

Resource and Environmental Economics I
ENVIRON 520, ENERGY 520, ECON 530, PUBPOL 576

Fall 2025

Room: Grainger Hall 1112 (Field Auditorium)

Time: Tuesdays & Thursdays, 10:05-11:20AM

Dates: 26-August through 07-October

Review Sessions: TBA

Instructor: David Katz

Email: dk269@duke.edu

Office: 3110

Office Hours: Tuesdays & Thursdays 1-2pm

TAs:	Email:	Office Hours
• Xingchen Chen	xingchen.chen@duke.edu	Wednesday 5:30-6:30pm
• Manjiri Deshmukh	manjiri.deshmukh@duke.edu	Thursdays 11:30am-12:30pm
• Julia Kagiliery	julia.kagiliery@duke.edu	Tuesdays 11:30am-12:30pm

Weekly Review Sessions: TBA

Course Description: This course focuses on basic theory and methods of economic analysis of environmental problems and potential responses to them. This includes assessing the benefits and limitations of markets, benefit-cost analysis, non-market valuation, and instrument choice.

Course objectives:

- **Part 1 (Market Failures & Economic Efficiency):** Understanding economic efficiency and market failures. All environmental challenges involve economic issues and tradeoffs, and you will learn different scenarios that could lead to market failures. Studying economics helps us to understand why environmental problems occur and what possible solutions there are in public policy.
- **Part 2 (Cost-Benefit Analysis & Non-Market Valuation):** Understanding analytical methods for conducting cost-benefit analysis and non-market valuation methods. Benefit-cost analysis is one of the most prevalent ways the field of economics has

impacted environmental policy. Students will learn the philosophical foundation for benefit-cost analysis and several key methods for valuing environmental goods and services in a benefit-cost framework.

- **Part 3 (Cost Effectiveness & Policy Instruments):** Understanding economic and market approaches to environmental policy. Market-based approaches such as cap-and-trade and pollution taxes have been widely promoted in policies ranging from air pollution, to fisheries, to climate change. Students will learn the economic foundations of these policies as well as the circumstances under which these policies are most likely to be effective.
- **Part 4 (Economics & Environmental Justice):** Critical analysis of the role of economic analysis in both fostering and in combating inequality and racism. Students will understand how economists analyze questions of environmental injustice, develop an appreciation for the limits of economic analysis, and understand efforts to promote inclusion of distributional concerns in benefit-cost analyses.

Prerequisites: Students are required to have taken introductory courses in microeconomics and one semester of college-level calculus.

You need to be familiar with the following introductory microeconomics concepts: demand and supply, market equilibrium, consumer and producer surplus, deadweight loss, opportunity cost, and marginal analysis. An old textbook may be useful if you need a refresher. Any Principles of Microeconomics book will work (e.g., Principles of Microeconomics by Gregory N. Mankiw or Principles of Microeconomics by John B. Taylor and Akila Weerapana).

Required Readings: The required book for the course is *Markets and the Environment* by **Nathaniel O. Keohane and Sheila M. Olmstead** (2nd Edition, Washington, D.C.: Island Press, 2016). H

A digital copy is posted on the class website or you can download it for free from the Duke Library. Hardcopies are available through amazon.com or lots of online bookshops and it's pretty cheap.

Another good basic reference, with examples (though somewhat dated), is **NOAA. 1995.**

Economic valuation of natural resources : a handbook for coastal resource policymakers

<https://repository.library.noaa.gov/view/noaa/2922>

In addition to the textbook, each class will also have additional readings that will be posted on the course website. **All readings are to be done before class!**

Grading:

10% Class Attendance & Participation We will have in-class mini-quizzes at the beginning of each class that are for tracking attendance. They are not graded.

You can submit answers with a smartphone, tablet, or laptop. You must bring a device with you to each class.

Students who miss a class with an excused absence (illness, other academic commitment, etc.) will have 24 hours to notify the instructor or one of the TAs. Otherwise, the absence will be considered unexcused.

You will be given extra credit for perfect attendance (2%).

10% Reading Response

Additional readings will be assigned to provide context to the economic theory that we cover in class. Students will write 2-3 paragraphs in response to questions assigned.

Students are required to submit 4 out of 5 reading responses. Students submitting all 5 receive extra credit (1%).

40% Problem Sets

There are 4 problem sets each worth 10% of your grade. They are due by ***11:59pm on the due dates:***

- ***Problem Set # 1: due September 5***
- ***Problem Set # 2: due September 12***
- ***Problem Set # 3: due September 26***
- ***Problem Set # 4: due October 3***

You are encouraged to work together and create study groups to work on the homework. However, each student must submit their own original work. Copying someone else's work is not allowed.

20% Exam 1

Exam 1 will be administered in class on **September 18th** and will cover the first half of course materials.

