

ECON 235 A Sp 23: Introduction To Environmental Economics

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ESRM/ENVIR/ECON 235

Introduction to Environmental Economics

Spring 2023

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Anderson Hall 123G

Office hours (in-person or Zoom): feel free to stop by every Monday and Wednesday from 12-1 pm at my office in Anderson 123G or join the Zoom meeting at <https://washington.zoom.us/j/97813995563> ↗ (<https://washington.zoom.us/j/97813995563>)

Teaching Assistant: Leo Wahl

leowahl@uw.edu (<mailto:leowahl@uw.edu>)

Anderson 014

Office hours: Tuesday from 3:00 PM to 4:00 PM

Thursday from 11:30 AM to 12:30 PM

in Anderson 014 or on Zoom: <https://washington.zoom.us/j/7041953470> ↗ (<https://washington.zoom.us/j/7041953470>)

Course location: WFS 201

This class is conducted in-person. Students are expected to participate in class to fully benefit from course activities and meet the course's learning objectives. Students should only register for this class if they are able to attend in-person. To protect their fellow students, faculty, and staff, students who feel ill or exhibit possible COVID symptoms should not come to class. When absent, it is the responsibility of the student to inform the instructor in advance (or as close to the class period as possible in the case of an unexpected absence), and to request appropriate make-up work as per policies established in the syllabus. What make-up work is possible or how assignment or course grading might be modified to accommodate missed work is the prerogative of the instructor. For chronic absences, the instructor may negotiate an incomplete grade after the 8th week, or recommend the student contact their academic adviser to consider a hardship withdrawal (known as a Registrar Drop).

• **Make up/Covid-related absences**

- If you have to miss class due to Covid-related concerns (or other concerns), please let me and the TA know as soon as you are able. We will work with you to provide you with class materials you may have missed, and will accept late work.

I strongly encourage you all to attend the lectures and actively engage with the lecture material, questions I will pose, and in-class activities and discussions. Powerpoint notes and other materials will be posted in the "Course outline" section below. In my presentation, sometimes I will follow the Powerpoint notes, and sometimes I will add material in the lecture or leave the material in the Powerpoints for your independent perusal.

Course meeting times: MW 1:00 - 2:50

Final exam: Mon, Jun 5, 2:30 – 4:20 PM

Course overview and objectives:

This course is intended to serve as an introduction to the concepts, theories, and methods used in the economic analysis of environmental and natural resource issues. The course covers topics such as scarcity, choice, economic concept of value, the principles of market efficiency, and why the market often appears to fail where environmental and natural resource issues are concerned.

Environmental policy prescriptions and tools designed to correct such market failures are explored. Economic principles and tools are used to discuss pollution, management and use of renewable natural resources such as forests and fisheries, the problem of managing nonrenewable resources, and sustainability. The course aims to provide students with an ability to think about pressing environmental and resource issues and possible solutions in terms of individual and social choices, tradeoffs, and efficiency, i.e., in economic terms.

Learning outcomes

Upon the completion of the course, the students will be able to:

- Understand and recognize when encountered in research or other literature, at the minimum, the following concepts
 - Pareto-improvement
 - Pareto-efficiency
 - Potential compensation test
 - Scarcity
 - Importance of exchange
 - Individual and market demand and demand shifters
 - Individual and market supply and supply shifters
 - Economic efficiency
 - Technical efficiency
 - Economic value
 - Marginal analysis
 - Conditions for economic efficiency of market outcomes
 - The role of prices in the economy
 - Externality
 - Transactions costs and the Coase Theorem
 - Rivalry
 - Excludability
 - Common pool resources
 - Simple non-cooperative games
 - Best response and Nash equilibrium
 - Consumer and producer surplus
 - Stated preference methods of non-market valuation
 - Revealed preference methods of non-market valuation
 - Capital, the valuation principle, and discounting
 - Net present value
 - Price-based incentive policies and their likely consequences
 - Quantity-based incentive policies and their likely consequences
 - Cost-effectiveness
 - Natural capital and ecosystem services
 - Weak and strong sustainability
 - Regulating a stock pollutant
 - Benefit-cost analysis
 - Distributional equity analysis
 - Sustainable development goals
- Solve, graphically and algebraically, for efficient and competitive market outcomes in a partial equilibrium framework
- Understand the role, promise, and pitfalls of market allocation mechanisms
- Find, explain, graphically identify, and compute (in the case that numerical parameters are provided), the following
 - Market equilibrium outcome
 - Efficient outcome
 - Deadweight loss
 - Consumers' surplus
 - Producers' surplus
- Evaluate a specific instance of resource allocation, identify potential market failures, and sketch out possible corrective policies
- Continue the study of economic aspects of environmental policy and management at intermediate and advanced levels

