

Request: EVR2001 Introduction to Environmental Science
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Responses

Course Prefix and Number : EVR2001
Course Title: Introduction to Environmental Science
Request Type: Change GE/WR designation (selecting this option will open additional form fields below)
Effective Term: Earliest Available **Effective Year:** Earliest Available
Credit Hours : 3
Prerequisites: None
Current GE Classification(s): None
Current Writing Requirement Classification : None **One-semester Approval?:** No
Requested GE Classification: B
Requested Writing Requirement Classification: None

Introduction to Environmental Science

EVR2001 Section 02DG (3 credit hours)
Spring Semester 2016
Anderson Hall, Room 0013
Tuesday Period 7 (1:55 PM- 2:45 PM) and Thursday, Periods 7-8 (1:55 PM- 3:50 PM)

Instructor
Danny Coenen, Ph.D.
Office Location: McCarty C, Room 409
Office Hours: Tuesday 12 PM – 1 PM, Thursday 12:50 PM – 1:30 PM, or by appointment
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Course web site: http://lss.at.ufl.edu (e-learning in Canvas)

Course Description
Delivered from a systems perspective, an interdisciplinary approach explores contemporary environments that are comprised of both human and non-human elements. Explores physical, chemical, and biological processes to understand pressing environmental challenges and cultural values, attitudes, and norms expressed by individuals and populations around the globe.

Course Overview and Purpose
Environmental Science is an interdisciplinary academic field that integrates physical, biological, and social sciences for the study of environmental systems, processes, constraints, and problems. Throughout history, nature has contributed to shaping human culture. In turn, a growing human population and continued economic and technological development subjects the environments of our planet to a large number of stresses, in some cases threatening their persistence and often resulting in undesirable consequences for humanity. The interdependence of physical, biological, and cultural aspects in shaping contemporary environments lies at the heart of environmental science.

This general education course introduces students to environmental science as an academic field to improve their environmental literacy while developing skills in scientific reasoning, interdisciplinary thinking and analysis of complex social-ecological environmental issues. Heavy emphasis is placed on international perspectives on environmental problems and solutions to emphasize the important role of culture in environmental matters.

Prerequisites
None

Required Textbook
William P. Cunningham and Mary Ann Cunningham. Environmental Science, 13th Edition. 2015. ISBN: 9780073532547.
Additional required readings will be made accessible via Canvas.

General Education Objectives and Student Learning Outcomes
This course is a physical (P) and biological (B) sciences as well as International (N) subject area course in the UF General Education Program.
Biological science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the life sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern biological systems. Students will formulate empirically-testable hypotheses derived from the study of living things, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

Physical science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the physical sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern physical systems. Students will formulate empirically-testable hypotheses derived from the study of physical processes, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

International courses provide instruction in the values, attitudes and norms that constitute the contemporary cultures of countries outside the United States. These courses lead students to understand how geographic location and socioeconomic factors affect these cultures and the lives of citizens in other countries. Through analysis and evaluation of the students' own cultural norms and values in relation to those held by the citizens of other countries, they will develop a cross-cultural understanding of the rest of the contemporary world.

These general education objectives will be accomplished in the context of this course through the following objectives:

1) Students will understand the process of scientific inquiry and gain the ability to apply scientific principles in cross-cultural and interdisciplinary contexts.
2) Students will be able to explain that ecosystems are comprised of physical and biological elements whose interactions engender ecosystem functions that provide humanity with a diverse array of ecological services.
3) Students will be able to describe the complex and diverse relationships between humans and environments around the world, including how cultural values shape patterns of resource use and valuation of ecological services.
4) Students will be able to compare and contrast non-renewable, exhaustible, and inexhaustible material and energy resources, the physical and biological processes through which they are created, and associated environmental constraints.
5) Students will be able to develop and communicate interdisciplinary approaches to evaluating and proposing solutions for environmental problems, taking into account scientific and socioeconomic information, including cultural and political constraints.
6) Students will gain the ability to consider environmental impacts of behaviors, choices, and activities into everyday decision making in their personal lives.

Specific weekly learning outcomes are listed in the course timeline. At the end of the course, students will have achieved the following student learning outcomes (SLOs) in content, communication, and critical thinking:

Category	Institutional Definition	Institutional SLO
Content	Content is knowledge of the terminology, concepts, methodologies and theories used within the subject area.	Students demonstrate competence in the terminology, concepts, methodologies and theories used within the subject area.

