

Economics 435
Natural Resource Economics
Summer 2016: TTh 10:50-1:00

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1 Course Overview

Resource economics is the study of how society allocates scarce natural resources, such as fish and trees, nonrenewable resources, such as oil and copper, environmental resources, such as clean air and water, and ecological resources, such as biodiversity. A principal theme in analyzing these topics is the determination of the optimal trade-offs between the benefits and costs of resource use, with special emphasis on trade-offs between current and future resource use and sustainability. The role of property rights in determining the optimality of market decisions concerning resource use is also stressed. A critical question in the allocation of natural resources is: “How much of the resource should be harvested (extracted) today?”

By the end of the course students should understand how to determine the optimal rate of utilization for different types of natural resources; the circumstances under which a free market system will and will not result in optimal outcomes with respect to the utilization of resources; and the lessons economics provides on how to design the best public policies to obtain the desired results.

Evaluation of Student Performance: The prerequisite for this course is ECON 300 and the class discussions assumes that students have a solid understanding of intermediate level microeconomics. There will be **two exams** and eight problems

sets with **three** of these **problems sets** to be handed in for grading. The exams will count for 85% of the grade and the problem sets will count for 15%. **The exam grade will be a weighted average of the numeric grades assigned to the individual exams, with the exam on which you do better receiving a weight of .6 and the exam on which you do worse receiving a weight of .4.** Please refer to the next page for further, very important, information concerning the rules for taking the exams and policies with respect to academic honesty.

Text: There is no required textbook for this course. Not required but helpful:

- Tietenberg, Thomas H., and Lynne Lewis. *Environmental and Natural Resource Economics*. No. HC79. E5. T52 1992. Reading, MA: Addison-Wesley, 2000.
- (Advanced) Conrad, Jon M., and Colin Whitcomb Clark. *Natural Resource Economics: Notes and Problems*. Cambridge University Press, 1987.

Lecture notes are posted on the course webpage, which can be accessed through Canvas. Problem sets, answers to problem sets, and other handouts will also be posted there.

Office hours: If you have any questions at any point during the course, my office hours during the Summer Quarter are 1:15 to 2:15 on Tuesday and Thursday in Savery 319H. An appointment to meet at another mutually convenient time can be made in person after class, or by email at tdf17@uw.edu. Email may also be used to ask any short questions that may arise as you review your notes or work on the problem sets.

2 Lecture Schedule

Dates shown for lectures and the mid-term exam are subject to revision.

- Lecture 1: INTRODUCTION/SYLLABUS (06/21/2016)
Preview of some new results, Economic efficiency and equity, Definitions of: Economic Efficiency, Equity Efficiency in distribution, Consumer sovereignty, Private markets and efficiency, Definition of perfect competition.
- Lecture 2: SOURCES OF MARKET & GOVERNMENT FAILURE (06/23/2016)
Market failures, Potential compensation criterion Government failures, Dynamic efficiency, Preferences, Opportunity Costs, Condition for Dynamic Efficiency.
- Lecture 3: PRESENT VALUE ANALYSIS (06/28/2016)
Capital markets and dynamic efficiency, Present Value Analysis, Present value of consumption, Net present value, Accounting for inflation, Numerical example, Future value, Continuous time formulas.
- Lecture 4: NON-RENEWABLE RESOURCES (06/30/2016)
Condition for Efficient Extraction, Demonstrations of condition's correctness, Proof by contradiction, Arbitrage interpretation, Calculus proof Diagrammatic proof, Derivation of marginal net benefit for: Society, Perfectly competitive firm, Monopoly, Review with solved problem.
- Lecture 5: (07/05/2016)
Effect of constant extraction cost Monopoly, Zero extraction cost, Constant elasticity, Non-constant elasticity, Constant extraction cost, Constant elasticity Effects of taxes, Tax per Unit Constant, Non-constant High-grading.
- Lecture 6: (07/07/2016)

Gross revenue tax Profit tax Summary, Effects of subsidies Effects of externalities, Definition, Constant externality cost Non-constant externality cost, Limitation on future price Future price control, Backstop technology, Green Paradox Rate of discount, Threat of expropriation

- Lecture 7: FORESTRY ECONOMICS (07/12/2016)

Renewable vs. nonrenewable resource, Growth function, Derivation of optimal harvesting age: No replanting, Calculus Algebra Graph, Comparative statics analysis Level of interest rate, Level of stumpage price, Trend in stumpage price Standing value, Value of land in alternative use