- Readily comprehend economic analyses of environmental issues presented in policy documents produced by governmental, non-governmental, international, and research organizations
- Comprehend, with only occasional need for reference, primary research articles published by economists and interdisciplinary teams in outlets such as *Nature*, *Science*, *Proceedings of the National Academies of Sciences*, and similar

Recommended textbook (denoted HR in the syllabus):

Environmental and Natural Resource Economics:

A Contemporary Approach, 4th Edition

by Jonathan Harris & Brian Roach

[Environmental and Natural Resource Economics – Global Development And Environment Institute \(tufts.edu\)](https://sites.tufts.edu/gdae/environmental-and-natural-resource-economics/) 
[\(https://sites.tufts.edu/gdae/environmental-and-natural-resource-economics/\)](https://sites.tufts.edu/gdae/environmental-and-natural-resource-economics/)

Additional readings and exercises will also come from <https://www.core-econ.org/>  [\(https://www.core-econ.org/\)](https://www.core-econ.org/)

Grading and Evaluation (please find all assignments under the "Quizzes" section on Canvas)

Quizzes and other activities: 20%

Homework assignments: 40%

There will be 4 homework assignments throughout the course.

Midterm Exam: 20%

Final Exam: 20%

Grades will be weighted as above to arrive at a percentage grade which will be converted to the 4.0 scale using the 55% cutoff for 0.7 and 95% and above for 4.0, with a linear interpolation in between: [grade scale.PNG](#)

<https://canvas.uw.edu/courses/1633480/files/103643935/download?wrap=1> 

https://canvas.uw.edu/courses/1633480/files/103643935/download?download_frd=1

I also expect to offer some synchronous and asynchronous activities which can earn extra credit.

Homework assignments are take-home work on which you may collaborate in groups, but you must submit your own answers. The midterm and the final exams will be programmed on Canvas and will be administered in class (unless there is an existing DRS accommodation or an illness-related absence). You may use the textbook and notes but you **cannot use other web materials or collaborate with others in person or electronically**.

Course outline (subject to change as quarter progresses, so check it frequently). Generally, please try to do the readings listed here before class, and follow with reviewing Powerpoint and other notes and additional suggested readings and resources. Students are expected to come to class prepared and ready to engage in a meaningful discussion.

Course Modules

1.Introduction. Economic preliminaries. Scarcity and choice. Social choice. Efficiency.

Read: HR Chapter 1

Notes: [Lecture1.1_235.pptx \(https://canvas.uw.edu/courses/1633480/files/103643949?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103643949?wrap=1)

Very dated but spot on bit on scarcity and tradeoffs

https://www.youtube.com/watch?v=VzhnMiB_Dro  [\(https://www.youtube.com/watch?v=VzhnMiB_Dro\)](https://www.youtube.com/watch?v=VzhnMiB_Dro)




https://www.youtube.com/watch?v=VzhnMiB_Dro

Good description of Pareto-efficiency (please read up to the paragraph which starts with "We now apply the language of Pareto efficiency to three possible ways of organizing the commons—open access...")

<https://www.core-econ.org/espp/book/text/03.html#pareto-efficiency>  <https://www.core-econ.org/espp/book/text/03.html#pareto-efficiency>


Recent technical efficiency (life cycle GHG emissions comparisons) of EVs vs gas-powered vehicles

https://www.wsj.com/graphics/are-electric-cars-really-better-for-the-environment/?mod=hp_lead_pos5  https://www.wsj.com/graphics/are-electric-cars-really-better-for-the-environment/?mod=hp_lead_pos5



Optional:

Fullerton and Stavins (1998): [how economists see the environment.pdf](https://canvas.uw.edu/courses/1633480/files/103643933/download?wrap=1)
(<https://canvas.uw.edu/courses/1633480/files/103643933/download?wrap=1>)

More on history of growth, capitalism, inequality, and sustainability challenges (1.1-1.13): <https://www.core-econ.org/espp/book/text/01.html#11-introduction>  <https://www.core-econ.org/espp/book/text/01.html#11-introduction>

Advanced (more on theories of social welfare and Pareto improvements): <https://link.springer.com/article/10.1007/s10677-004-2217-0>  <https://link.springer.com/article/10.1007/s10677-004-2217-0>

Discussion: identify dimensions of scarcity at the individual and social levels. Think about ways that scarcity can be mitigated.

