IDS 2935 Unintended Consequences in the Environment

Quest 2

I. Course Information

Spring 2022

Meeting Day/Time: [T7 (1:55 PM - 2:45 PM), R7-8 (1:55 PM - 3:50 PM)]

Location: Leigh Hall, Room 0104

Primary General Education Designation: Physical Sciences

Secondary General Education Designation (if seeking): International (N)

Writing Designation (if seeking): No writing designation

A minimum grade of C is required for general education. Class resources, announcement, updates, and assignments will be made available through Canvas site.

Instructor

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Office location: G163 McCarty Hall A

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Course Description

Humans' impact on the Earth is so profound that a new geological epoch - the Anthropocene - has begun. Human decisions often have unintended effects on the environment. For example, Indonesia government jeopardized the conservation efforts of the Javan hawk eagle by declaring it a National Rare animal. In another example, subsidies that promote energy-efficient appliances often backfire by increasing energy consumption and greenhouse gas emissions. Why did these unintended consequences happen? How can we better predict and prevent them? To answer these questions, we will seek to explore the complex relationships between humans and the environment using a system approach.

This interdisciplinary Quest 2 course will provide students with fundamental knowledge and scientific methods to study the human-environment systems. It includes three interconnected modules. The first module focuses on defining and describing the coupled human-environment systems. We will build a conceptual model of human-environment systems using system science approaches and explore the feedback among different components of the systems. In the second module, we will study how unintended consequences can emerge from key system properties, such as feedbacks, nonlinearity, and path-dependency using examples from physical science disciplines, including geology, hydrology, and soil science. In the last module, we will apply system thinking in environmental management and discuss management tools that may prevent these consequences. We will link the discussion to key issues in social sciences such as individual vs. collective actions, policy making, and environmental justice.

Each week will start with a lecture on Tuesday outlining the fundamental scientific background of each week's topic. Thursday's class will be divided into two halves. In the first half, students will lead discussion and case studies using the assigned reading material. In the second half, students will work in group activities, assignments, and group research projects.

In the group project, students will work collaboratively and investigate the potential unintended consequences of human actions in their chosen human-environment systems. It is strongly encouraged that students pick topics related to the pressing issues faced by society, such as climate change and loss of biodiversity, and the novel ideas to address these issues, such as geoengineering and vertical ocean farming. Students will communicate their research in the form of a research paper and a presentation and work on their skills in scientific reasoning and hypothesis testing. More guidelines and sample paper/presentation will be provided on the Canvas site.

This class fulfills two General Education Designations:

Physical Sciences (P)

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 (N)

International courses promote the development of students' global and intercultural awareness. Students examine the cultural, economic, geographic, historical, political, and/or social experiences and processes that characterize the contemporary world, and thereby comprehend the trends, challenges, and opportunities that affect communities around the world. Students analyze and reflect on the ways in which cultural, economic, political, and/or social systems and beliefs mediate their own and other people's understanding of an increasingly connected world.

Required Course Materials

There is no required textbook for this class. Required readings, including wiki pages, blogs, excerpts, and primary literature, will be distributed on the Canvas site.

Materials and Supplies Fees

N/A.

II. Coursework & Schedule

1. List of Graded Work (1000 pts total)

Deadlines and Due Dates may be adjusted as the semester progresses. Refer to the Canvas website for final due dates

Graded work	Description	Points
Assignment 1	Due 1/14; system diagram	50
Assignment 2	Due 1/28; feedback model with SageModeler	50
Reading and guest lecture reflections (3)	These reflections will focus on how readings and discussions have affected your understanding of human-environment systems as well as how we can better predict unintended consequences. 300-500 words. See reflection rubrics for details.	150
Project outline	Due 2/18; identifies the research question, describe the study system and its key components, and divide duties among group members. 300-500 words	50
Midterm	2/23-2/26; open book, multiple choices and short assay questions.	150
Project paper	Due 4/1; see the grading rubrics for more details. Minimum 4 pages double-spaced	150
Discussion participation	Students take turn to serve as discussion leaders, who are responsible for summarizing the reading, designing discussion questions, and modulating discussion (60 pt per section). Other students participate in discussion (40 pt, 5 pt per section, lowest two grades dropped). See participation grading rubric for more details.	100
Group presentation	10-minute talk with 5 minutes for Q/A. Both the instructor and peers will grade the presentation. See the grading rubric for details.	150
Final	4/23-27; Open book, cumulative but focused on the 2nd half of the classes	150

