

**AREC/ECON 540: Natural Resource Economics**  
**Department of Agricultural and Resource Economics**  
**Colorado State University**  
**MWF, 11:00-11:50, Eddy 119**  
**Spring, 2018**

**Course Syllabus**

Dale Manning

B304 Clark

970-491-5706 (office)

[Dale.manning@colostate.edu](mailto:Dale.manning@colostate.edu)

OH: Mon and Wed: 1-2 pm, or any time by appointment

Final Exam: take-home, due by 4 pm Monday 5/9/2018

**Course Description**

This course is a second-year master's class that will make use of micro-economic theory and mathematical modeling tools to develop a rigorous understanding of the connection between human economic behavior and the natural environment. We will use mathematical techniques, including optimization tools, to examine problems related to pollution, environmental valuation, climate change, and the use of scarce natural resources over space and time. Concepts and mathematical tools introduced in AREC 540 will be further developed in AREC 740 (resource econ) and AREC 741 (environmental econ).

**Course Objectives**

My goal is to expose students to the major environmental and natural resource economics models while emphasizing the concepts and intuition of the models. Students should be able to extend these basic models to a wide variety of topics that we will not have time to cover in this class. I use the examples in class to provide examples of applying economic theory to environmental and natural resource issues. If successful, these examples will inform the development of ideas for a master's thesis.

**Prerequisites**

According to the website, prerequisites are AREC/ECON 340 (intro to natural resource economics) and math 141 (calculus). I will assume everyone has taken at least intermediate microeconomics (AREC/ECON 306) and is comfortable with differential calculus and the basics of static optimization.

**Recommended Texts and Readings**

For this class, I will use the Perman et al. 4<sup>th</sup> edition textbook:

Perman, Roger, Yue Ma, Michael Common, David Maddison, and James McGilvray. *Natural Resource and Environmental Economics*. Prentice Hall; 4 edition (June 23, 2012)

This textbook provides a foundation but most of the reading in the class will come from journal articles posted online. The relevant references are listed in the topics below, using the same name as the online file. I will use Canvas to share files, including readings and assignments (described below).

## Grading

Grades will come from a mid-term (15%), a final (20%), homework assignments (25%), a paper proposal (rough draft (10%) and final (10%), including presentation (5%)), and participation (5%). Finally, each student will lead a discussion of a paper that we cover in class (10%). The mid-term will be in class and the final, a take-home, will be due the afternoon of the scheduled exam day. There will be 5 homework assignments and I will provide approximately 2 weeks per homework. You can collaborate on homework and turn in one problem set per 3 people but exams must be done entirely independently. I encourage you to come to me for help on homework as well. I will not accept late work.

I will give grades based on a percentage score but use a curve to ensure that the average grade is approximately a B+.

## Class Topic Outline (subject to change)

| <i>Topic</i>   | <i>Readings</i>   | <i>Important Dates</i> | <i>Perman Chapter(s)</i> |
|--|---|------------------------|--------------------------|
| <b>I. Course Introduction</b>  |   |                        |                          |
| Course overview  | Pearce 2002<br>Lichtenberg et al., 2010<br>What is Conservation?  |                        |                          |
| Math review<br>(production example)  |   |                        |                          |
| Discounting  |   | HW1 Due 2/2            |                          |
|  |   |                        |                          |
| <b>2. Natural Resource Economics</b>   |   |                        |                          |
| Land: rents, scarcity, and land use  | SchlenkerHanemannFisher2006*<br>Wu Platinga 2003*   |                        |                          |
| Tragedy of the Commons: and institutions to correct                              | Hardin 1968<br>Homans and Wilen 1997*   |                        |                          |
| Forestry: from maximizing biomass to maximizing net value                        | Hartwick<br>McDermott 2015*   | HW2 due 2/16           | 18                       |
| Nonrenewable Resources: sustainability and the optimal use over time             | Hotelling 1931<br>Sinn Green Paradox<br>Tierney Betting on the Planet<br>AndersonKelloggSalant_HotellingPressure* | No class on 2/23       | 15                       |
| Renewable Resources—<br>The Fishery: Maximum economic yield<br>Population models | Gordon 1954<br>Bromley 2015*<br>Sanichirico and Wilen 2001*   | HW3 due 3/5            | 17                       |