Discussion: skim section 5.2 <https://www.core-econ.org/the-economy/book/text/05.html#52-evaluating-institutions-and-outcomes-the-pareto-criterion>  <https://www.core-econ.org/the-economy/book/text/05.html#52-evaluating-institutions-and-outcomes-the-pareto-criterion> (can omit game-theory-specific terms--we will cover those later, consider Figure 5.1 . Discuss your answers to <https://www.core-econ.org/the-economy/book/text/05.html#question-51-choose-the-correct-answers>  <https://www.core-econ.org/the-economy/book/text/05.html#question-51-choose-the-correct-answers>) and see the feedback.

****To-Do:** [Quiz 1](https://canvas.uw.edu/courses/1633480/quizzes/1830606) (<https://canvas.uw.edu/courses/1633480/quizzes/1830606>)

2. Choosing the efficient level of environmental quality. Total benefits and total costs and marginal benefits and marginal costs. Equimarginal Principle I.

Read: HR pp. 68-76

Notes: [Lecture2_equimarginal_principle_so2_example.pptx](https://canvas.uw.edu/courses/1633480/files/103643943?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643943?wrap=1>)

Handout: [Week 2 Efficiency Model Handout.pdf](https://canvas.uw.edu/courses/1633480/files/104439855?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/104439855?wrap=1>)

Quiz 1 Extra Credit: [Quiz 1 Extra Credit \(Consumer Utility Maximization\)](https://canvas.uw.edu/courses/1633480/quizzes/1850404?wrap=1) (<https://canvas.uw.edu/courses/1633480/quizzes/1850404?wrap=1>)


Results From In Class Exercise: [Candy Supply and Demand.pdf](https://canvas.uw.edu/courses/1633480/files/104600567?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/104600567?wrap=1>)

3. Efficiency of markets. Supply and demand. Working with a market model. Markets and economic efficiency. Measuring benefits and costs using demand and supply. Consumers' surplus, producers' surplus; adding up demand

Notes: [supply_demand \(2\).pptx](https://canvas.uw.edu/courses/1633480/files/103643918/download?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643918/download?wrap=1>)

Material from the whiteboard: [supply_demand_whiteboard_4.6.pptx](https://canvas.uw.edu/courses/1633480/files/103643966?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643966?wrap=1>)
[Whiteboard_Apr11.pptx](https://canvas.uw.edu/courses/1633480/files/103643971?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643971?wrap=1>)

Read: <https://core-econ.org/the-economy/book/text/08.html>  <https://core-econ.org/the-economy/book/text/08.html> (you can ignore the concepts of "Nash equilibrium" and "isoprofit")

Explore: https://www.econgraphs.org/graphs/micro/equilibrium/partial_equilibrium/summing_linear_demands  https://www.econgraphs.org/graphs/micro/equilibrium/partial_equilibrium/summing_linear_demands

Breakout question: Suppose a demand curve is described by $Q_d(P) = 30 - 0.5P$ and the supply curve is described by $Q_s(P) = \frac{1}{2}P$. Plot the supply and demand curves with P (in \$) on the vertical axis and Q on the horizontal axis. A useful thing to do would be to invert both curves so that marginal benefits and marginal costs are represented as a function of quantity. For the demand curve, expressing it as $mWTP(Q) = P_d(Q)$ can be done by inverting the demand expression $Q = 30 - 0.5P \Leftrightarrow 0.5P = 30 - Q \Leftrightarrow P_d(Q) = 60 - 2Q = mWTP(Q)$ and similarly for the supply curve. Find the competitive market equilibrium quantity and price.

****Reminder:** [Homework 1 \(https://canvas.uw.edu/courses/1633480/quizzes/1830605\)](https://canvas.uw.edu/courses/1633480/quizzes/1830605) due 4/17

KEY:

4. Market failures I (externalities)

Read: Ch. 3 HR up to section 3.3. + Appendix 3.2

[Notes \(https://canvas.uw.edu/courses/1633480/files/103643964/download?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103643964/download?wrap=1)

Handout: [Transport externalities handout.docx \(https://canvas.uw.edu/courses/1633480/files/103643897/download?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103643897/download?wrap=1)

Optional: Externality, visualized: <https://vimeo.com/119170132> [⇒ \(https://vimeo.com/119170132\)](https://vimeo.com/119170132)

[externality_\(2\).pdf \(https://canvas.uw.edu/courses/1633480/files/103643813/download?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103643813/download?wrap=1)

Breakout activity: Market model with a negative externality. (15 min)

Solve for the market equilibrium quantity and the efficient outcome quantity. Label NSB in both cases. Convince yourself that $NSB(\text{market outcome}) < NSB(\text{efficient outcome})$ outside of class time.

