

Econ 480/580. Intermediate Environmental and Resource Economics
Department of Economics, Iowa State University
Spring 2021

Syllabus

Instructors: Professors Gil DePaula and Wendong Zhang

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Office: DePaula: 468H Heady Hall; Zhang: 478C Heady Hall

Virtual Office Hours: Tuesday/Thursday: 12:30pm-1:30pm or by appointment

Class Lectures: Tuesday and Thursday 9:30-10:45am; Curtiss 0108; **Hybrid**

Zoom: Please click this URL to start or join.

<https://iastate.zoom.us/j/3285634941?pwd=Y1pMS1JHaVISVWpSL0RReHN1ZGZjQT0>

[9](#) Or, go to <https://iastate.zoom.us/join> and enter meeting ID: 328 563 4941 and password: ISU2021

Credit Hours: 3

Prerequisite: Econ 301 or Econ 501S

Teaching Assistant: Wenran Fan (fwr@iastate.edu)

Virtual TA Office Hours: Monday and Tuesday 2-3:30 pm via Webex

Please click this URL to join:

<https://iastate.webex.com/meet/fwr>

Textbook and Readings:

Keohane and Olmstead, Markets and the Environment, Island Press, 2016 (Second edition). If you plan to get a book, get this **second edition**.

Our library has an electronic copy of this book: https://iowa-primo.hosted.exlibrisgroup.com/permalink/f/11r0uch/TN_cdi_askewsholts_vlebooks_9781610916080

Additional readings will be posted on Canvas.

Canvas:

A class website has been created using Canvas. The website will contain the syllabus, lecture notes, readings, review quizzes, problem sets, updates and announcements, plus other useful information. You should check the class website regularly.

Course Objective:

This course provides a survey of environmental and natural resource economics. You will develop understanding of the key concepts of environmental and resource economics and acquire analytical tools to solve real world problems. You will become familiar with the theory and methods of study within this area. In particular, you will learn about the role of economics when markets fail, techniques that policy makers adopt to solve market

failures, methods of non-market valuation, management of renewable and non-renewable resources, and the sustainable economic growth.

Learning Outcomes:

This course aims to prepare you to:

- Discuss the role of economics in environmental and resource challenges
- Describe the limits of markets as mechanisms to manage environmental and resource problems
- Demonstrate different policy instruments to solve market failures
- Carry out basic analysis of economic problems applied to environment and resource issues
- Understand and evaluate empirical research in environmental and resource economics
- Use non-market valuation method to value environmental attributes
- Apply and solve simple models to optimally manage natural resources
- Discuss real-world challenges and potential policy responses
- Use R, ArcGIS, and Excel to analyze and present data and results

Evaluations:

The course will include multiple forms of assessment that will help us both keep track of your progress in the course and your understanding of course concepts. We will also have a number of in-class activities and discussions to keep things interesting. Your final grade breakdown is as follows:

1. Class participation (10%)
2. Canvas quizzes (10%)
3. Homework assignments (30%)
4. Two exams (50%)
5. Requirement for Master students: 2-page literature review & outreach articles

Following are the descriptions of each category, more detailed rubrics will be handed out in class:

Class participation (10%)

- 1) Classroom etiquette (5%): this is how we demonstrate respect for one another. As a class we can decide what is best to create a mutually respectful environment to promote best learning outcomes. Here are a few examples:
 - Being prepared to begin class on time (finish reading before class to respect everyone's time)
 - Remaining focused throughout the entire class (no bathroom/water breaks, no cellphones)
 - Refraining from behavior that may be interpreted as disrespectful (side conversations, checking emails/messages)
 - Respect academic honesty
- 2) Active participation (5%): In this course, we will read and discuss many papers, actively contributing to the discussion can make a big difference. **Asking and answering questions** pose great positive externality in the classroom and will be rewarded. Even without answering a question in class, **actively thinking** about

the questions are proven to be conducive to studying. We will have many activities and practices in class, some of them will be randomly collected.

Canvas quizzes (10%):

The weekly online quizzes on Canvas are designed to help you review and master the topics we covered in class and prepare you for exams. Research show that taking the quiz **without referring to the notebook** increases your memory and understanding of the knowledge (retrieval effect). To make this low risk, you can take the quizzes **twice** and only the highest grades will be recorded. The quizzes contain multiple choice questions that are representative of questions you might see in the exams.

