**Objectives**

This course is designed to introduce advanced students in natural science and policy to the economic tools applied in the management of fisheries and other natural resources, with the objective of understanding how economic outcomes are introduced into the policy process alongside resource outcomes. To develop this understanding, we will examine how and why people interact with natural resources, and why these interactions often threaten resource health. Our inquiry will focus on two major threats to aquatic resources: overfishing and low fishery profits, and pollution and global change. For each issue, we will assess the problem; identify the incentives that lead people to choose problem-causing actions; consider alternative policies to manage those incentives; and discuss why effective management has not yet been broadly implemented. Through this process, we will develop familiarity with economic tools used to support policy decisions related to fishery and aquatic resource management.

**Learning Goals**

All students (461 and 561) will be able to apply new frameworks explain behavior and outcomes:

- **Know the status of fisheries**
  - Understand global trends in stock health, economic and social outcomes
  - Understand, in detail, outcomes and management of regionally important fisheries

- **Interpret and apply the model of competitive equilibrium**
  - Explain how prices, quantities and allocations are determined through markets to predict the effects of supply and demand shocks, including taxes and subsidies.
  - Understand why economists think of markets as efficient.
  - Explain pollution as an externality problem, and understand how commonly discussed policy approaches work.
  - Apply the model to infer changes in price and quantities based on news events.

- **Analyze fisheries as a renewable common pool resource**
Use a model to explain the predicted outcome for unregulated common pool resources.
Explain how commonly discussed policy approaches are addressing the problem.
Apply the model to infer economic and ecological outcomes in new situations.

- Identify who bears the costs and receives the benefits of policies, and identify when policy effects are sufficient to motivate political activity.
  - Analyze the incentives present in the political system to identify policies that are or are not politically viable.
- Interpret results from the tools of environmental economists use to evaluate policies that trade off between people’s welfare and environmentally destructive activities.

Pedagogical and evaluation methods will practice skills in:
- Critical reading of agency reports developed in support of management to understand described motivations and effects.
- Developing and structuring arguments that explain how and why.
- Applying and interpreting graphical and mathematical models.

In addition, students in FISH561 will develop skills in:
- Applying simple mathematical models to explain behavior and outcomes in substantially different complex cases
- Synthesizing and presenting agency reports
- Practice skills in presenting results of complex analyses

Prerequisites
This course is intended to be an introduction to applied natural resource economics for analytically sophisticated students. For 461, appropriate sophistication is developed in previous coursework through two 300-level FISH courses, or an introductory resource economics course like FISH230 or ENV235. This course does not presuppose previous economics coursework, though experience with microeconomics will be useful.

Readings
This course is unique in the varying backgrounds of its students, its range of topics, and its depth in fisheries economics. As a result, there is no single book that covers a majority of the material adequately and at an appropriate level. Lectures will based on material covered in:

*Intermediate Microeconomics* by Hal Varian

*Environmental Economics and Management* by Scott Callan and Janet Thomas

If you have not had any economics, you may find it useful to have a *Principles of Microeconomics* text, like the one by N. Gregory Mankiw (referenced in the reading list); it is fine to save money by purchasing an older edition (8 is current, back to 3 is fine).
In addition, we will draw heavily from several supplemental readings. Links to the readings will be provided on the course’s Canvas site.

**Canvas**
Readings and other critical information, including some homework assignments, will be distributed on the course page on Canvas. You will be responsible for accessing the site on a regular basis.

**Grading**
This class covers a wide range of tools and factual material, including new ways of thinking about and managing natural resources and the environment. Daily preparation is expected.

Undergraduate students (461) will be assessed on mastery of concepts presented, and graduate students (561) will be assessed on mastery of concepts and extension of them novel applications through a case study and a final project.

For 561, grades will be determined as follows:
- Homework: 10%
- Midterm: 20%
- Final Project: 40%
- Discussion*: 20%

For 461, grades will be determined as follows:
- Homework: 20%
- Midterm: 30%
- Final Exam: 30%
- Discussion*: 20%

* Your discussion grade will be based on the level and quality of contributions to the Discussion sections, which includes the preparatory Canvas discussion list and the discussion session itself.