Demand: $MSB(Q) = P_d(Q) = 12 - 1.5Q$

Supply (marginal private cost): $MPC(Q) = P_s(Q) = 2 + Q$

Marginal damage from a negative externality: $MD = 2.5$

Competitive market outcome: $MPC(Q) = MSB(Q)$, that is, supply = demand

Efficient outcome: $MSB(Q) = MSC(Q)$ or $MSB(Q) = MPC(Q) + MD$ or $P_d(Q) = P_s(Q) + MD$

4. Coase theorem.

Read: Section 3.3 in HR;

Notes: [coase_theorem.pptx \(https://canvas.uw.edu/courses/1633480/files/103643967/download?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103643967/download?wrap=1)

5. Market failures II (public goods). Tragedy of the commons.


https://www.youtube.com/watch?v=E1v5eRs0_fw&list=PLBfu1mD9hk64sgOIH_nUEsndUzACDe-4Y&index=16&t=0s [⇒ \(https://www.youtube.com/watch?v=E1v5eRs0_fw&list=PLBfu1mD9hk64sgOIH_nUEsndUzACDe-4Y&index=16&t=0s\)](https://www.youtube.com/watch?v=E1v5eRs0_fw&list=PLBfu1mD9hk64sgOIH_nUEsndUzACDe-4Y&index=16&t=0s)



https://www.youtube.com/watch?v=E1v5eRs0_fw&list=PLBfu1mD9hk64sgOIH_nUEsndUzACDe-4Y&index=16&t=0s

Read: Ch. 4 in HR;

Notes (<https://canvas.uw.edu/courses/1633480/files/103643968/download?wrap=1>).

Activity: https://docs.google.com/document/d/1ICr7OyX_BPkrblOgiNAjrupRB4cg1bqnvNU-D_pE5jg/edit?usp=sharing 
https://docs.google.com/document/d/1ICr7OyX_BPkrblOgiNAjrupRB4cg1bqnvNU-D_pE5jg/edit?usp=sharing

Optional:

<https://www.core-econ.org/espp/book/text/11.html#1111-public-goods-common-pool-resources-and-market-failure> 
<https://www.core-econ.org/espp/book/text/11.html#1111-public-goods-common-pool-resources-and-market-failure>



Congestion example [spreadsheet](https://canvas.uw.edu/courses/1633480/files/103643975/download?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643975/download?wrap=1>) 
https://canvas.uw.edu/courses/1633480/files/103643975/download?download_frd=1

Local example:

https://www.seattle.gov/Documents/Departments/SDOT/About/SeattleCongestionPricingStudy_SummaryReport_20190520.pdf
 (https://www.seattle.gov/Documents/Departments/SDOT/About/SeattleCongestionPricingStudy_SummaryReport_20190520.pdf)

Midterm exam (Monday, April 24).

Common pool resource management simulation (extra credit)

Game link is <https://economics-games.com/tragedy-commons>  (<https://economics-games.com/tragedy-commons>).
 payoff sheet and the fishery dynamics [example](https://docs.google.com/spreadsheets/d/17YTF0CwWciZfJFrJSqW5MZBpTzX4Ek2CHWMUTukXZTc/edit?usp=sharing) 
<https://docs.google.com/spreadsheets/d/17YTF0CwWciZfJFrJSqW5MZBpTzX4Ek2CHWMUTukXZTc/edit?usp=sharing>

6. Using game theory concepts to illustrate market failures.

Notes: [Game_theory.pptx](https://canvas.uw.edu/courses/1633480/files/103643851?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643851?wrap=1>).

