Natural Resource Economics and Policy (ESM 242)

Bren School of Environmental Science & Management
University of California, Santa Barbara
Fall 2016

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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 Wednesday. 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 8-9, 3) a final report due by 5 pm on Wednesday, December 7.

Times and Dates

Class meets Monday and Wednesday, 10:00-11:15 am, in BH 1424.
Homework assignments are due on **October 5, October 12, October 19, October 26,** and **November 2.**
A one-page description of your final project is due on **Monday, October 17**.
The mid-term exam will be handed out on **Wednesday, October 26,** and due at the **beginning of class** on **Monday, October 31.**
The final report will be due by **5 pm** on **Wednesday, December 7**.

Course Grades
Course grades will be based on homework assignments and in-class exercises (40%), the mid-term exam (20%), and the group presentation and final report (40%).

Schedule

Week 1 (Conrad, Chapter 1 & 2)

September 26. Introduction to basic concepts

- Natural resources
- Dynamics
- Discounting
- Optimization

September 28. Numerical optimization

- Using the Excel Solver

Week 2 (Conrad, Chapter 3)

October 3. Fisheries

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

October 5. In-class exercises

Week 3 (Conrad, Chapter 3)

October 10. Fisheries, continued

October 12. In-class exercises

Week 4 (Conrad, Chapter 4)

October 17. Forestry

- Yield function
- Optimal rotations
- Non-timber benefits

October 19. In-class exercises

Week 5 (Conrad, Chapter 5)

October 24. Nonrenewable resources

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

October 26. In-class exercises

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 (Hartwick and Olewiler, Chapter 2)

October 31. Land use and land value

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

November 2. In-class exercises

Week 7 (No readings this week)

November 7. Water

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

November 9. Resource Use under Uncertainty

- Risk preferences
- Irreversibility and option value

Week 8

November 14. Group presentations

November 16. Group presentations

Week 9

November 21. Group presentations

November 23. Group presentations

Week 10

November 28. Wrap-up

November 30. No class

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 7.