1.) Students will identify, describe, and explain the basic concepts, theories and terminology of natural science and the scientific method in environmental science. They will identify, describe, and explain the major scientific developments within the subject area and the impacts on society and the environment. They will identify, describe, and explain relevant processes that govern biological and physical systems within the subject area.

Implementation: Through lecture, discussion, readings, and activities, students will acquire knowledge of the physical and biological structures and processes that shape Earth's ecosystems, natural resources, and environmental issues.

Assessment: Achievement of these learning outcomes will be assessed through two examinations, two quizzes, weekly engagement preparation assignments, and graded in-class activities (part of students' class attendance and engagement grade).

2.) Students will identify, describe, and explain the values, attitudes and norms that shape the cultural differences of peoples who live in countries other than the United States. They will identify, describe, and explain the roles of geographic location and socioeconomic factors on the lives of citizens in other countries.

Implementation: Through lecture, discussion, readings, and activities, students will acquire knowledge of how Earth's ecosystems, natural resources, and environmental issues vary by geographic location, and how they are differently impacted by humanity in various cultural contexts.

Assessment: Achievement of these learning outcomes will be assessed through two

examinations, two quizzes, weekly engagement preparation assignments, and in-class activities (part of students' class attendance and engagement grade).

Critical Thinking	Critical thinking is characterized by the comprehensive analysis of issues, ideas, and evidence before accepting or formulating an opinion or conclusion.	Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the subject area.

1.) Students will formulate empirically-testable hypotheses derived from the study of physical processes or living things within the subject area. They will apply logical reasoning skills effectively through scientific criticism and argument within the subject area. They will apply techniques of discovery and critical thinking effectively to solve experiments and to evaluate outcomes.

Implementation**:** Critical thinking is key to understanding the complex social-ecological systems that shape our planet, and required to gain tangible skills needed to apply scientific principles necessary to address contemporary and emerging environmental issues. A key part of critical thinking in science is the formulation of hypotheses and applying sound methodologies to observationally or experimentally support or reject these hypotheses. These skills will be taught to students through lecture and reading materials, and applied through discussion, activities, and assignments.

Assessment: Achievement of this learning outcome will be assessed through multiple means. Students will work with physical, biological, and hybrid datasets for hypothesis formulation and testing as part of engagement preparation assignments and graded in-class activities. The international environmental case study presentation assignment prompts teams of students to apply scientific skills to propose biologically and physically possible, economically feasible, and culturally appropriate solutions to environmental problems. The final essay will prompt students to critically reflect on how material learned throughout the semester has influenced their personal and professional outlook on environmental issues.

2.) Students will analyze and evaluate their own cultural norms and values in relation to those held by citizens in other countries.

Implementation**:** Students will compare and contrast course concepts as they apply to international case studies to highlight commonalties and key differences in how environmental problems arise and are addressed in different cultural and socioeconomic contexts. These case studies are part of the weekly curriculum and will be explored through lecture, discussion, and activities.

Assessment: For the global article analysis assignments, students will critically compare international and domestic perspectives on environmental topics. The international environmental case study presentation assignment prompts teams of students to apply scientific skills to propose biologically and physically possible, economically feasible, and culturally appropriate solutions to environmental problems. In-class activities (part of students' class attendance and engagement grade) complement assessment of this learning objective.

Communication	Communication is the development and	Students clearly and effectively

expression of ideas in written and oral forms.	communicate knowledge, ideas, and reasoning in written or oral forms appropriate to the subject area.

1.) Students will communicate scientific findings clearly and effectively using oral, written and/or graphic forms.

Implementation: Being able to communicate scientific concepts clearly, both orally and in writing, are essential skills. This includes the ability to communicate scientific and social aspects of environmental issues.

Assessment: Achievement of this learning outcome will be assessed through students' participation in class discussions (part of students' class attendance and engagement grade), the clarity of information dissemination in the international case study presentation, and the various writing assignments in this class.