2. Weekly Course Schedule

Deadlines and Due Dates may be adjusted as the semester progresses. Refer to the Canvas website for final due dates

Week	Modules	Tuesday/lectures	Thursday/readings and group activities	Readings due prior to Thursday's class	Assignments and other activities
1/3	A system perspective		Introduction		
1/10		Coupled human-environment systems	Reading: coupled human-environment systems; Group activities: system diagram	Marten, Chapter 1, 8 pages.	Assignment 1: system diagram
1/17		Feedback mechanisms	Reading: feedbacks; Group activities: introduction to SageModeler	Marten, Chapter 2, 11 pages	
1/24		System behavior	Reading: system thinking in social systems; Group activities: feedback model	Shadow 2007, 6 pages	Assignment 2: feedback model
1/31	Sources of unintended consequences	Self-organization	Reading: unintended consequences of information technology; Group activities: Equilibrium in natural vs. social systems	Zuboff 2016, 9 pages	
2/7		Scaling	Reading: scale-free networks; Group activities: Intro. to group project	Broido and Clauset 2019, 10 pages.	Reflection #1: system dynamics
2/14		Complexity	Reading: thresholds in coral reef systems; Group activities: thresholds in social systems	Walker and Salt, 2006, 10 pages	Project outline
2/21		Midterm review	Midterm, no class		

2/28		Basics of environmental management	Reading: fishery commons part 1; Group activities: project paper	Anderies and Janssen, 10 pages.	
3/14		Managing commons	Reading: fishery commons part 2; Group activities: are unintended conseq. unavoidable?	McCay, 2012, 3 pages; Libecap, 2017, 3 pages	
3/21	System thinking in environmental management	Adaptive management	Reading: adaptive management case studies; Group activities: discuss topics for 'Name your lecture'.	Love et al. 2018, 16 pages	Reflection #2: managing commons
3/28		Environmental inequality	Reading: Post-Katrina cleanup and inequality; Group activities: project paper	Wright and Bullard 2007, 10 pages	Project paper due
4/4		Name your lecture.	Reading: Name your reading; Group activities: project presentation	To be determined by students.	
4/11		Guest lecture	Group project presentation		Reading reflection #3: environmental management
4/18		Review	Group project presentations		
4/25		Final			

III. Grading

3. Statement on Attendance and Participation

Attendance and Make-Up Policy

- **Attendance:** will be taken daily and recorded in the Canvas gradebook. You are allowed four "personal days" for the semester, after which each absence that does not meet university criteria for "excused" will result in a five-point deduction from your final grade. Excused absences are consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

- **Make-Up:** A make-up midterm and makeup final exam will be provided for students who miss either exam due to extreme, documented circumstances. Assignments, reflection report, and project work are due by the end of Fridays on Canvas. Late submissions **will be accepted for 3 days after the submission date** and will lose 10% of the grade per day that they are late. After 3 days (including Saturdays and Sundays) the work will no longer be accepted, and the student will receive a zero for that work. Students who can demonstrate that they were unable to submit an assignment, reflection report, or project work by the deadline due to an excused absence and who can provide appropriate documentation for the absence will be given a reasonable period of time to make up the late work.

Participation:

- **Participation**: Consistent informed, thoughtful, and considerate class participation is expected and will be evaluated using the rubric below. The instructor will inform you of your participation grade to date when mid-term exams are returned and schedule a conference if you are earning below 70% of the possible points.

- **NOTE**: If you have personal issues that prohibit you from joining freely in class discussion, e.g., shyness, language barriers, etc., see the instructor as soon as possible to discuss alternative modes of participation.

Discussion Leader Rubric (60 pts., one section):

	High Quality	Average	Needs Improvement
Informed: Shows evidence of having done the assigned work.	20	16	12
Thoughtful: Shows evidence of having understood and considered issues raised.	20	16	12
Considerate: Takes the perspective others into account.	20	16	12

Discussion Participant Rubric (40 pts., 5 pts per section):

A total of 11 discussion sections will be graded, each by their perspective discussion leaders. Eight grades will be counted, excluding the onetime students lead the discussion and the lowest two grades.