- Lecture 8: (07/14/2016)

Harvesting with replanting Balanced forest, Maximum sustainable yield rule Faustmann rule Standing value, Sources of inefficiency, Recycling and the stock of trees Deforestation

FIRST EXAM COVERS LECTURES 1 THROUGH 8 (Tentative (07/19/2016))

- Lecture 9: ECONOMICS OF THE ENVIRONMENT (07/21/2016)

Externalities Pollution diagram, Coase theorem, Efficiency Equity Uniqueness, Policy relevance

- Lecture 10: (07/26/2016)

Policy instruments when know MB and MD curves Pigouvian tax, Regulation, Policy instruments when have almost no information on MB and MD, Target vs. efficient level of pollution Per unit tax vs. regulation, Attaining the target level Minimizing total cost Tradable pollution permits

- Lecture 11: ECONOMICS OF FISHERIES (07/28/2016)

Property rights, Fish Biology, Sustainable yield as a function of stock Dynamic analysis of optimal stock and harvest Optimal vs. market outcomes

- Lecture 12: (08/02/2016)

Sustainable yield as a function of effort Total revenue and total expenditure, Efficient vs. open-access level of effort, Perverse open-access results, Fishery has no net benefit, Environmental improvement has no net benefit, Technological progress is not good, Backward-bending supply curve, Qualifications to result that net benefit equals zero, Short-run vs. long-run, Non-constant prices

- Lecture 13: (08/04/2016)

Goals of public policy, Effort function, Command and control instruments, Direct control of technology, Direct control of effort, Direct control of fishing areas, Direct control of harvest, Economic incentives, Per unit tax on harvest, Individual transferable quotas

- Lecture 14: SUSTAINABILITY (08/09/2016)

Definition and desirability Feasibility, Total capital stock Substitution Technology Recycling Prospects

- Lecture 15: ECOLOGICAL RESOURCES (08/11/2016) Oikos Biodiversity, Quantification, Valuation Preservation of species, US Endangered Species Act, CITES

SECOND EXAM COVERS LECTURES 9 THROUGH 15 ((08/16/2016))

3 Exam Rules

3.1 Exam Absence Policy

1. If you are unable to make it to an exam period due to illness or another unexpected happening, do the following:
 - (a) Notify me no later than the time of the exam that you are not able to take the exam and why.
 - (b) If you missed the exam for health reasons, you need to show me a note issued by a medical professional documenting the reason you missed the exam.
 - (c) If there was some other reason for missing the exam come and see me to explain the reason. You will need to show appropriate documentation. Not waking up or missing your bus/plane is not an acceptable excuse.
2. If you know that you are going to be away due to a University-related activity, such as participation in an away sport or debate, let me know well in advance so that arrangements can be made.

3.2 Exam Taking Rules

1. Material allowed during an exam.
 - (a) You must use a large bluebook for your answers.
 - (b) All books, papers, notebooks, etc., must be placed inside your backpack or other type of bag, which must be securely and fully closed. If you do not have a bag, you must place all your material out of your reach.
 - (c) No electronic devices can be accessible during the exam. Cellular phones must be turned off before entering the class and placed in your closed bag (not in your pocket). You are not allowed to use a cellular phone during an exam. Doing so will result in the termination of your exam time.
 - (d) Baseball caps and any other kinds of headgear that conceal your eyes are

not permitted.

2. Attendance and special accommodation.
 - (a) You are not allowed to leave the room during the exam. This includes restroom use; be sure to use the restroom before the beginning of the exam.
 - (b) If you arrive late to an exam, you cannot expect to get extra time after the official end of the exam to make up for the missing time at the beginning.
 - (c) If you have a documented disability, please show me documentation from the Office of Disability Resources for Students on the first day of class, so that I can make any arrangements required for accommodations.

3.3 Academic Integrity

1. Exams are individual work and cheating will not be tolerated. Looking at notes or your neighbors' answers will result in the immediate termination of your exam time and a grade of zero for the exam.
2. Altering an exam before submitting it for a review of the grading, obtaining an advance copy of an examination, or arranging for a surrogate test-taker are all flagrant violations of University policy.
3. Cheating of any kind may result in expulsion from the University. The Department will follow University policy in case of academic misconduct. I strongly recommend that you review University policy at <http://www.washington.edu/uaa/advising/help/academicintegrity.php>. Students found to have engaged in academic dishonesty will be subject to sanctions, which range from a disciplinary warning to permanent expulsion from the University, depending on the seriousness of the misconduct.