20% Exam 2

Exam 2 will be administered in class on **October 7th** (the last day of class). The final exam is not cumulative and will cover the second half of course materials.

Grading Scale

A+	> 98%
A	93-98
A-	90-93
B+	87-90
B	83-87
B-	80-83
C+	77-80
C	73-77
C-	70-73
F	<70

Late Policy:

Late homework will be penalized 10%. Assignments more than one day late will not be accepted unless you received prior permission from the instructor. If an illness or other event will prevent you from completing an assignment on time, please notify me via e-mail before the assignment is due.

Makeup exams will only be given in case of an emergency or unavoidable problems such as an illness requiring hospitalization. Please communicate with me as early as possible about such issues.

Course Website: All materials will be posted on the course website on Canvas. In addition, we will utilize the website to facilitate discussion of the course material and serve as a means for you to get real-time help with course material from the instructor, the TAs, and other students in the class.

Recordings: Classes will be recorded on Panopto and made available on the course website on Canvas.

Review Sessions: We will have weekly review sessions for students needing additional assistance. Prior to exams we will have additional review sessions.

Schedule and Reading Assignments:

Note: K&O refers to the text: *Keohane, N. & Olmstead, S. 2016. Markets and the Environment*

Week 1	<p>August 26 – Overview of Environmental Economics</p> <p><i>Readings due before class:</i></p> <p>K&O: Chapter 1</p> <p>Fullerton, Don, and Robert Stavins. "How economists see the environment." <i>Nature</i> 395.6701 (1998): 433-434.</p> <p>August 28 – Market Failures & Externalities</p> <p><i>Readings due before class:</i></p> <p>K&O: Chapters 4 & 5 (Externalities)</p>
Week 2	<p>September 2 – Public Goods & Dynamic Efficiency</p> <p><i>Readings due before class:</i></p> <p>K&O: Ch.5 (Public Goods) & Ch. 2 (Dynamic Efficiency & Environmental Policy)</p> <p>EPA. 2010. Guidelines for Preparing Economic Analyses Chapter 6 (Washington, D.C.: U.S. Environmental Protection Agency, 2010) https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-06.pdf</p> <p><i>Recommended readings:</i></p> <p>Goulder, L. H., & Stavins, R. (2002). An eye on the future-the economists' practice of discounting. <i>Nature</i>, 419, 673-674.</p>

September 4 – Cost-Benefit Analysis & Cost Efficiency Analysis

Readings due before class:

K&O: Chapter 3 (Benefit-Cost Analysis)

Arrow, K. J., et al. (1996). Is there a role for benefit-cost analysis in environmental, health, and safety regulation?. *Science*, 272(5259), 221-222.

OECD (2018), Cost-Benefit Analysis and the Environment: Further Developments and Policy Use, **Chapter 2**. OECD Publishing, Paris, <https://doi.org/10.1787/9789264085169-en>

Recommended readings:

Aldy, Joseph E., Giles Atkinson, and Matthew J. Kotchen. (2021) "Environmental benefit-cost analysis: A comparative analysis between the United States and the United Kingdom." *Annual Review of Resource Economics* 13, no. 1: 267-288.

Aldy, J., Kotchen, M. J., Evans, M., Fowlie, M., Levinson, A., & Palmer, K. (2021). Cobenefits and regulatory impact analysis: Theory and Evidence from federal air quality regulations. *Environmental and Energy Policy and the Economy*, 2(1), 117-156.

Problem Set # 1: due September 5 at 11:59pm

Week 3

September 9 – Benefits Estimation: Revealed Preference I (Productivity Declines, Defensive Expenditures, Travel Cost)

Readings due before class:

K&O: Chapter 3

Recommended readings:

Timmins, Christopher, and Jennifer Murdock. (2007). "A revealed preference approach to the measurement of congestion in travel cost models." *Journal of Environmental Economics and Management* 53.2: 230-249.

September 11 – Benefits Estimation: Revealed Preference II (Hedonic Methods) **& Stated Preference** (Contingent Valuation & Choice Models)

Readings due before class:

K&O: Chapter 3

Recommended readings:

Bishop, K. C., Kuminoff, N. V., et al., (2020). Best practices for using hedonic property value models to measure willingness to pay for environmental quality. *Review of Environmental Economics and Policy* 15(2).

Kling, Catherine L., Daniel J. Phaneuf, and Jinhua Zhao. (2012) "From Exxon to BP: Has some number become better than no number?." *Journal of Economic Perspectives* 26(4): 3-26.

