

## ENVIRONMENTAL ECONOMICS

Econ 4545

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### Course Description:

Environmental Economics (Econ 4545) considers the *efficient* and *equitable* use of society's environmental resources, which like all resources are scarce. Environmental resources include the atmosphere, water, water bodies and waterways, soils, undeveloped land, wilderness, many parks (but not Disneyland), wildlife, genetic diversity, and ecological systems.

The environment is where we get the stuff that sustains us and determines, to a large extent, the quality of our lives; the environment is also where we must dump our wastes.

Environmental economics accepts, without much discussion, efficiency and equity as the goals for environmental policy. Note that many others (some environmentalists, politicians, environmental studies majors, etc.) do not accept efficiency and equity as the appropriate determinants of whether an environmental policy is good or bad (right or wrong). Throughout the term, I will mention and discuss some of these other perspectives.

Environmental economics is a course in applied *welfare economics*: how to increase the welfare (*well-faring*) of society. The primary economic goal is to make society better off by increasing the well-faring of its members; it is not to improve the environment. So, making society better off might mean preserving more of an environmental resource or it might mean preserving less of it—it might mean more pollution rather than less pollution, or more of one kind and less of another kind (there are always tradeoffs).

The course will consider *market failures* (particularly *externalities* and *common-property* resources), and the economic valuation of environmental amenities such as clean air, wilderness and ecological systems. Put simply, a market failure is something inherent to the market that keeps the market equilibrium from being efficient.

My expertise is in the valuation of environmental resources. I have done much theoretical, policy and legal work in this area.

Use of environmental resources will be considered from four perspectives: the market allocation (how the market would allocate environmental resources if the market were left to its own devices (no government involvement), efficient allocations, equitable allocations (*environmental justice*), and government attempts, some successful, some not, to achieve more efficient and more equitable allocations of our scarce environmental resources.

Courses in environmental economics and courses in natural resource economics both consider natural resources but differ in that natural resource courses have historically dealt with the inter-temporal utilization (how much to use now and how much to save for the future) of conventional

renewable and nonrenewable natural resources such as energy, minerals, trees and fish; whereas environmental courses have considered pollution and other environmental issues, historically from a static perspective. This historical distinction is blurring.

Before we begin, I want to make a few comments about what economics is not. Economics is not about making money or how to run a firm. Economics is the study of the allocation of society's scarce resources. Economics per se is not pro-market or pro-government. The purpose of this course is not to argue that government action to protect the environment is bad or good; sometimes it is bad, sometimes it is good, often it is necessary if one wants environmental resources to be more efficiently allocated.

The purpose of this course is not to extol the virtues of the market. Markets have many virtues, but, when it comes to the environment, they also have many faults. In one respect, this course could be described as a course on market failures and government actions to that try to correct those failures.

An important component of environmental economics is estimating the costs, in \$, of decreasing pollution, cleaning up the environment and protecting scarce ecological systems such as wetlands and wilderness. (Contrary to what Al Gore (former Vice President, arguably elected President) says, there is no free lunch when it comes to cleaning up.)

I want to stress that, equally important, environmental economics is motivated to estimate the benefits (in \$) of decreasing pollution, cleaning up the environment and protecting scarce ecological systems.

To increase efficiency, one must estimate both an action's costs and its benefits. Not surprisingly, polluters tend to play up the costs of cleaning up and downplay the benefits of cleaning up.

I do a lot of research, theoretical and applied, on estimating the benefits of environmental improvements. An important issue is the costs and benefits to whom. I have worked on a lot of environmental damage cases (legal cases where the government is suing polluters for the damages caused by their pollution).

Note that a lot of non-economist environmentalists reject the idea valuing the environment is \$ and even the ideal that the value of the environment can be quantified. Many insist that economists are weird because economists insist that everything can be valued in \$. Economists are weird.

Environmental economists don't consider society's production and distribution of goods and services as separate from the environment; put simply, societies take from the environment to produce goods and services, and, ultimately what they take ends up being emitted back into the environment in terms of emissions, pollution and wastes. Very simply, the total weight of what is taken from the environment to produce goods and services must eventually equal the total weight

of what we put back into the environment (“what goes in must come out”). This fact is often referred to as *materials balance*. The same balance holds for energy—we change energy’s form but do not create or destroy energy. Production and consumption change the form of matter and the form of energy but, with the exception of nuclear reactions, no matter or energy is created or destroyed. The word consumption is a misnomer; when you eat a Big Mac, nothing is destroyed. Materials balance is of critical importance, but not stressed in your other economics courses.

This is a very interesting time to be taking Environmental Economics. The goal of the current administration is to reduce or eliminate most, or all, restrictions on how one can use the environment. I am not sure this is because it thinks doing so will increase the well-being of society’s current and future members. For an efficiency perspective, society want the efficient amount of regulation: not too much and not too little. Looking ahead, environmental economists tend to like pollution taxes as a method of achieving efficient amounts of taxes.