**Methods of Teaching**

**Lectures (Monday and Wednesday)**
Led by me, lectures allow me to introduce the frameworks we will be using for analysis, drawing on models and interpretations from different sources. Textbook readings are supportive of lecture materials, and may be referenced as needed. Lectures will make extensive use of the board, and will involve constructing a lot of graphical and numerical models. We will also use lecture sessions to play a handful of illustrative games for homework credit during the quarter. Lectures will be your primary guide to the material I think is important, and thus will appear on homework and exams.

**Discussion Section**
The Wednesday discussion section (4:00-4:50) will be used to review and discuss particular studies that demonstrate the use of the tools introduced during the previous week. To prepare for class, everyone must:
- Read and think about the readings provided
• Post thoughtful discussion questions on the discussion board on the Catalyst site, by 6pm the Tuesday before; completion of this task is part of your grade. Each week, one or two students from 561 will be appointed as discussion leaders. Their job will be to synthesize the readings with class material, facilitate discussion on the Catalyst site, and use posted questions to structure discussion during section. Students in 461 will follow and participate in the discussion, with an emphasis on understanding how class material is applied within the readings.

Homework Assignments
There will be regular homework assignments, slightly less often than weekly, designed to reinforce important concepts from class. Homeworks are due at the beginning of class on the day for which they are assigned. Late assignments will be accepted until that assignment is graded, but will be penalized 5% for each day they are late.

Exams
There will be a mid-term exam for all students (461 and 561) over core microeconomic models related to common pool resources. Students in 461 will take a final exam over material presented in the second half of the quarter.

Case Study Presentation
We will introduce case studies in various methods for fishery management through student researched and presented case studies. 561 students will work in teams of 3 to identify fisheries that are managed using particular methods. To these fisheries, they will apply a framework for assessing the ecological, economic and community performance of the management outcome. They will present their findings in an oral/Powerpoint presentation of approximately 10 minutes to the class. The case study will emphasize how the structure of the fishery and management system has established incentives that have led to observed outcomes. Students in 461 will be accountable for understanding the incentives in case study, and to use ideas from class to explain differences in outcomes across cases. A list of suggested case studies—to ensure we examine easy and difficult cases of each major management method—will be provided. A grading rubric for the presentations will be provided later in the quarter.

Final Project (561 only)
In lieu of a final exam, FISH561 students will write a five-page final project that requires comparison of management in two or more fisheries (or other natural resource management situations that can be analyzed with the tools presented in class) that are similarly managed, but have led to different outcomes. The focus of the assignment will be in applying the range of tools discussed in class to explain the differences in outcomes between the cases examined. An assignment and rubric will be distributed later in the quarter; there will be intermediate due dates.

Policies
Collaboration
Your peers are often your best resource for learning. Working in groups to complete the homework and plan and revise your final paper is strongly encouraged. However, work
you turn in must be in your own words. It is suggested you make sparse notes in a group setting, and then write up your own answers to turn in.

**Academic (Mis)Conduct**

At the University level, passing anyone else’s scholarly work (which can include written material, exam answers, graphics or other images, and even ideas) as your own, without proper attribution, is considered academic misconduct. Because I am interested in how well you understand and can explain the situations and models discussed in class, it is imperative your work is in your own words. Shared homework or test answers or plagiarized assignment answers, will receive a zero for the assignment for involved parties and will be referred to the university for disciplinary action.