	High Quality	Average	Needs Improvement
Informed: Shows evidence of having done the assigned work.	5/3	1.25	1
Thoughtful: Shows evidence of having understood and considered issues raised.	5/3	1.25	1
Considerate: Takes the perspective others into account.	5/3	1.25	1

4. Grading Scale

Passing grades	% of Possible pts	Grade points		Passing grades	% of Possible pts	Grade points
A	90 – 100%	4.0		C	70 – 76.9%	2.0
B+	87 – 89.9%	3.33		D+	67 – 69.9%	1.33
B	80 – 86.9%	3.0		D	60 – 66.9%	1.0
C+	77 – 79.9%	2.33		E	<60	0

Note that **a minimum grade of C is required for general education credit**. More information on grades and grading policies is here:

https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Project Paper Evaluation Rubric

	Research Question	Organization/Logic	Use of citations	Analysis/Argumentation	Mechanics
The A essay	Identifiable, plausible, insightful, clear	Connected to question. strong transitions, excellent topic sentences. Ideas flow logically	Uses a variety of citations from literature to support points. Good use of citations.	Fresh, exciting or even creative look at material & sources. Argument is sound.	Well-executed grammar, spelling, punctuation, citations, & sentence structure
The B essay	Promising, may be slightly unclear or lack plausibility	May wander a little, have a few unclear transitions or topic sentences.	Uses not as many examples & may not always connect. Good use of citations.	Links to question not always as clear but still interesting thought process. Argument clear & makes sense.	Strong mechanics (see above) but may be occasional lapses or mistakes.

The C essay	May be vague, unclear, and implausible	Generally unclear, few transitions, jumps around. Logic may fail.	Points lack supporting evidence, quotes don't fit into argument.	Little actual analysis of sources or quotes. Argument unclear	Problems in sentence structure, grammar, citation style, punctuation, & spelling.
The D essay	Fails to identify a clear thesis statement	Confusing and no topic sentences, very unclear, logical contradictions, incoherent	Very few or weak examples. Failure to support argument. Factual errors	Does no analysis that relates to research question. Ideas don't flow because it lacks argument	Major problems with grammar, spelling, sentence structure, citation style, & punctuation
The F essay	Shows obviously a minimal lack of effort or comprehension of the research topic. Very difficult to understand owing to major problems with mechanics, structure, and analysis. Has no identifiable research question. Fails to connect at all with the course material or the literature. Succumbs to internal inconsistencies to the point of incoherence.				

Reading Reflections Rubric (150 pts total, 50 pt each)

Evaluation Rubric	Above Expectations	Meets Expectations	Below Expectations
Content • Demonstrates a thorough understanding of the unintended consequences covered in the reading • Connects content of the reading to other material from the course	20	16	12
Reflection • Reflects on the impacts of reading and course material on their perspectives	10	8	6
Organization and effectiveness • Ideas flow logically, strong transitions, excellent topic sentences. • Well-executed grammar, spelling, punctuation, citations, & sentence structure	20	16	12

Presentation Evaluation Rubric

Presentation Evaluation: Your presentation will be evaluated on the following basis (60 pts.).

Evaluation Rubric	Above Expectations	Meets Expectations	Below Expectations
Content (accurate, concise, thorough, informative)	15	12	8
Organization (meaningful, logical)	15	12	8
Delivery (effective, clear)	15	12	8
Overall effectiveness	15	12	8

Peer Evaluation: Each group will receive feedback though peer evaluation in class. Every student is expected to participate in peer evaluation. (40 pts.).

IV. Quest Learning Experiences

5. Details of Experiential Learning Component

Experiential learning: students will learn from fishery managers and scientists in a guest lecture/discussion on the implications and unintended consequences of fishery management. This experience will offer students a real-life example of the topics discussed in the classroom and provide synergy with two case studies/assigned readings.