### Details

My hope it that the end of the semester you conclude the course was difficult but worth the effort.

*Web page:* My web site is located at <http://www.edwardmorey.org/index.html> . From it you can link to the web page for Econ 4545, or you can go directly to the web page for the course, <http://www.edwardmorey.org/4545/4545home.html>

You can always find my web page and the web page for the course by Googling “Edward Morey”

Many past and current assignments, review questions, and the readings will be made available at this site on an as-need basis.

All of the lectures are on the course web page. I will revise and update them as we go along. Some of the lectures are also available as audio files.

You may also want to visit the web sites for the other natural resource and environmental courses that I teach. You will find a lot of overlap. My old undergraduate natural resources course for economics majors can be found at <http://www.edwardmorey.org/4535/4535home.html> . I have not taught it for a while.

My natural resource and environment course for M.A. students (the M.A. program is now extinct) is at <http://www.edwardmorey.org/6535/6535home.html> , and my PhD level environmental course at <http://www.edwardmorey.org/8545/8545home.html>

I used to teach a course called *Economics, Ethics and the Environment*. That course questions many of the assumptions we make in Econ 4545, assumptions that are also made in your other

economics courses. The web page for that course is [www.edwardmorey.org/4999Ethics/4999ethics-home.html](http://www.edwardmorey.org/4999Ethics/4999ethics-home.html) That course has been replaced by *Ethics, Happiness and Choice* ([Econ 4060: Ethics happiness and choice](#))

*Review questions and problems* will be posted online for each section of the course – old versions of the review questions are already on the web page. I will advise you by email whenever I revise a set.

I strongly encourage you to write out answers to these questions and discuss them with your classmates. You will want to form study groups. Your grade will be **highly correlated** with your understanding of the review questions—**don't confuse familiarity with understanding**. On exams and quizzes, I expect your answers to be well written; writing well is a valuable skill that is only learned by practice. I will give you ample opportunity to practice writing.

**One might describe my role as facilitating your understanding of the review questions and helping you to write out clear and precise answers to those questions.**

Writing well is a necessary condition for doing well in the course.

*Final:* There will be a comprehensive final

*Midterms:* There will be two midterms: the first is on **Thursday October 11<sup>th</sup>** and the second one is on **Tuesday Nov 13<sup>th</sup>**. Each will be comprehensive up to that point in the course. I typically do not give make-up exams, so be there. (If I must give you a make-up it will be an oral midterm in my office where I ask you a few questions, and then give you a grade. Most people prefer the regular exam). The University has scheduled our final for **Dec 15<sup>th</sup> at 1:30**

*Assignments:* There will be N short exams assignments (quizzes, small projects, problems, debates, etc.) during the term, Use the review questions to study for these assignments.

Note that **I do not give make-up assignments**. Please don't ask. There will be a bunch of assignments. 25% of your quiz grades will be dropped (the 25% lowest).<sup>1</sup> This policy is in place because bad stuff happens (people get sick, space out, have better things to do, etc.).

Some of the assignments will be in-class; some will be take-home. Some of the assignments will be done in groups. The group, usually three people, will work together and turn in just one assignment. Everyone in the group will get the same grade for that assignment. Group assignments are one of my ways of giving you an incentive to work and study together. Note that getting an A on a group assignment does not imply that everyone in the group understands and can explain the concepts at an A level.

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<sup>1</sup> For example, if there are 11 quizzes in total (I don't know how many there will be) we would drop the lowest 3.

*Final:* Comprehensive final which will constitute 20% of your course grade. So, not a lot.

*Midterm:* The midterms will constitute 50% of your course grade, the one you do better on will be 30% (60% of the 50%) of your course grade, the other will be 20% (40% of the 50%)

*Assignments:* best (N-X) of these assignments will constitute 30% of your course grade.

*Class participation:* If, at the end of the term, I recognize you as someone who has contributed positively and significantly, I will increase your final grade by some appropriate, but small, amount. Ways to contribute include asking or answering questions, attendance, participating in class discussions, and helping other students to learn the material. (Note that the exams and assignments add to 100% of your grade, so any credit for class participation is on top of that. If you are in class almost all of the time (I will determine what that means). I will add 5% to your course grade.) In determining whether you get any participation points, why you were absent does not matter.

If you do better on the final than your aggregate midterm, the final will count 30% of your course grade and the aggregate midterm score will be will count 40% of your course grade.

If you get an A on the first midterm, you can make a private arrangement with me to do a course paper/project. How much the paper will count will depend on our arrangement. If you are doing well in the course and like to write and do research, this is something I highly recommend

Some papers by past student of Econ 4545 and Econ 4535 can be found on the web page for Econ 4535(<http://www.edwardmorey.org/4535/4535home.html> ) I look forward to including your excellent paper or web project on the page.

