Course Description

Economics is the study of the use of scarce resources to satisfy human wants. Nowhere is this more apparent than in society’s interaction with the ocean. This class will focus on the economic effects of specific policies in areas such as ocean recreation, shipping, boat building, ports, offshore energy production, aquaculture, fishing, coastal construction, and coral reef protection.

This course will demonstrate the different methodologies used by economists to answer important marine policy research questions: for example, economic impact assessment, equilibrium analysis, benefit-cost analysis and non-market valuation.

Student Learning Objectives

The course is designed to enhance the student’s ability to understand economic concepts and models and to assess their relevance to marine issues. After completion of the course, students should be able to:

(1) Rigorously evaluate the economic impacts of marine management policies
(2) Explain the linkages between economics, law and environmental science in the marine sector
(3) Communicate with professionals working in the ocean economy

Textbook

*Environmental and Natural Resource Economics, 8/e*, Tom Tietenberg and Lynne Lewis ISBN: 0-321-48571-8. This book is available at the UH bookstore. It is not essential but may prove very helpful.
Online Resources

Lecture notes, practice problems and grades will be posted on Laulima (https://laulima.hawaii.edu/).

Assessment

Short Assignments

There will be several short assignments during the semester. The assignments will be linked to the case studies associated with each topic. Each assignment involves solving a problem or considering policy options and writing a short report. Detailed requirements for each report will be established in class the week before they are due. On the due dates students will hand in their reports at the beginning of the class. Students will collectively discuss and evaluate the assignment.

Midterms and Final

There will be two mid-term exams and a final exam (each 1 hour and fifteen minutes long). The midterms and final will consist of fifteen multiple-choice questions (which should take about forty-five minutes) and an essay question (which should take about thirty minutes). The essay question will be based on a topic I cover in my lectures.

Grades

The course grade will be based upon classroom participation (10 percent), short assignments (30 percent) and the midterms/final (60 percent).

Office Hours

TBA
Topics and Readings

1. Introduction to the Ocean Economy

This part of the course will quickly overview the different sectors and industries in the ocean Economy (see table below from the National Ocean Economics Program).

<table>
<thead>
<tr>
<th>Living Resources - Marine</th>
<th>Tourism &amp; Recreation - Coastal</th>
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<tbody>
<tr>
<td>Fish Harvesting</td>
<td>Boat Dealers</td>
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<tr>
<td>Fish Hatcheries and Aquaculture</td>
<td>Eating and Drinking Places</td>
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<td>Seafood Processing</td>
<td>Hotels and Motels</td>
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<td>Marinas</td>
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<td>Minerals - Offshore</td>
<td>Recreational Vehicle Parks and Campgrounds</td>
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<td>Limestone, Sand, and Gravel</td>
<td>Sporting Goods Retailers</td>
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<td>Oil and Gas Exploration</td>
<td>Zoos and Aquaria</td>
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<td>Oil and Gas Production</td>
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<tr>
<td>Transportation</td>
<td>Marine</td>
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<td>Deep Sea Freight Transportation</td>
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<td>Marine Passenger Transportation</td>
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<td>Marine Transportation Services</td>
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<tr>
<td>Ship &amp; Boat Building</td>
<td>Petroleum and Natural Gas Pipelines</td>
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<tr>
<td>Boat Building and Repair</td>
<td>Search and Navigation Equipment</td>
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<tr>
<td>Ship Building and Repair</td>
<td>Warehouse</td>
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2. Principles of Microeconomics

This part of the course will remind students of the fundamental principles underlying most economic analysis. We will start with the simple model of a competitive market and explore how to calculate consumer and producer surplus. We will then extend our analysis to the realm of “market failures”, in particular the role of externalities, public goods and common property resources. This part of the course will conclude with a broad discussion of the policy instruments used to address market failures such as taxes/subsidies, cap-and-trade regulation and enclosure of the commons. The case studies used to highlight these principles will include the 1973-74 Oil Crisis, the establishment of SO₂ Permit Markets and the current carbon tax vs. cap-and-trade debate.