Homework assignments (30%):

There are six homework assignments which include problem solving assignments, empirical analysis assignments, and excel practice assignment. They will be due at the beginning of class as indicated on the schedule and will be graded and commented on based on a combination of completeness and correctness. **Late submissions will be deducted 20% of the grade each day.** Showing your thought process may get you partial points.

The assignments are representative of the exams and essential (but not sufficient!) to fully understanding the material and doing well in the course. They are supposed to be challenging so you may work together and it is encouraged to do so, but you must write your own solutions in your own words, and you should keep in mind that **it is in your best interest to not rely too heavily on your study partners/groups.**

Exams (25% each):

There will be two exams in this course. We will hold online Q&A sessions before the exams to help you prepare, but it is your responsibility to learn and practice what we covered in this course. If you have an official excuse for missing either of the exams you have to notify me **at least a week** before the exam dates. The first exam will be in class and the second exam will be during the final week.

Additional Requirement for Master students:

For Master students enrolled in Econ 580, we also require you to write a 2-page literature review of a chosen environmental & natural resource economics issue, and also write a 1000-word 2-page outreach article similar to what you would read in the Economist, the Conversation, or CARD's Agricultural Policy Review. This does not need to be original research, more like a research synthesis. If you want to write a sketch of research proposal instead, please discuss with us.

Here are some examples: Degraded Water Quality in Lakes: Consequences for Use

https://www.card.iastate.edu/ag_policy_review/article/?a=43

Climate change and the Paris Accord: <https://theconversation.com/why-the-us-rejoining-the-paris-climate-accord-matters-at-home-and-abroad-5-scholars-explain-153783>

Solar power and environmental justice: <https://theconversation.com/cheaper-solar-power-means-low-income-families-can-also-benefit-with-the-right-kind-of-help-151907>

Carbon farming: <https://theconversation.com/carbon-farming-a-solution-to-global-land-degradation-and-poverty-8491>

Biodiversity: <https://theconversation.com/why-companies-should-help-pay-for-the-biodiversity-thats-good-for-their-bottom-line-106298>

Grade Scale:

We will use the following grading-scale:

- **A** : 94 – 100; **A-** : 90 – 93
- **B+** : 88 – 89; **B** : 84 – 87; **B-** : 80 – 83
- **C+** : 78 – 79; **C** : 74 – 77; **C-** : 70 – 73
- **D+** : 68 – 69; **D** : 64 – 67; **D-** : 60 – 63
- **F** : < 60

Late submissions & Make-ups:

Unless with approved proofs AND consent of the instructor, this class does not allow or accept late submissions or make ups for all problem sets, project materials and/or exams.

COVID-19 health and safety requirements:

Students are responsible for abiding by the university's COVID-19 health and safety expectations (<https://bit.ly/guidance-covid-19>). All students attending this class in-person are required to follow university policy regarding health, safety, and face coverings:

- wear a cloth face covering in all university classrooms, laboratories, studios, and other in-person instructional settings and learning spaces. Cloth face coverings are additionally required to be worn indoors in all university buildings, and outdoors when other people are or may be present where physical distancing of at least 6 feet from others is not possible. Students with a documented health or medical condition that prevents them from wearing a cloth face covering should consult with Student Accessibility Services (<https://sas.dso.iastate.edu/>) in the Dean of Students Office.
- ensure that the cloth face covering completely covers the nose and mouth and fits snugly against the side of the face.
- practice physical distancing to the extent possible. • assist in maintaining a clean and sanitary environment.
- not attend class if you are sick or experiencing symptoms of COVID-19.
- not attend class if you have been told to self-isolate or quarantine by a health official.
- follow the instructor's guidance with respect to these requirements. Failure to comply constitutes disruptive classroom conduct. Faculty and teaching assistants have the authority to deny a non-compliant student entry into a classroom, laboratory, studio, conference room, office, or other learning space.

These requirements extend outside of scheduled class time, including coursework in laboratories, studios, and other learning spaces, and to field trips. These requirements may be revised by the university at any time during the semester.

In accordance with university policy, instructors may use a face shield while they are teaching as long as they are able to maintain 8 feet of physical distance between themselves and students during the entire instructional period. Some form of face covering must be worn at all times in learning spaces regardless of the amount of physical distancing.