Throughout their group research project, students will also practice scientific methods themselves and gain valuable experience in scientific discovery. The objective is to work collaboratively to predict future unintended consequences in the environment as a result of human intervention and communicate the research in the form of a paper and a presentation. Students are encouraged to leverage their background and interests and study novel ideas for tackling the pressing issues, such as climate engineering, biofuel development, and universal basic income. The project should have a central prediction that serves as the hypothesis. For example, one prediction may be that implementing universal basic income in the US will increase deforestation in developing countries via changing consumer behavior in the US and international trade patterns. Students will outline the key components, boundary, and feedbacks of their studied system and present them in a system diagram. The predicted feedbacks and system behavior should be argued using existing data, primary literature, and expert opinion/interviews. For example, past studies on the feedback between consumer decision and trade patterns can be analyzed and referenced to support the argument. A list of sample questions will be provided via Canvas.

6. Details of Self-Reflection Component

Students will write three self-reflection essays based on their readings and guest lecture. The reflection paper will be graded and feedback given. The research project offers another opportunity for students to reflect on the implications of their behavior/decisions on the environment.

V. General Education and Quest Objectives & SLOs

7. This Course's Objectives—Gen Ed Primary Area and Quest

Physical Sciences + Quest 2 + Course Objectives

Physical Sciences Objectives ➔	Quest 2 Objectives ➔	This Course's Objectives ➔ (This course will….)	Objectives will be Accomplished By: (This course will accomplish the objective in the box at left by…)
Physical science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the physical sciences.	Address in relevant ways the history, key themes, principles, terminologies, theories, or methodologies of the various social or biophysical science disciplines that enable us to address pressing questions and challenges about human society and/or the state of our planet.	Gain fundamental understanding of the coupled human-environment systems. Gain familiarity with the scientific methods for studying the coupled human-environment systems.	Outline and develop a conceptual model of the coupled human-environment systems. Gain familiarity with system modeling using the SageModeler tool. Read primary literature during group discussion and reflect on the scientific methods.
Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern physical systems.	Present different social and/or biophysical science methods and theories and consider how their biases and influences shape pressing questions about the human condition and/or the state of our planet.	Appreciate how unintended consequences can emerge from key system properties. Investigate the social, economic, and cultural drivers of unintended consequences.	Learn the fundamental structure and property of the coupled human-environment systems. Discuss and reflect on the drivers of unintended consequences using case studies, guest lecture, and independent research.

Physical Sciences Objectives ➔	Quest 2 Objectives ➔	This Course's Objectives ➔ (This course will….)	Objectives will be Accomplished By: (This course will accomplish the objective in the box at left by…)
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.	Enable students to analyze and evaluate (in writing and other forms of communication appropriate to the social and/or biophysical sciences) qualitative or quantitative data relevant to pressing questions concerning human society and/or the state of our planet.	Develop and analyze simple system models. Develop hypothesis for assessing potential unintended consequences. Read and integrate primary literature.	Develop hypothesis about system behavior and interpret quantitative data generated by the SageModeler tool. Develop hypotheses for group research project. Define and analyze the studied human-environment system and include a system diagram. Integrate primary literature to conduct group research.
	Analyze critically the role social and/or the biophysical sciences play in the lives of individuals and societies and the role they might play in students' undergraduate degree programs. Explore or directly reference social and/or biophysical science resources outside the classroom and explain how engagement with those resources complements classroom work.	Appreciate the complexity of the coupled human-environment systems. Self-reflect on the implications of individual and collective actions on the environment and society.	Develop reflection papers for readings and the guest lecture to the Ordway-Swisher station. Conduct group research and reflect on the potential unintended consequences of human actions.

8. This Course's Student Learning Outcomes (SLOs)—Gen Ed Primary Area and Quest

Physical Sciences + Quest 2 + Course SLOs

	Physical Sciences SLOs ➜ Students will be able to…	Quest 2 SLOs ➜ Students will be able to…	This Course's SLOs ➜ Students will be able to…	**Assessment** Student competencies will be assessed through…
Content	**Identify, describe, and explain** the basic concepts, theories and terminology of natural science and the scientific method; the major scientific discoveries and the impacts on society and the environment; and the relevant processes that govern biological and physical systems.	**Identify, describe, and explain** the cross-disciplinary dimensions of a pressing societal issue or challenge as represented by the social sciences and/or biophysical sciences incorporated into the course.	**Identify and describe** the structure and dynamics of complex human-environment systems. **Explain** how unintended consequences can emerge from key system properties. **Identify** the social, economic, and cultural drivers of unintended consequences.	Class participation, discussion, midterm and final exam, assignments, and group research project.
Critical Thinking	**Formulate empirically-testable hypotheses** derived from the study of physical processes or living things; apply logical reasoning skills effectively through scientific criticism and argument; and apply techniques of discovery and critical thinking effectively to solve scientific problems and to evaluate outcomes.	**Critically analyze** quantitative or qualitative data appropriate for informing an approach, policy, or praxis that addresses some dimension of an important societal issue or challenge.	**Analyze** and **Evaluate** simple system models. **Describe** the coupled human-environment systems using system diagram. **Analyze** and **evaluate** potential unintended consequences.	Class participation, discussion, midterm exam, assignments, and group research project.