Grading Policies

The final grade for this course is based on a 1000 point scale and will be weighted as follows:

Grade Component	**Points**	**Percentage**
Class Attendance and Engagement	100	10.0 %
Engagement Preparation (13 × 10 points)	130	13.0%
Global Article Analyses (4 × 30 points)	120	12.0%
International Environmental Case Study Presentation	150	15.0%
Final Essay	150	15.0%
Quizzes (2 × 25 points)	50	5.0%
Exam 1	150	15.0%
Exam 2	150	15.0%
Total	**1000**	**100%**

Grading scale

Grade	Points	Percent	Grade	Points	Percent
A:	930-1000	93.0-100.0%	C:	730-769	73.0-76.9%
A-	900-929	90.0-92.9%	C-	700-729	70.0-72.9%
B+:	870-899	87.0-89.9%	D+:	670-699	67.0-69.9%
B:	830-869	83.0-86.9%	D:	630-669	63.0-66.9%
B-	800-829	80.0-82.9%	D-	600-629	60.0-62.9%
C+:	770-799	77.0-79.9%	E:	0-599	0.0-59.9%

Class Attendance and Engagement: Students significantly contribute to creating a comfortable and productive learning environment by attending and participating in class. Students are encouraged to challenge themselves and others' ideas and thoughts in a collegial manner. Each student's contribution is valuable to our class. Grades are based on attendance, as well as frequency and quality of student contributions to the class.

Engagement Preparation: Students complete readings and respond to questions that reinforce the read material prior to the Tuesday class. Emphasis will be placed on developing and applying scientific reasoning skills, such as formulating hypotheses and interpreting empirical data. There are 13 total engagement preparations to be completed during the semester. Responses to questions are to be submitted online no later than the beginning of class. Grades are based on quality and completeness of the work submitted.

Global Article Analysis: Students identify an environmental topic covered in class and locate two related articles (news, popular, or refereed). One article will cover the topic from a domestic perspective, while the other article covers the same topic from an international perspective. Students critically analyze the biological, physical, and cultural differences between domestic and international perspectives on the selected topic in a 2-page essay. There are four total global article analyses, which are due by 11:59 PM on the due date. Grading is based on quality and completeness of the work submitted, as well as clarity of writing.

International Environmental Case Study Presentation: Teams of students apply scientific methodology to formulate and disseminate a biologically and physically possible, economically feasible, and culturally appropriate solution to a controversial environmental issue outside of the United States to the class. Team presentations are no more than 8 minutes in length, and creativity of visual and oral dissemination methods is encouraged. Teams are assigned to present during Thursday meetings throughout the semester. Grading is based on clarity and quality of presentation materials and narration, plausibility of the proposed solution, and creativity in presentation design and information dissemination.

Final Essay: Upon completion of the class, students will write a 1500-word reflection essay highlighting the impact of class on the student as an individual and ways in which the class changed how the student approaches environmental science issues on personal and professional levels. Grading is based on the quality of writing and cohesiveness of the narrative, and specificity with respect to referencing particular materials, assignments, and activities.

Quizzes: There are two quizzes, which may or may not be announced ahead of time. They will assess if students are keeping up with and understanding course material.

Exams: There are two 50-minute exams during the semester that will assess comprehension of course content using a variety of question styles, including multiple choice, fill-in-the-blanks, short answer, and matching. Grading is based on the number of correct answers.

Specific grading criteria for each assignment will be provided via Canvas. Students are responsible for maintaining duplicate copies of all work submitted in this course and retaining all returned, graded work until the semester is over. Should the need arise for a re-submission of papers or a review of graded submissions, it is the student's responsibility to make these materials available. In case of a grading dispute, students must notify the instructor via e-mail within three days of the date the assignment is returned in class or on Canvas.
Information on current UF grading policies for assigning grade points can be found at https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx. A minimum grade of C is required for general education credit.

Course Policies

Attendance Policy: On-time attendance is mandatory. Students are permitted two unexcused absences without penalty. Additional unexcused absences incur a score of zero for the day's Class Attendance and Engagement. Every third time a student is tardy, defined as entering the classroom after the instructor has taken attendance, a score of zero is entered for that day's Class Attendance and Engagement. If a student accumulates more than eight unexcused absences during the semester, they will be assigned a failing course grade.
Absences due to academic conferences, religious holidays, and certain university-sponsored events will be excused if appropriate documentation is provided ahead of time. Absences due to illness will be excused if a doctor's note is provided within one week of returning to class. Undocumented illnesses will not be excused.
If absent, it is the student's responsibility to make themselves aware of all due dates via the course e-learning site and/or contacting the instructor. Students are still responsible for turning assignments in on time unless an extension has been requested via e-mail and approved by the instructor prior to the deadline. In case of true documented emergencies, the instructor may waive this requirement at his discretion.