Further reading: with more games analyzed: <https://core-econ.org/the-economy/book/text/04.html#subheadline>  (<https://core-econ.org/the-economy/book/text/04.html#subheadline>)

Good videos from Jesse Agar:

<https://www.youtube.com/watch?reload=9&v=t9Lo2fgxWHw>  (<https://www.youtube.com/watch?reload=9&v=t9Lo2fgxWHw>)



<https://www.youtube.com/watch?reload=9&v=t9Lo2fgxWHw>

and on the iterated prisoners' dilemma and evolution of cooperation

<https://www.youtube.com/watch?v=BOvAbjfJ0x0>  (<https://www.youtube.com/watch?v=BOvAbjfJ0x0>)



<https://www.youtube.com/watch?v=BOvAbjfJ0x0>

Link for player signup: https://docs.google.com/spreadsheets/d/1NJ_51vg-XjMu7-6ZXoV9bS1X8cd1cHdv9xk_9AJtwPI/edit?usp=sharing  (<https://docs.google.com/spreadsheets/d/1ArNjg7ZOxTEol4AIVQa16UvQ8HJiMXtxtEJNDG8-1IY/edit?usp=sharing>)

7. Cost-efficiency. Equimarginal Principle II. Assessing incentive-based policy options: subsidies, taxes, cap-and-trade.

Read: HR Ch. 8;

Notes: [cost_efficiency-1 \(4\).pptx](https://canvas.uw.edu/courses/1633480/files/103643950/download?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643950/download?wrap=1>)

Review for the midterm exam

spreadsheet with an example: [equimarginal principle 2 example.xlsx](https://canvas.uw.edu/courses/1633480/files/103644019?wrap=1) (https://canvas.uw.edu/courses/1633480/files/103644019/download?download_frd=1)

Optional: summary and analysis of the WA cap-and-trade bill <http://lawfilesexternal.wa.gov/biennium/2021-22/Pdf/Bill%20Reports/House/5126-S2.E%20HBA%20ENVI%2021.pdf?q=20210510134337> [↗](http://lawfilesexternal.wa.gov/biennium/2021-22/Pdf/Bill%20Reports/House/5126-S2.E%20HBA%20ENVI%2021.pdf?q=20210510134337)
(<http://lawfilesexternal.wa.gov/biennium/2021-22/Pdf/Bill%20Reports/House/5126-S2.E%20HBA%20ENVI%2021.pdf?q=20210510134337>)

8. Global climate change/"bathtub analogy". Regulating a stock pollutant

Read: HR Ch. 12

Notes: [climate change cost efficiency and ipcc.pptx](https://canvas.uw.edu/courses/1633480/files/103644012?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644012?wrap=1>)

International synthesis: https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf [↗](https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf)
(https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf)

Not required, but highly recommended: http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf [↗](http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf)
(http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf)

In-class activity: climate pledges simulation

[World-Climate-Proposal-Form.docx](https://canvas.uw.edu/courses/1633480/files/103643988?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643988?wrap=1>)

[WCS Briefing Statement - China v10.pdf](https://canvas.uw.edu/courses/1633480/files/103643996?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643996?wrap=1>)

[WCS Briefing Statement - EU v9.pdf](https://canvas.uw.edu/courses/1633480/files/103643997?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643997?wrap=1>)

[WCS Briefing Statement - India v9.pdf](https://canvas.uw.edu/courses/1633480/files/103644002?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644002?wrap=1>)

[WCS Briefing Statement - Other Developed v9.pdf](https://canvas.uw.edu/courses/1633480/files/103644000?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644000?wrap=1>)

[WCS Briefing Statement - Other Developing v9.pdf](https://canvas.uw.edu/courses/1633480/files/103644006?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644006?wrap=1>)

[WCS Briefing Statement - US v15.pdf](https://canvas.uw.edu/courses/1633480/files/103644004?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644004?wrap=1>)

Pledges:

https://docs.google.com/spreadsheets/d/19GuKjigjwldX_WxmIOI5jTXI9OmVJ6sENZaFOW_y9ZA/edit?usp=sharing [↗](https://docs.google.com/spreadsheets/d/19GuKjigjwldX_WxmIOI5jTXI9OmVJ6sENZaFOW_y9ZA/edit?usp=sharing)
(https://docs.google.com/spreadsheets/d/19GuKjigjwldX_WxmIOI5jTXI9OmVJ6sENZaFOW_y9ZA/edit?usp=sharing)

Additional CI slides: [World-Climate-Slides-Mar-2022-v6.pptx](https://canvas.uw.edu/courses/1633480/files/103644008?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644008?wrap=1>)

[Supplemental-Slides-Dec-2021-v9.pptx](https://canvas.uw.edu/courses/1633480/files/103644010?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644010?wrap=1>)