|   |   |   |     |
|---|---|---|-----|
| Development and the environment: resource management and income | Samuelson 1974*<br>Ostrom 2002*   |   |     |
| Optimal Control Overview  |   |   |     |
|   |   | Midterm Exam (in class) 3/9                               |     |
|   |   | Spring Break: No Class 3/12, 3/14, 3/16                   |     |
| <b>3. Environmental Economics</b>                               |   |   |     |
| Introduction to environmental economics                         | Fullerton and Stavins 1998<br>Oates 2006  |   |     |
| Externalities   |   | 3/26 and 3/30—I am out of town                            |     |
| Public goods  |   |   |     |
| Policies to correct market failures                             | Coase 1960<br>Goulder and Parry 2008*<br>Gillingham et al 2013<br>Schmalensee and Stavins 2013*<br>Hornbeck 2010* | Proposal rough draft due 4/4                              | 5-7 |
| General equilibrium considerations                              |   | HW4 due 4/6   | 4,8 |
| Benefit-cost analysis   |   |   | 11  |
| Environmental Valuation: revealed and stated preferences        | Carson 2000*<br>Muehlenbachs et al 2015*  | HW 5 due 4/25   | 12  |
| Environmental economics and trade                               |   |   | 10  |
| Development and the environment: ecosystem services             | Ferraro et al 2012*   |   |     |
| Climate change economics  | Goulder and Pizer 2006<br>Weitzman 1974<br>Novan 2011*  |   | 9   |
|   |   |   |     |
| Student Presentations   |   | 4/30, 5/2, and 5/4: present (and hand in) thesis proposal |     |
| Final Exam  |   | Take-home, due May 9 <sup>th</sup> by 4pm                 |     |

\*Eligible for student presentation



# Principles of Community

The Principles of Community support the Colorado State University mission and vision of access, research, teaching, service and engagement. A collaborative, and vibrant community is a foundation for learning, critical inquiry, and discovery. Therefore, each member of the CSU community has a responsibility to uphold these principles when engaging with one another and acting on behalf of the University

## Inclusion:

We create and nurture inclusive environments and welcome, value and affirm all members of our community, including their various identities, skills, ideas, talents, and contributions.

## Integrity:

We are accountable for our actions and will act ethically and honestly in all our interactions.

## Respect:

We honor the inherent dignity of all people within an environment where we are committed to freedom of expression, critical discourse, and the advancement of knowledge.

## Service:

We are responsible, individually and collectively, to give of our time, talents, and resources to promote the well-being of each other and the development of our local, regional, and global communities.

## Social Justice:

We have the right to be treated and the responsibility to treat others with fairness and equity, the duty to challenge prejudice, and to uphold the laws, policies and procedures that promote justice in all respects.

## **Mental Health statement**

### Need Help?

CSU is a community that cares for you. If you are struggling with drugs or alcohol and/or experiencing depression, anxiety, overwhelming stress or thoughts of hurting yourself or others please know there is help available. Counseling Services has trained professionals who can help. Contact 970.491.6053 or go to <http://health.colostate.edu>. If you are concerned about a friend or peer, tell someone at by calling 970.491.1350 to discuss your concerns with a professional who can discreetly connect the distressed individual with the proper resources (<http://supportandsafety.colostate.edu/tellsomeone>). Rams take care of Rams. Reach out and ask for help if you or someone you know is having a difficult time.

### Sexual Assault and Violence Elimination

CSU's Student Sexual Harassment and Violence policy, following national guidance from the Office of Civil Rights, requires that professors follow CSU policy as a "mandatory reporter" of any personal disclosure of sexual harassment, abuse, and/or violence related experiences or incidents shared with the professor in person, via email, and/or in classroom papers or homework exercises. These disclosures include but are not limited to reports of personal relational abuse, relational/domestic violence, and stalking. While professors are often able to help students locate appropriate channels of assistance on campus (e.g., see the CSU Health Network link below), disclosure by the student to the professor requires that the professor inform appropriate CSU channels to help ensure that the student's safety and welfare is being addressed, even if the student requests that the disclosure not be shared.

For counseling support and assistance, please see The CSU HEALTH NETWORK, which includes a variety of counseling services that can be accessed at: <http://www.health.colostate.edu/>. And, The Sexual Assault Victim Assistance Team is a confidential resource for students that does not have a reporting requirement and that can be of great help to students who have experienced sexual assault. The web address is <http://www.wgac.colostate.edu/need-help-support> .