If you are interested in writing a paper see <http://www.edwardmorey.org/4545/4545assg.html>

*I grade on the following scale:*

90% = A  
80% = B  
70% = C  
60% = D  
59% = F

In past semesters, some students, not many, have earned a D or an F, and have gotten that grade. I hate doing this but will give a D or F if it is earned.

I try to grade on the basis of standards rather than on the basis of a curve. Everyone, in theory,

can get an A. That said, the Department has grading guidelines: I am supposed to aim for a course average grade of around 76% (middle to high C, so would get in trouble if every semester I gave mostly A's

*Office hours:* these are posted on the home page for the course. If you can't make it to the office hours, catch me after class to schedule a time. My office is Econ 122. Please feel free to contact me by email [Edward.Morey@Colorado.edu](mailto:Edward.Morey@Colorado.edu) about setting up an appointment. Sometimes it will take a day or so for me to get back to you.

I will often communicate important information (e.g. announce a quiz) to you by email sent to your CU email account. I have learned from years of experience to not send emails to addresses like [HotRodStud@excite.com](mailto:HotRodStud@excite.com).

*Prerequisites:* Intermediate Micro Theory (C.U. Econ. 3070), and Econ 1078 and 1088 (or fulfillment of one of the more rigorous ways to fulfill the mathematics requirement for the major). I will use calculus in the course. Materials learned in 3070 will form a foundation for what we will do in 4545. Knowledge of Public Economics will make this course easier.

I will cover the relevant micro theory in my lectures but cover it more quickly than when it was presented to you in intermediate microeconomic theory. It is important that you have successfully completed Intermediate Micro Theory. If you an environmental studies major who has doubts about their knowledge of economics, talk to me—soon.

While this is not a micro-theory course, economics without theory is not economics. You will need micro theory to understand and explain the allocation of environmental resources. Some of the theory and terms you will need to know include: the *theory of the firm*, the *theory of the consumer*, *efficiency*, *equity*, when the market equilibrium will and won't be efficient, *market failure*, types of market failures, corrections for market failure, *discounting* and *present value*, *materials balance*, *public goods*, *property rights*, *common property*, *externalities*.

A strong math background will make this course easier. Math involves rigor and a way of thinking that facilitates economic thinking. In addition, graphs and simple mathematical descriptions of economic problems provide insights that would be difficult to convey with only words.

*Readings:*

There is no course text book. If you want a reference text, I recommend Tom Tietenberg's *Environmental and Natural Resource Economics*. You could check it out by borrowing, for a day or two, one of my copies. If you are so inclined, buy a used copy online. I will not directly lecture from this book. Rather, consider Tietenberg a standard undergraduate text on the topic of environmental economics.

If you bring me that book, or some other undergraduate text in environmental economics, I will try and tell you which chapters are relevant to the topics and issues we are discussing. Don't consider Tietenberg a substitute for either the course readings or class time. It is simply another way to study environmental economics.

Other possible resources are the course web pages for other environmental courses for undergraduate economics majors. This syllabus should include links to a few such courses, but for now does not. Maybe you could help me find some. Of course, I am not responsible for the mistakes of other professors.

Your required readings consist of journal articles, magazine articles and newspaper articles. They vary in length from a few newspaper columns to twenty-page journal articles. Some of these articles will be discussed in class.

I will often draw review questions from these articles. You are responsible for the material in all of the articles for each section of the outline that is covered in class, even though not all of the readings will be explicitly discussed in class.

Many of these articles were suggested by students. I encourage your comments and feedback on these readings. Bring me articles (preferably email them to me as attachments in .pdf or .html) you feel would be good class readings, explaining why would be a good class reading. Also tell me which of the current readings have the greatest value and which have the least value.

The *New York Times* is a very good source of articles about the environment, particularly the *Science* section on Tuesdays. *The New York Times* is on the web ( [www.nytimes.com](http://www.nytimes.com) ). You can search by topic for articles previously published in the New York Times.

I am in the process of trying to get all of the class readings onto the web page for the course. The articles on the course web page are in either .pdf or .html format. Note that some of these files are large. See the course web page for details.

**I will be revising and updating the list of articles during the semester.**

Note that much of the material I will present in class does **not** appear in any of the readings.

*Applications/topics:* Some of the applications/issues/topics we are likely to consider include extinction and animal preservation, pollution permits, parks and wilderness areas, valuation (travel-cost, contingent valuation, and choice experiments), global warming, conservation, mobile-source pollution (from cars and trucks), and acid deposition.

*Class format:* View the readings and my lectures as complements rather than substitutes.

A lot of the basic material that you will be responsible for will be presented in lecture and is material that is not explicitly in the readings. Class time will be devoted to lectures, problem solving and discussion. It is important that you do the appropriate readings before each lecture. Some class time will be devoted to working on the review questions. Prepare for these review sessions by answering the questions to the best of your ability. I will ask a lot of questions and will sometimes offer extra credit for correct answers. Expect to be called on.