Readings:

Chapters 2, 4 and, 15 of Tietenberg and Lewis, Environmental and Natural Resource Economics

Interactive Exercises:

In-class experimental markets
3. Harvesting and Management of Commercial Fisheries

This topic is the core of the course. Students will learn how to couple market systems with natural systems in a unified modeling framework. We will focus on deriving bio-economic equilibria and on optimizing yield from fisheries. This part of the course will conclude with an overview of the empirical techniques used to test whether fisheries management policies are achieving their desired goals. A key case study will be the Alaskan halibut fishery and its transition through various forms of fisheries management.

Readings:

(1) Chapter 14 of Tietenberg and Lewis, *Environmental and Natural Resource Economics*

Video:

Fate of the Oceans: Our Threatened Fisheries

Interactive Exercises:

In-class “Tragedy of the Commons” experiment.
Electronic over-fishing experiment.

4. Economics of Marine Reserves and Ecosystem-Based Management

The design of marine reserves is one of the most important and contentious issues in modern marine conservation and fisheries management. This part of the course will use many of the methodologies already introduced (such as Discrete-Choice Logit Modeling, Bio-economic Modeling and Dynamic Programming) to evaluate existing and potential marine reserves. Case studies will include the Channel Islands, the Northwest Hawaiian Islands and the main Hawaiian Islands. This topic will conclude with analyzing how economics can be incorporated into the movement towards ecosystem-based management of marine resources.

Readings:

(1) Chapter 14 of Tietenberg and Lewis, *Environmental and Natural Resource Economics*

*Interactive Exercises:*

We will use the computer software designed by the American Museum of Natural History ([http://ncep.amnh.org/marine_simulation/](http://ncep.amnh.org/marine_simulation/)) to design and implement our own marine reserves and study their effects on populations and fishery yields.

### 5. Aquaculture

Aquaculture is both a rising global industry and of important historical significance in Hawai‘i. This part of the course will focus on emerging trends in the aquaculture industry, potential interactions with wild harvest, mitigation of negative impacts and the potential for demand-side management. Case studies will include Kona Blue Water Farms and the restoration of Hawaiian fishponds.

*Reading:*

(1) Chapter 14 of Tietenberg and Lewis, *Environmental and Natural Resource Economics*

### 6. Economic Impact Assessment and Benefit-Cost Analysis

This part of the course will focus on what most people assume economists do: assessing the economic impacts of different policies. In particular, we will focus on two methodologies: Economic Impact Assessment and Benefit-Cost Analysis. As a case study, we will focus on efforts to estimate the economic benefits of coral reefs for the Hawaiian economy.

*Readings:*

(1) Chapters 2, 3, 17 and 19 of Tietenberg and Lewis, *Environmental and Natural Resource Economics*
(2) Dave Swenson (2002). *An Introduction to Economic Impact Assessment.*

7. Methods for Measuring Non-Market Values

This part of the course will introduce the commonly used methodologies of Contingent Valuation, Hedonic Pricing and Travel Cost Valuation. These are different methods for estimating non-market values, such as how much do people value the waves on the North Shore or mammals in the ocean. The case study of the Exxon Valdez Oil Spill will be used to illustrate how these methodologies are used in practice.

**Readings:**

1. Chapter 3 of Tietenberg and Lewis, *Environmental and Natural Resource Economics*
4. Arrow et al., 1993

8. The Economics of Ports and Shipping

We will return to our analysis of Pigouvian taxes and also introduce basic Bayesian Decision-Making to study the subsidization of seaports, the control of carbon emissions from sea trade and the massive risk proposed by trade-related invasive species introductions. Case studies will include Honolulu Harbor and the control of invasive species in Hawai‘i.

**Readings:**


9. Economics of Offshore Oil Development
The course will conclude with a discussion of the optimal extraction of non-renewable resources, in particular Hotelling’s Rule. We will combine this with our earlier study of Benefit-Cost Analysis to evaluate the pros and cons of extending offshore oil drilling in the United States.

**Readings:**

(1) Energy Information Administration. (2007) “Impacts of Increased Access to Oil and Natural Gas Resources in the Lower 48 Federal Outer Continental Shelf”