Make-up Policy: Work missed due to excused absences can be made up. For absences excused ahead of time, the instructor will develop a make-up plan and schedule. In case of documented illnesses or emergencies, arrangements for completing make-up exams or assignments should be made upon return to class. If experiencing truly extenuating circumstances resulting in longer absences, the instructor should be notified as soon as possible to develop a plan to make up missed work. Any requests for make-ups due to technical issues must be accompanied by the ticket number from e-Learning Support Services when the problem was reported to them. The ticket number will document the time and date of the problem. The instructor must be e-mailed within 24 hours of the technical difficulty if you wish to request a make-up. Please refer to the section of Campus Helping Resources in this syllabus for contact information for the e-Learning Support Services.
More information regarding class attendance and make-up policies for class work are consistent with University of Florida policies and can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

Late Work: For each day written course assignments are submitted late, I will subtract 10% from the assignment grade. If the assignment is more than five days late, a score of 0 will be entered. I highly recommend starting work on assignments early to preclude unexpected emergencies or late-semester stress from compromising your grade. If extended deadlines are not met, late penalties will be assessed based on the original, not the revised due date! Finally, please do not wait until the end of the semester to discuss problems with the course material or performance in class. Your performance and success are important to the instructor and University of Florida, so please contact the instructor to discuss your concerns as soon as they arise.

Office Hours: Please take advantage of office hours to discuss any questions or concerns. The instructor may also summon a student to his office hour. If you cannot be present for the regularly scheduled office hour, the instructor will attempt to accommodate you at an alternate time.

Course Communications and Technology: The preferred way to get ahold of me outside of class and office hours is via e-mail addressed to dcoenen@ufl.edu. All students are expected to check the course web site on Canvas (http://lss.at.ufl.edu) on a daily basis. Please ensure that you have access to this service. Grades are posted there.

University of Florida Policies

Academic Honesty and Plagiarism
Academic honesty and integrity are fundamental values of the University community. University of Florida students are bound by The Honor Pledge, which states "*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code*. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "*On my honor, I have neither given nor received unauthorized aid in doing this assignment*"." The UF Honor Code is available in its full form at http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/ . It specifies a number of behaviors that are in violation of this code and the possible sanctions. You should be sure to read and understand the Honor Code in its entirety. Furthermore, you are obligated to report any conditions that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor of this class.
The instructor emphasizes that **PLAGIARISM, WHETHER INTENTIONAL OR UNINTENTIONAL, IS A SERIOUS, AND POTENTIALLY CAREER-ENDING FORM OF ACADEMIC MISCONDUCT.**

Software Use
All UF faculty, staff and students are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, appropriate disciplinary action will be taken.

Students with Disabilities
Students requesting accommodation for disabilities must first register with the Disability Resource Center (DRC). The DRC coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer

equipment, providing interpretation services and mediating faculty-student disability related issues. Upon registering, the DRC will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations. The DRC may be contacted by visiting 001 Reid Hall, calling 352-392-8565, or visiting their web site at www.dso.ufl.edu/drc/ .

Course Evaluation
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester. Students will be given specific times when the evaluations are available. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being or academic performance are strongly encouraged to talk to the instructor or take advantage of the university's counseling resources, available at no cost for currently enrolled students.

- *University Counseling Center & Wellness Center*, 3190 Radio Rd., 392-1575. Personal and career counseling, as well as therapy for anxiety, stress and mental health issues. http://www.counseling.ufl.edu/cwc/
- *Teaching Center*, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. http://teachingcenter.ufl.edu/
- *Writing Studio, 302 Tigert Hall,* 846-1138. Help brainstorming, formatting, and writing papers. http://writing.ufl.edu/writing-studio/
- *Library Support*, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.
- *E-learning technical support*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.
- *Sexual Assault Recovery Services (SARS)*, Student Health Care Center, 392-1161. Sexual assault counseling.
- *Career Resource Center*, Reitz Union, 392-1601. Career assistance and counseling. http://www.crc.ufl.edu/
- *University Police Department,* 392-1111 (or 9-1-1 for emergencies). http://www.police.ufl.edu/

Course Topics, Timeline, and Detailed Learning Objectives

Each week, we will explore an environmental science topic from a cross-cultural, international perspective. Class meetings provide content through lecture, discussion, and activities. Class meetings are structured as follows:

Tuesday: Content is delivered to students through lectures, videos, and guest speakers.