Some additional data sources used:

<https://www.climatewatchdata.org/ghg-emissions> [↗](https://www.climatewatchdata.org/ghg-emissions) (<https://www.climatewatchdata.org/ghg-emissions>)

<http://openclimatedata.net/climate-spirals/from-emissions-to-global-warming-line-chart/> [↗](http://openclimatedata.net/climate-spirals/from-emissions-to-global-warming-line-chart/) (<http://openclimatedata.net/climate-spirals/from-emissions-to-global-warming-line-chart/>)

<https://www.globalwarmingindex.org/> [↗](https://www.globalwarmingindex.org/) (<https://www.globalwarmingindex.org/>)

<https://sealevel.climatecentral.org/about> [↗](https://sealevel.climatecentral.org/about) (<https://sealevel.climatecentral.org/about>)

9. Experience with market instruments and policies for climate change: taxes, cap-and-trade, EN-ROADS simulation exercise

Read: Ch. 13 HR

Notes: [climate change part 2 policies.pptx](https://canvas.uw.edu/courses/1633480/files/103644014?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644014?wrap=1>)

Optional:

Consider scenarios in <https://croadsworldclimate.climateinteractive.org/> ↗ (<https://croadsworldclimate.climateinteractive.org/>)

Very helpful in understanding the rapidly evolving policy landscape

<https://carbonpricingdashboard.worldbank.org/what-carbon-pricing> ↗ (<https://carbonpricingdashboard.worldbank.org/what-carbon-pricing>)

10. Giving environment a “money voice”: valuation I. Taxonomy of values and methods. Revealed preference methods.

Read: Ch. 6 HR; 125-136;

[Notes](https://canvas.uw.edu/courses/1633480/files/103643994/download?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643994/download?wrap=1>)

Optional: [Travel Cost example.xlsx](https://canvas.uw.edu/courses/1633480/files/103643887/download?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643887/download?wrap=1>) ↓
(https://canvas.uw.edu/courses/1633480/files/103643887/download?download_frd=1)

<https://www.youtube.com/playlist?list=PLBfu1mD9hk66oUjAURGn9PCXbUnBHWaP> ↗ (<https://www.youtube.com/playlist?list=PLBfu1mD9hk66oUjAURGn9PCXbUnBHWaP>)

11. Valuation II: Stated preference methods. Value of risks to life and health.

Read: Ch. 6 HR, pp. 137-150;

[Notes](https://canvas.uw.edu/courses/1633480/files/103644016/download?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644016/download?wrap=1>)

Note on VSL terminology problem: recent suggestions to use “value of reduced mortality risk” (VRMR) (see <https://academic.oup.com/reep/article/13/1/155/5288726> ↗ (<https://academic.oup.com/reep/article/13/1/155/5288726>))

Recommended: <http://theconversation.com/whats-the-value-of-a-clean-beach-heres-how-economists-do-the-numbers-94805> ↗ (<http://theconversation.com/whats-the-value-of-a-clean-beach-heres-how-economists-do-the-numbers-94805>)

12. Benefits and costs across time. Discounting.

Read: Ch. 7 HR + Appendix;

[bca discounting-1.pptx](https://canvas.uw.edu/courses/1633480/files/103643941/download?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103643941/download?wrap=1>)

Optional:

https://www.researchgate.net/profile/Gerald_Shively/publication/255661807_An_Overview_of_Benefit-Cost_Analysis/links/00b4953c6c71e4e538000000.pdf ↗

(https://www.researchgate.net/profile/Gerald_Shively/publication/255661807_An_Overview_of_Benefit-Cost_Analysis/links/00b4953c6c71e4e538000000.pdf)

EPA's guidelines for economic analyses of environmental issues: <https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses> ↗ (<https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses>)

See pp. 173-175 in HR on how to use Excel for discounting and simple benefit-cost analysis, as well as Excel example of discounting: [Present value example.xlsx](https://canvas.uw.edu/courses/1633480/files/103644030/download?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644030/download?wrap=1>) ↓
(https://canvas.uw.edu/courses/1633480/files/103644030/download?download_frd=1)

