Natural Resource Economics and Policy (ESM 242)

Bren School of Environmental Science & Management
University of California, Santa Barbara
Fall 2017

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Office Hours: Wednesday 2:00-3:30 or by appointment

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 with 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: You are expected to complete all of the assigned reading before class, as lectures will build on rather than reiterate reading material.
Homework assignments: There will be five homework assignments. You may work on the assignments in groups; however, you are responsible for writing your own answers, in your own words. Assignments will be posted at the end of the week (Thursday or Friday) and due at the start of class the following Thursday. On the days that assignments are due, we will use the class period to work through the problems. I will call on students to explain their answers to the class.
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 17, 2) a presentation to the class during Weeks 9-10, 3) a final report due by 5 pm on Wednesday, December 13.

Times and Dates

Class meets Tuesday and Thursday, 8:00-9:15 am, in BH 1424.
Homework assignments are due on **October 12, October 19, October 26, November 2,** and **November 16.**
A one-page description of your group project is due on **Tuesday, October 17**.
The mid-term exam will be handed out on **Thursday, October 26,** and due at the **beginning of class** on **Tuesday, October 31.** There is no final exam.

The final report will be due by **5 pm** on **Wednesday, December 13**.

Course Grades
Course grades will be based on homework assignments and in-class exercises (30%), the mid-term exam (30%), and the group presentation and final report (40%).

Schedule

Week 1

September 28. Course overview

Week 2 (Conrad, Chapters 1 & 2)

October 3. Introduction to basic concepts

- Natural resources
- Dynamics
- Discounting
- Optimization

October 5. Numerical optimization

- Using the Excel Solver

Week 3 (Conrad, Chapter 3)

October 10. Fisheries

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

October 12. In-class exercises (Homework 1)

Week 4 (Conrad, Chapter 3)

October 17. Fisheries, continued

ONE-PAGE DESCRIPTION OF YOUR GROUP PROJECT - Due today

October 19. In-class exercises (Homework 2)

Week 5 (Conrad, Chapter 4)

October 24. Forestry

- Yield function
- Optimal rotations
- Non-timber benefits

October 26. In-class exercises (Homework 3)

MID-TERM EXAM – A take-home exam will be handed out in class on October 26. It is due at the beginning of class on October 31.

Week 6 (Conrad, Chapter 5)

October 31. Nonrenewable resources

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

November 2. In-class exercises (Homework 4)

Week 7 (Hartwick and Olewiler, Chapter 2)

November 7. No class

November 9. Land use and land value

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

Week 8 (No readings this week)

November 14. Water

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

November 16. In-class exercises (Homework 5)

Week 9 (No readings this week)

November 21. Resource Use under Uncertainty

- Risk preferences

- Irreversibility and option value

November 23. No class

Week 10 (No readings this week)

November 28. Group presentations

November 30. Group presentations

Week 11 (No readings this week)

December 5. Group presentations

December 7. Group presentations

FINAL EXAM – In lieu of a final exam, students will turn in a final report on their group project. The reports are due by 5 pm on Wednesday, December 13.