	<p>Problem Set # 2: due September 12 at 11:59pm</p>
Week 4	<p>September 16 – Benefits Estimation: Valuing Morbidity and Mortality</p> <p><i>Readings due before class:</i></p> <p>OECD (2018). Cost-Benefit Analysis and the Environment: Further Developments and Policy Use, Chapter 15. OECD Publishing, Paris, https://doi.org/10.1787/9789264085169-en</p> <p>Bosworth, Ryan C., Alecia Hunter, and Ahsan Kibria. (2017). "The value of a statistical life: economics and politics." STRATA: Logan, UT, USA.</p> <p><i>Recommended readings:</i></p> <p>Cameron, Trudy Ann. (2010). "Euthanizing the value of a statistical life." <i>Review of Environmental Economics and Policy</i>.</p> <p>September 18 – Exam 1</p>
Week 5	<p>September 23 – Cost Estimation & Economics of Pollution Control I</p> <p><i>Readings due before class:</i></p> <p>K&O: Chapter 8, Chapter 9</p> <p>EPA. 2010. Guidelines for Preparing Economic Analyses Chapter 8 (Washington, D.C.: U.S. Environmental Protection Agency, 2010) https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-08.pdf</p> <p>September 25 – Economics of Pollution Control II</p> <p><i>Readings due before class:</i></p> <p>K&O: Chapter 8, Chapter 9, Chapter 10</p> <p>Problem Set # 3: due September 26 at 11:59pm</p>
Week 6	<p>September 1 – Economics of Pollution Control III</p> <p><i>Readings due before class:</i></p> <p>K&O: Chapter 8</p> <p>October 2 – Environmental Justice & Macroeconomics</p> <p><i>Readings due before class:</i></p> <p>Banzhaf, Spencer, Lala Ma, and Christopher Timmins. "Environmental justice: The economics of race, place, and pollution." <i>Journal of Economic Perspectives</i> 33.1 (2019): 185-208.</p>

	<p>Arrow, K., Bolin, B., Costanza, R., Dasgupta, P., Folke, C., Holling, C.S., Jansson, B.O., Levin, S., Mäler, K.G., Perrings, C. and Pimentel, D., 1995. Economic growth, carrying capacity, and the environment. <i>Science</i> Vol 268, Issue 5210 pp. 520-521</p> <p><i>Recommended readings:</i></p> <p>Goulder, L. H., Hafstead, M. A., Kim, G., & Long, X. (2019). Impacts of a carbon tax across US household income groups: What are the equity-efficiency trade-offs?. <i>Journal of Public Economics</i>, 175, 44-64.</p> <p>Wichman, C. J. (2025). The Economics of Equity and Affordability in Residential Water Pricing. <i>Water Economics & Policy</i>, 11(2).</p> <p>Fowlie, M., & Meeks, R. (2021). The economics of energy efficiency in developing countries. <i>Review of Environmental Economics and Policy</i>, 15(2), 238-260.</p> <p>Problem Set # 4: due October 3 at 11:59pm</p>
Week 7	October – Exam 2

The Nicholas School Honor Code

All activities of Nicholas School students, including those in this course, are governed by the Duke Community Standard.

Duke University is a community dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Citizens of this community commit to reflect upon and uphold these principles in all academic and nonacademic endeavors, and to protect and promote a culture of integrity. To uphold the Duke Community Standard, students sign the following pledge on assignments and exams:

- *I will not lie, cheat, or steal in my academic endeavors;*
- *I will conduct myself honorably in all my endeavors; and*
- *I will act if the Standard is compromised.*

You are encouraged to share ideas with other students currently enrolled in the course and to discuss homework assignments with each other. However, you must submit your own solutions to the homework assignments. ***Discussing homework assignments with students who took the course in previous years or examining their solutions are both strictly prohibited and will result in expulsion from the course.***

Use of AI Tools:

All work submitted in this course must be your own. AI tools such as ChatGPT are **not allowed** for reading responses or for completing homework assignments which require you to use your own critical thinking and analysis. Use of AI for such purposes will be considered a violation of Duke honor code and can result in disciplinary actions.

LAND ACKNOWLEDGEMENTS

Duke University and its surroundings were originally the territory of several Native nations, including Tutelo and Saponi - speaking peoples. Today, the area is surrounded by contemporary Native nations, the descendants of Tutelo, Saponi, and other Indigenous peoples who survived early colonization. These nations include the Haliwa-Saponi, Sappony, and Occaneechi Band of Saponi.

North Carolina has the largest Native American population east of the Mississippi River. They hold many events and opportunities to learn. For more information see:

- [Occaneechi Band of Saponi](#)
- [UNC American Indian Center](#)

Also, much of the area, including Duke family wealth, was developed through the exploitation of slaves. To learn more about local African American history, see the [North Carolina African American Heritage Commission](#). For a history of Duke, including its early days and reliance on slavery, see: [Duke University: A Brief Narrative History](#).

STUDENT HEALTH & WELLNESS

Duke provides a range of resources to assist with student health, physical, mental and emotional. Information can be found at: nicholas.duke.edu/wellness