

Natural Resource Economics and Policy (ESM 242)

Bren School of Environmental Science & Management
University of California, Santa Barbara
Fall 2021

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Office Hours: Tuesday 3:00-5:00, Bren 3424

Course Objectives

This course examines the use of natural resources such as fish, forests, and minerals. An emphasis will be placed on how to use resources over time in a way that maximizes their value. We will also consider whether markets for these resources are optimal in this sense or whether policy interventions are warranted. After an introduction to basic concepts, we will study how dynamic problems can be solved numerically using the Excel Solver. This will be the primary tool that students use throughout the class. Specific topics examined will include fisheries, forests, nonrenewable resources, land, and decision-making under uncertainty. In addition to regular homework assignments, students will formulate and solve a dynamic resource problem of their own design.

Course Materials

Most of the readings for the course will be in *Resource Economics, Second Edition* by Jon M. Conrad (Cambridge University Press, 2010). Additional readings will be made available on the course website.

Course Requirements

Readings: The readings are optional but strongly encouraged. They will help you to better understand the material presented in class and to build a deeper understanding of resource economics.

Homework assignments: There will be six homework assignments. You may work on the assignments in groups; however, you are responsible for writing your own answers, in your own words. Assignments 1-5 will be available on Tuesday and due the following week on Wednesday. The class period on Wednesday will be used to answer any remaining questions about the homework assignment due on that day and to discuss the new homework. Assignment 6 will be based on the group presentations and be made available after the last group presentation.

Mid-term exam: There is a take-home mid-term exam.

Group projects: Students will work in groups on projects of their own design. Each team must identify an interesting dynamic natural resource problem, formulate a research question, develop a mathematical statement of the problem, find a numerical solution to the problem, and report on their findings. There are three deliverables: 1) a one-page description of the problem due on October 13, 2) a presentation to the class during Weeks 9, 10, & 11, 3) a final slide deck due by Wednesday, December 1.

Times and Dates

Class meets Monday and Wednesday, 9:30-10:45 am, in Bren 1424

Homework assignments are due on **October 13, October 20, October 27, November 3, November 17,** and **December 8.**

A one-page description of your group project is due on **Wednesday, October 13.**

The mid-term exam will be handed out on **Thursday, November 3,** and due at the **beginning of class on Monday, November 8.** There is no final exam.

The final slide decks for your group presentation are due on **Wednesday, December 1**.

Course Grades

Course grades will be based on homework assignments (40%), the mid-term exam (30%), and the group presentation and final slide deck (30%).

Schedule

Week 2 (Conrad, Chapters 1 & 2)

September 27. Course overview

September 29. Introduction to basic concepts

- Natural resources
- Dynamics
- Discounting
- Optimization

Week 3 (Conrad, Chapter 2)

October 4. Numerical optimization

- Using the Excel Solver

October 6. Introduction to Homework #1

Week 4 (Conrad, Chapter 3)

October 11. Fisheries

- Biological growth
- Yield-effort relationships
- Static fisheries models
- Dynamic fisheries models
- Fisheries policy

October 13. Introduction to Homework #2

ONE-PAGE DESCRIPTION OF YOUR GROUP PROJECT - Due today

Week 5 (Conrad, Chapter 4)

October 18. Forestry

- Yield function
- Optimal rotations

- Non-timber benefits

October 20. Introduction to Homework #3

Week 6 (Conrad, Chapter 5)

October 25. Nonrenewable resources

- Hotelling's rule
- Price and extraction paths
- Reserve dependent costs
- The Green Paradox

October 27. Introduction to Homework #4

Week 7 (Hartwick and Olewiler, Chapter 2)

November 1. Land use and land value

- Economic rent
- Heterogeneity in land quality
- Price of land
- Land use patterns

November 3. Land use policy and applications

- Urban growth controls
- Wildland-urban interface
- Biodiversity
- Public lands and the local economy

MID-TERM EXAM – A take-home exam will be made available on November 3. It is due at the beginning of class on November 8.

Week 8 (No readings this week)

November 8. Water

- Open access use of an aquifer
- Optimal use of an aquifer
- Policy application

November 10. Introduction to Homework #5

Week 9 (Plantinga 2018; Buechi et al. 2021)

November 15. Economics of Wildfire

- Wildfire trends in California
- Fuels treatments
- Fire suppression
- Insurance markets

November 17. Group presentations

Week 10 (No readings this week)

November 22. Group presentations

November 24. Office Hours

Week 11 (No readings this week)

November 29. Group presentations

December 1. Group presentations

FINAL EXAM – In lieu of a final exam, students will do a final homework assignment that will be based on the group presentations. The assignment will be due on Wednesday, December 8.