Optional (more advanced): an example of how uncertainty may lead us to discount at low rates: an example of averaging discount factors, not discount rates. See M. Weitzman, “Risk-Adjusted Gamma Discounting,” Journal of Environmental Economics and Management, 60, 1-13 (2010). [weitzman discounting.xlsx](https://canvas.uw.edu/courses/1633480/files/103644028/download?wrap=1) (<https://canvas.uw.edu/courses/1633480/files/103644028/download?wrap=1>) ↓
(https://canvas.uw.edu/courses/1633480/files/103644028/download?download_frd=1)

13. Benefit-cost analysis. Choosing projects.

Breakout questions:

- All other things being equal, the higher the discount rate used, the (higher/lower) is the present value.
- The present value of \$80,000 in 10 years ($T=10$), using a real discount rate of 4% ($r=0.04$) is:

× [\(%24CANVAS OBJECT REFERENCE%24/quizzes/g095986391485d273d85ae03d60465a4e\)](#)

- The net present value of a project which costs 100 million at time 0, yields 50 million in benefits in 5 years ($T=5$) and then another 150 million in benefits in 50 years ($T=50$) is, assuming a 5% discount rate ($r=0.05$):

Read: Ch. 7 HR

[Notes \(https://canvas.uw.edu/courses/1633480/files/103644021/download?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103644021/download?wrap=1)

14. Economics of natural resources I. Nonrenewables.

Read: Ch. 5 HR; Ch. 17 HR

Notes: [dynamic_efficiency_hotelling_nonrenewables_shorter.pptx \(https://canvas.uw.edu/courses/1633480/files/103644023?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103644023?wrap=1)

15. Economics of natural resources II: Resources that grow: forests, fisheries.

Forestry:

<https://www.conservation-strategy.org/csf-economic-video/intro-forestry-economics> [↗](https://www.conservation-strategy.org/csf-economic-video/intro-forestry-economics) (https://www.conservation-strategy.org/csf-economic-video/intro-forestry-economics) (~ 5 min)

<https://www.conservation-strategy.org/csf-economic-video/forestry-economics-optimal-rotation-age-part-1> [↗](https://www.conservation-strategy.org/csf-economic-video/forestry-economics-optimal-rotation-age-part-1) (https://www.conservation-strategy.org/csf-economic-video/forestry-economics-optimal-rotation-age-part-1) (~ 12 min) -- part 2 is more technical so part 1 will suffice

<https://www.conservation-strategy.org/csf-economic-video/ecosystem-services-and-optimal-rotation-age> [↗](https://www.conservation-strategy.org/csf-economic-video/ecosystem-services-and-optimal-rotation-age) (https://www.conservation-strategy.org/csf-economic-video/ecosystem-services-and-optimal-rotation-age) (~ 5 min)

<https://www.conservation-strategy.org/csf-economic-video/forestry-economics-forest-policy> [↗](https://www.conservation-strategy.org/csf-economic-video/forestry-economics-forest-policy) (https://www.conservation-strategy.org/csf-economic-video/forestry-economics-forest-policy) (~ 5 min)

Fisheries (also can see notes below with more on the bioeconomic model of fisheries)

<https://www.conservation-strategy.org/csf-economic-video/fisheries-economics-policy-intro-fisheries-management> [↗](https://www.conservation-strategy.org/csf-economic-video/fisheries-economics-policy-intro-fisheries-management) (https://www.conservation-strategy.org/csf-economic-video/fisheries-economics-policy-intro-fisheries-management) (~ 5 min)

<https://www.conservation-strategy.org/csf-economic-video/fisheries-economics-policy-maximum-economic-yield> [↗](https://www.conservation-strategy.org/csf-economic-video/fisheries-economics-policy-maximum-economic-yield) (https://www.conservation-strategy.org/csf-economic-video/fisheries-economics-policy-maximum-economic-yield) (~ 15 min)

Suggested Reading: Ch. 16, 18, 19 HR

Notes: [renewables.pptx \(https://canvas.uw.edu/courses/1633480/files/103643942/download?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103643942/download?wrap=1)

May also be helpful: from HR, Ch. 19

[forest_rotationHR_1.jpg \(https://canvas.uw.edu/courses/1633480/files/103643915/download?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103643915/download?wrap=1). [↓](https://canvas.uw.edu/courses/1633480/files/103643915/download?download_frd=1) (https://canvas.uw.edu/courses/1633480/files/103643915/download?download_frd=1) [forest_rotationHR_2.jpg \(https://canvas.uw.edu/courses/1633480/files/103643937/download?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103643937/download?wrap=1). [↓](https://canvas.uw.edu/courses/1633480/files/103643937/download?download_frd=1) (https://canvas.uw.edu/courses/1633480/files/103643937/download?download_frd=1)