Thursday: During the first period, the lecture from Tuesday is continued. During the second period, the learned material will be reinforced and applied through individual and team-based discussions and activities.

Date	Topic	Specific Foci	Assignments Due
Week 1 Jan 5-7	Understanding the Global Environment	What is Environmental Science? Scientific process and inquiry Human and cultural pressures	none

Week 1 Learning Objectives in Physical(P)/Biological (B), and International (N) Subject Areas:
P/B: Students will review what science is, how scientific research is conducted and disseminated, and be introduced to environmental science as an interdisciplinary academic field. In teams, students will be assigned a physical or biological science issue and will practice how to formulate valid hypotheses and propose methodologies for testing their hypotheses.

N: Students will be introduced to the importance of cultural and socioeconomic contexts in environmental science through an overview of environmental issues in different countries.

Week 2 Jan 12-14	Geology and Biogeochemistry	Biogeochemical Cycles (C, N, P) Geology and Earth Systems	Engagement Prep. (T)

Week 2 Learning Objectives:
P/B: Students will understand how carbon, nitrogen, and phosphorus cycle through the earth system via physical, chemical, and biological pathways. Students will review how plate tectonics creates a dynamic planet with volcanism and earthquakes.
N: Students will explore differences in resilience to natural disasters between different countries by comparing impacts of the 2010 Haiti earthquake and the 2011 Tōhoku earthquake in Japan.

Week 3 Jan 19-21	Ecosystems	Biomes - Global Pattern of Life Ecosystem structure Ecosystem functions Ecosystem services	Engagement Prep. (T)

Week 3 Learning Objectives:
P/B: Students will learn what biomes are and how climatic constraints are the primary driver of differentiation between them. Students will further gain an understanding how ecosystem structure and function engender ecological services benefitting humanity.
N: Cultural services are one of the four major categories of ecosystem services. Students will explore how nature shapes human culture and well-being in different contexts, and how cultural values shape natural resource extraction preferences and patterns.

Week 4 Jan 26-28	Biodiversity	Evolutionary Mechanisms Measures of Biodiversity	Engagement Prep. (T) Global Article Analysis (R)

Week 4 Learning Objectives:
P/B: Students will understand what biodiversity is and be able to explain how it arises through evolutionary mechanisms. Concepts of island biogeography are explored. Students will work with species abundance datasets to formulate and test hypotheses regarding diversity of different ecosystems using Simpson's Diversity Index.
N: Students will evaluate impacts of invasive species on islands with high endemism, specifically the Galapagos and New Zealand.

Week 5 Feb 2-4	Population Dynamics Human Geography	Human Population Dynamics Demography I=PAT Relationship	Engagement Prep. (T)

Week 5 Learning Objectives:
P/B: Students will learn fundamental concepts in demography and learn how rapid human population growth creates pressures on natural resources and ecosystems. They will formulate hypotheses regarding interrelationships between population growth, economic development, and natural resource depletion and support or reject them by referencing data visualized by the Gapminder World web-based software application.
N: Students will compare and contrast population dynamics in Japan, China, and India, with a focus on how culture and economic development influence growth rates.

Week 6 Feb 9-11	Energy	Thermodynamics Sources and Generation Evolving Technologies	Engagement Prep. (T)

Week 6 Learning Objectives:
P/B: Students will differentiate between non-renewable, exhaustible renewable, and inexhaustible renewable energy resources and learn how they are utilized for electricity generation and transportation. Data on depletion rates of conventional and unconventional fossil fuel reserves will be evaluated to assess the longevity of the increased production of fossil fuels generated by hydraulic fracturing.
N: Students will learn about how World War II and post-war experiences have created a culture of precautionism in Germany, which has contributed to Germany's nuclear phase-out and parallel rapid deployment of wind and solar power.