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	Physical Sciences SLOs ➔ Students will be able to…	Quest 2 SLOs ➔ Students will be able to…	This Course's SLOs ➔ Students will be able to…	Assessment Student competencies will be assessed through…
Communication	Communicate scientific knowledge, thoughts, and reasoning clearly and effectively.	**Develop and present**, in terms accessible to an educated public, clear and effective responses to proposed approaches, policies, or practices that address important societal issues or challenges.	**Develop and present** scientific reasoning and hypotheses testing with regard to predicting unintended consequences.	Group research project, discussion, and class participation.
Connection	N/A	**Connect course content** with critical reflection on their intellectual, personal, and professional development at UF and beyond.	**Connect course content** with critical reflection on their development. **Evaluate** the implications of their individual and collective actions.	Discussion, self-reflection paper, and group research project.

9. Secondary Objectives and SLOs (Optional)

International Objectives (for N co-designation)

International Objectives ➔	This Course's Objectives➔ (This course will….)	Objectives will be Accomplished By: (This course will accomplish the objective in the box at left by…)
International courses promote the development of students' global and intercultural awareness.	Promote the development of students' global and intercultural awareness.	Read and discuss case studies from African savanna, Canada, Indonesia, Venezuela.
Students examine the cultural, economic, geographic, historical, political, and/or social experiences and processes that characterize the contemporary world, and thereby comprehend the trends, challenges, and opportunities that affect communities around the world.	Students examine the cultural, economic, and social background around the world and thereby comprehend the challenges and opportunities that affect communities around the world.	Examples in the lecture are drawn from various communities around the world. Discuss the specific features of human-environment systems that enable unintended consequences using international case studies.
Students analyze and reflect on the ways in which cultural, economic, political, and/or social systems and beliefs mediate their own and other people's understanding of an increasingly connected world.	Explore the impacts of cultural, economic, and social drivers on the emergency of unintended consequences in various communities around the world	Discuss international case studies. Develop group research projects.

International Student Learning Outcomes (for N co-designation)

	International SLOs ➜ Students will be able to…	Course SLOs ➜ Students will be able to…	Assessment Student competencies will be assessed through…
Content	Identify, describe, and explain the historical, cultural, economic, political, and/or social experiences and processes that characterize the contemporary world.	**Examine** the cultural, economic, and social background of an international community that enables unintended consequences. **Comprehend** the opportunities to mediate and prevent unintended consequences.	Class participation, discussion, midterm and final exams.
Critical Thinking	Analyze and reflect on the ways in which cultural, economic, political, and/or social systems and beliefs mediate understandings of an increasingly connected contemporary world.	**Explore** the impacts of cultural, economic, and social drivers on the emergency of unintended consequences in various communities around the world.	Class participation, discussion, midterm and final exams.

VI. Required Policies

10. Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

11. UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

12. University Honesty Policy

UF 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 honor 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 Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

13. Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Additional support and career service can be found at U Matter We Care, https://www.umatter.ufl.edu/ and Career Connections Center, First Floor JWRU, 392-1601, https://career.ufl.edu/.

Students complaints policy can be found at https://sccr.dso.ufl.edu/policies/student-honor-code-studentconduct-code/.

14. The Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at

http://writing.ufl.edu/writing-studio/ or in 2215 Turlington Hall for one-on-one consultations and workshops.

15. Software Use

All faculty, staff and students of the university 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, disciplinary action will be taken as appropriate.

16. Combating COVID-19

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- • You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.

- • This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.

- • Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.

- • Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.

- • If you are experiencing COVID-19 symptoms (Click here for guidance from the CDC on symptoms of coronavirus), please use the UF Health screening system and follow the instructions on whether you are able to attend class. Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms.

- • Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Find more information in the university attendance policies.