16. Economic growth and the environment; sustainability; empirical indicators of sustainability

Read: Ch. 2, 10, 22 HR

Notes for presentation: [econ_sustainability.pptx \(https://canvas.uw.edu/courses/1633480/files/103643849?wrap=1\)](https://canvas.uw.edu/courses/1633480/files/103643849?wrap=1)

Also helpful: Ch. 18 BH., Ch. 19 BH

<http://www.oecdbetterlifeindex.org/#/11111111111>  (<http://www.oecdbetterlifeindex.org/#/11111111111>)

Final exam (June 5).

Diversity and Inclusion

The College of the Environment supports an inclusive learning environment where diverse perspectives are recognized, respected, and seen as a source of strength. In this course, we will strive to create an environment of free, honest, and respectful conversation where everyone feels included and engaged regardless of their social and cultural backgrounds.

Disability Accommodations

To request academic accommodations due to a disability, please contact Disability Resources for Students (<http://depts.washington.edu/uwdrs/>) (<http://depts.washington.edu/uwdrs/>).

Academic Integrity:






At the University level, passing anyone else's scholarly work as your own, without proper attribution, is considered academic misconduct.









Plagiarism, cheating, and other misconduct are serious violations of the University of Washington [Student Conduct Code \(WAC 478-120\)](http://www.washington.edu/students/handbook/conduct.html) (<http://www.washington.edu/students/handbook/conduct.html>). We expect that you will know and follow the university's policies on cheating and plagiarism. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the College of the Environment [Academic Misconduct Policy](http://environment.uw.edu/wp-content/uploads/2013/05/Academic-Misconduct-Policy.pdf) (<http://environment.uw.edu/wp-content/uploads/2013/05/Academic-Misconduct-Policy.pdf>) and the University of Washington [Community Standards and Student Conduct website](http://www.washington.edu/cssc/) (<http://www.washington.edu/cssc/>).

Religious accommodation.

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at [Religious Accommodations Policy](https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/) (<https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/>) (<https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/>). Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request form](https://registrar.washington.edu/students/religious-accommodations-request/) (<https://registrar.washington.edu/students/religious-accommodations-request/>) (<https://registrar.washington.edu/students/religious-accommodations-request/>).

Course Summary:

| Date | Details | Due |
|------------------|--|----------------|
| Mon Apr 3, 2023 |  Quiz 1 (https://canvas.uw.edu/courses/1633480/assignments/8180722) | due by 11:59pm |
| Wed Apr 12, 2023 |  Quiz 1 Extra Credit (Consumer Utility Maximization) (https://canvas.uw.edu/courses/1633480/assignments/8294731) | due by 11:59pm |
| Mon Apr 17, 2023 |  Homework Assignment 1 (https://canvas.uw.edu/courses/1633480/assignments/8180721) | due by 11:59pm |
| Mon Apr 24, 2023 |  Midterm exam (https://canvas.uw.edu/courses/1633480/assignments/8180731) | due by 11:59pm |
| Thu Apr 27, 2023 |  Quiz 2 (https://canvas.uw.edu/courses/1633480/assignments/8180725) | due by 11:59pm |

| Date | Details | Due |
|------------------|---|----------------|
| Wed May 3, 2023 |  Homework Assignment 2 (https://canvas.uw.edu/courses/1633480/assignments/8180729) | due by 11:59pm |
| Wed May 17, 2023 |  Homework Assignment 3 (https://canvas.uw.edu/courses/1633480/assignments/8180724) | due by 11:59pm |
| Mon May 22, 2023 |  Non-market valuation (https://canvas.uw.edu/courses/1633480/assignments/8180736) | due by 11:59pm |
| Fri Jun 2, 2023 |  Homework Assignment 4 (https://canvas.uw.edu/courses/1633480/assignments/8180733) | due by 11:59pm |
| Mon Jun 5, 2023 |  Final Exam (https://canvas.uw.edu/courses/1633480/assignments/8180726) | due by 11:59pm |
| |  Public goods game_extra credit (https://canvas.uw.edu/courses/1633480/assignments/8180728) | |
| |  Trading game earnings (https://canvas.uw.edu/courses/1633480/assignments/8180740) | |
| |  Valuation, tradeoffs, and discounting - extra credit (https://canvas.uw.edu/courses/1633480/assignments/8180727) | |