Week 7	Water	Water Cycle	Engagement Prep. (T)

Feb 16-19		Water Pollution Water Use and Management	Global Article Analysis (R)

Week 7 Learning Objectives:
P/B: Students will understand the hydrologic cycle and the concept of biochemical oxygen demand in aquatic ecosystems.
N: Students will explore water policy in the former Soviet nations Kazakhstan and Uzbekistan to understand the desiccation of the Aral Sea.

Week 8 Feb 23-15	Air	Atmospheric Circulation Air Pollution Air Management	Exam 1 (T) Engagement Prep. (R)

Week 8 Learning Objectives:
P/B: Students will understand the structure and components of Earth's atmosphere, and how it influences transport of airborne pollutants. Major air pollutants and their impacts will be discussed. Data on emissions of ozone-depleting substances and subsequent impacts to the ozone layer will be assessed.
N: Students will explore the causes and impacts of smog in Beijing, China, and steps being taken to alleviate the problem.

Week 9	*No Class- Spring Break*		

Week 10 Mar 8-10	Agricultural Processes	Agricultural Practices Genetic engineering Organic agriculture	Engagement Prep. (T)

Week 10 Learning Objectives:
P/B: Students will understand environmental inputs required for food production, differences between conventional and organic agriculture, and how hybridization and genetic modification are influencing agriculture today.
N: Students learn about the challenges countries in arid regions face with respect to agricultural production. Food security and desertification in the Saharan fringe and Australian outback are discussed using case studies that illustrate the importance of cultural memory and social capital in coping with environmental degradation.

Week 11 March 15-17	Solid, Toxic, and Hazardous Waste	Environmental Health Waste management	Engagement Prep. (T)

Week 11 Learning Objectives:
P/B: Students will understand fundamental principles of toxicology, such as dose-response curves, acute vs. chronic exposure, mutagens, carcinogens, and teratogens, endocrine disrupting substances, and biomagnification.
N: Students will study the causes, impacts, and legacy of international pollution events with human and environmental health impacts, including Minamata disease in Japan and the Bhopal disaster in India.

Week 12 March 22-24	Environmental Change I	Natural Climate Variability Anthropogenic Climate Change Sea Level Rise Ocean Acidification	Engagement Prep. (T) Global Article Analysis (R)

Week 12 Learning Objectives:
P/B: Students will explore causes for variability in Earth's climate with emphasis on the differences between natural climate variability and anthropogenic climate change. Sea level rise and ocean acidification will be discussed. Students will work with CO_2 and temperature datasets.
N: Students will appreciate climate change as an environmental problem spanning many orders of magnitude in geographic scale in terms of its causes, impacts, and solutions.

Week 13 Mar 29-31	Environmental Change II	Ecological Impacts Human Impacts	Engagement Prep. (T)

Week 13 Learning Objectives:
P/B: Students will learn about climate modeling and projected impacts of climate change on species and ecosystems.
N: Students will learn that vulnerability and capacity to adapt to climate change varies widely between countries. The Netherlands and Bangladesh, two low-lying countries with high population densities, will be critically compared and contrasted in this respect.

Week 14 Apr 5-7	Environmental Economics	Economic systems Natural Resource Value	Engagement Prep. (T)

Week 14 Learning Objectives:
P/B: Students will understand basic concepts in environmental economics, including externalization of costs, market failures, and valuation of natural resources and ecosystem services with emphasis on common and public goods.
N: Students will be introduced to the concept of Payment for Ecosystem Services (PES) as a (controversial) means to finance conservation and development in developing countries.

Week 15 Apr 12-14	Environmental Policy	Environmental Laws Policy Implementation International Treaties	Engagement Prep. (T) Global Article Analysis (R)

Week 15 Learning Objectives:
P/B: Students will learn about discrepancies between scientific knowledge and assumptions inherent in environmental policies.
N: Students will learn about the contexts in which environmental laws and policies are created, and the challenges of forging international environmental legislation. Case studies include the Montreal Protocol, the Kyoto Protocol, and bilateral environmental treaties between the United States and its neighbor countries.

Week 16 Apr 19	*None*	Exam 2 (T)

The final essay must be submitted no later than Monday, April 25, at 11:59 PM via Canvas.

Course Alterations

Due to unforeseen circumstances or to enhance class learning opportunities, it may be necessary to alter the information given in this syllabus during the semester. Such changes are not unusual and should be expected. All changes to the syllabus will be announced in class and/or posted to Canvas. It is your responsibility to keep up with any syllabus changes.