Faculty may refer matters of non-compliance to the Dean of Students Office for disciplinary action, which can include restrictions on access to, or use of, university facilities; removal from university housing; required transition to remote-only instruction; involuntary disenrollment from one or more in-person courses; and other such measures as necessary to promote the health and safety of campus.

It is important for students to recognize their responsibility in promoting the health and safety of the Iowa State University community, through actions both on- and off-campus. The university's faculty asks that you personally demonstrate a commitment to our Cyclones Care campaign (<https://www.care.iastate.edu/>). Iowa State University's faculty support the Cyclones Care campaign and ask you personally to demonstrate a commitment to our campaign. Your dedication and contribution to the campaign will also protect your family, classmates, and friends, as well as their friends and families. Our best opportunity for a successful fall semester with in-person learning and extramural activities requires all of us to collaborate and fully participate in the Cyclones Care campaign.

Accessibility Statement:

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294- 7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.

Dead Week:

This class follows the Iowa State University Prep Week policy, as noted in the ISU Policy Library and section 10.6.4 of the Faculty Handbook. Visit the ISU Policy Library website (<http://www.policy.iastate.edu/>) for policy wording.

Discrimination and Harassment:

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410

Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515-294-7612, Hotline 515-294-1222, email eooffice@iastate.edu.

Academic Misconduct:

Academic Misconduct in any form is in violation of Iowa State University Student Disciplinary Regulations and will not be tolerated. This includes, but is not limited to: copying or sharing answers on tests or assignments, plagiarism, and having someone else do your academic work. Depending on the act, a student should receive an F grade on the test/assignment, F grade for the course, and could be suspended or expelled from the University. See the Conduct Code at www.dso.iastate.edu/ja for more details and a full explanation of the Academic Misconduct policies.

Free Expression:

Iowa State University supports and upholds the First Amendment protection of freedom of speech and the principle of academic freedom in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.

Religious Accommodation:

Iowa State University welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request reasonable accommodation for religious practices. In all cases, you must put your request in writing. The instructor will review the situation in an effort to provide a reasonable accommodation when possible to do so without fundamentally altering a course. For students, you should first discuss the conflict and your requested accommodation with your professor at the earliest possible time. You or your instructor may also seek assistance from the Dean of Students Office, website

(<http://dso.iastate.edu>) or via phone 515-294-1020 or the Office of Equal Opportunity, website

(<https://www.eoc.iastate.edu>) or via phone 515-294-7612.

Contact Information

If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu.

Tentative Class Schedule and Readings (Key Instructor in Parenthesis)

Week 1: Introduction: What is Environmental Economics (Zhang)

- Keohane and Olmstead, Ch. 1
- Fullerton, D., & Stavins, R. (1998). How economists see the environment. *Nature*, 395(6701), 433.
- Polasky, S. et al. (2019). Role of economics in analyzing the environment and sustainable development. *Proceedings of the National Academy of Sciences* Mar 2019, 116 (12) 5233-5238
- Pearce, D. (2002). An Intellectual History of Environmental Economics. *Annual Review of Energy and the Environment*, 27: 57-81

Week 2: Market Efficiency and Environmental Protection (Zhang)

- Keohane and Olmstead, Ch.2 &4
- In class game of payment for ecosystem services*
- Jayachandran, S., De Laat, J., Lambin, E. F., Stanton, C. Y., Audy, R., & Thomas, N. E. (2017). Cash for carbon: A randomized trial of payments for ecosystem services to reduce deforestation. *Science*, 357(6348), 267-273.
- Inefficiency of command-and-control policies: “Why license plate bans don’t cut smog” published by the Guardian on 3/20/2014
- Alex Laskey: How behavioral science can lower your energy bill TED talk (Aired on 6/4/2013; Duration: 8:11)

Week 3 and 4: The Benefits and Costs of Environmental Protection (Zhang)

- Keohane and Olmstead, Ch.3
- Podcast: Lives vs. the Economy NPR Planet Money episode April 2020 (25min), discuss the value of a statistical life
- TED Talk: Put a value on nature! by Pavan Sukhdev (July 2011, 15 min)
- The Cost of Climate Change by The Indicator from NPR Planet Money (Aired on 10/9/2019; Duration: 9:51)
- the Conservation Strategy Fund has several short videos on the Travel Cost method, Hedonic Pricing method and Contingent Valuation
- Bishop et al. (2017). Putting a value on injuries to natural assets: The BP oil spill. *Science*, April: 253-254.
- Keiser, D., C. Kling and J. Shapiro, The Low but Uncertain Measured Benefits of U.S. Water Quality Policy, *Proceedings of the National Academy of Sciences*, 2019, 116(12): 5262-5269.
- Keeler et al. 2016. The Social Costs of Nitrogen. *Science Advances*

Optional:

- Poor, P. J., Pessagno, K. L., & Paul, R. W. (2007). Exploring the hedonic value of ambient water quality: A local watershed-based study. *Ecological Economics*, 60(4), 797-806.

- Viscusi, W. K., & Aldy, J. E. (2007). Labor market estimates of the senior discount for the value of statistical life. *Journal of Environmental Economics and Management*, 53(3), 377-392.
- Jevan Cherniwchan, Brian R. Copeland, M. Scott Taylor. Trade and the Environment: New Methods, Measurements, and Results. *Annual Review of Economics* 2017 9:1, 59-85

Week 5-6: Market Failures: Externalities and Public Goods & Environmental Justice (Zhang)

- Keohane and Olmstead, Ch. 5
- Hardin, G. (1968). The tragedy of the commons. *Science*, 162(3859), 1243-1248.
- Ostrom, E., Burger, J., Field, C. B., Norgaard, R. B., & Policansky, D. (1999). Revisiting the commons: local lessons, global challenges. *Science*, 284(5412), 278-282.
- Polluting Farmers Should Pay by Catherine Kling (Published in the New York Times on 8/25/2019)
- Ma, L., (2020) Mapping the Clean Air Haves and Have-nots, *Science*
- Ma, L., S. Banzhaf and C. Timmins. (2019) Environmental Justice: Establishing Causal Relationships, *Annual Review of Resource Economics*

Exam 1: Online via Canvas Quiz - Thursday Mar 4th 2021

Week 7-8: Pigouvian Policy and Coase Theorem (DePaula)

- Keohane and Olmstead, Ch. 8,
- “The Invisible Green Hand” *The Economist* (7/4/2002).
- 8-min YouTube video on the Coase Theorem by Marginal Revolution published on March 2015
- Desrochers, P. (2008). Did the invisible hand need a regulatory glove to develop a green thumb? Some historical perspective on market incentives, win-win innovations and the Porter hypothesis. *Environmental and Resource Economics*, 41(4), 519-539.

Week 8-9: Policy Instruments for Pollution Control: Taxes, Standards, and Marketable Permits (DePaula)

- Keohane and Olmstead, Ch.9, Ch.10
- Fisher-Vanden, K., & Olmstead, S. (2013). Moving pollution trading from air to water: potential, problems, and prognosis. *Journal of Economic Perspectives*, 27(1), 147-72.

Week 10-11: Introduction to Dynamics, Discounting, and Natural Resources as Capital & Climate Change (DePaula)

- Keohane and Olmstead, Ch.2

- Nordhaus, W. D. (2007). A review of the Stern review on the economics of climate change. *Journal of economic literature*, 45(3), 686-702.
- Lind, R. C. (1995). Intergenerational equity, discounting, and the role of cost-benefit analysis in evaluating global climate policy. *Energy Policy*, 23(4-5), 379-389.

Week 12: Economics of Non-renewable Resources (DePaula)

- Keohane and Olmstead, Ch.6

Week 13: Economics of Renewable Resources (DePaula)

- Keohane and Olmstead, Ch.7
- Borenstein, S. (2012). The private and public economics of renewable electricity generation. *Journal of Economic Perspectives*, 26(1), 67-92.

Week 14: Sustainability and Economic Growth (DePaula)

- Keohane and Olmstead, Ch.11
- Stavins, R. N., Wagner, A. F., & Wagner, G. (2003). Interpreting sustainability in economic terms: dynamic efficiency plus intergenerational equity. *Economics Letters*, 79(3), 339-343.
- Dasgupta, S., Laplante, B., Wang, H., & Wheeler, D. (2002). Confronting the environmental Kuznets curve. *Journal of economic perspectives*, 16(1), 147-168.

Exam 2