Plagiarism, cheating, and other misconduct are serious violations of the University of Washington Student Conduct Code (WAC 478-120). I expect that you will know and follow the university’s policies on cheating and plagiarism. Any suspected cases of academic misconduct will be handled according to University of Washington regulations. For more information, see the College of the Environment Academic Misconduct Policy and the University of Washington Community Standards and Student Conduct website. University plagiarism policies apply

**Disability**

Full participation in this course requires the ability to read and synthesize written material, attend three classroom sessions a week (up to 80 minutes), participate in class discussion, and compose mathematical and graphical answers to homeworks and projects. If you anticipate or experience barriers to your learning or full participation in this course based on a physical, learning, or mental health disability, please contact the instructor to discuss possible accommodation(s) within the first week of class, or at least a week before you anticipate an issue. The instructor will maintain confidentiality of the disability and associated accommodations.

A more complete description of the disability policy of the College of the Environment can be found http://coenv.washington.edu/intranet/academics/teaching/disability-accommodation/. If you have, or think you have, a temporary or permanent disability that impacts your participation in any course, please also contact Disability Resources for Students (DRS) at: 206-543-8924 V / 206-543-8925 TDD / uwdss@uw.edu e-mail / http://www.uw.edu/students/drs.
**Reading List (Subject to change)**


Greenberg, P. 2013. Specific reading TBD.


# Class Schedule (Preliminary and subject to revision)

**Italicized readings to be completed before class**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Content</th>
<th>Readings</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/30</td>
<td>Resource management or <em>people</em> management?</td>
<td>Prisoner's dilemma</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Consumer Basics</strong></td>
<td><strong>Opportunity sets, scarcity and tradeoffs</strong></td>
<td>Opportunity sets</td>
<td>Varian 2,3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indifference curves</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Budget constraints</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Utility maximization</td>
<td>Lagrangians</td>
<td>Varian 4,5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MRS</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Demand</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trading for scarce goods</td>
<td></td>
</tr>
<tr>
<td>10/5</td>
<td>Consumer Basics</td>
<td>Trade experiment</td>
<td>Varian 15,16</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Competitive Equilibrium</td>
<td>Callan &amp; Thomas 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS,CS, Efficiency</td>
<td>Mankiw Ch. 4, 7</td>
<td></td>
</tr>
<tr>
<td>10/7</td>
<td>Market Basics</td>
<td>The market for fish</td>
<td>Applied</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shocks &amp; curve shifts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/12</td>
<td>Economic Models of Fisheries</td>
<td>Game Models: Static model of CPR</td>
<td>Goat farming game</td>
<td>Mankiw 232-237</td>
</tr>
<tr>
<td>10/19</td>
<td></td>
<td>Rent dissipation</td>
<td>Field Ch. 13</td>
<td></td>
</tr>
<tr>
<td>10/21</td>
<td></td>
<td>The steady-state bioeconomic model</td>
<td>Overview</td>
<td>Anderson et al. 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fishery Management Methods</td>
<td>FPIs</td>
<td>BSAI Crab Rationalization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Project assignment</td>
<td>EIS</td>
</tr>
</tbody>
</table>
Comparing Resource Uses Policies

10/26  Policy with risk and uncertainty
       Expected value
       Risk aversion
       Uncertainty aversion
       Callan & Thomas Ch. 6

10/28  Cost-benefit analysis
       Cost benefit analysis
       Opportunity cost
       Uncertainty (EV)
       Discounting
       Callan & Thomas Ch. 9
       N. Dyn. Min. 18, esp 18.8
       Duffield et al (2007)

11/2   In-Class EXAM

11/4   Economic impact of the fishing industry
       Multiplier Studies
       IEM 2010
       Cinner et al. 2012

11/9   Valuation of ecosystem services
       Public goods?
       Callan & Thomas Ch. 7
       CV
       WTA/WTP

11/11  Veteran’s Day

Harvester Behavior

11/16  Political economy: Identifying politically
       feasible policies
       Gardner & Acheson (2011)

11/18  Dynamic bioeconomics
       Excel exercises
       Conrad
       Gardner & Acheson (2011)
       Abbott, Garber-Yonts and
       Wilen (2011)

11/23,  Fishery management case study presentations
       Fishery Management case
       study project presentations
       Thanksgiving Break

11/25

11/30  Harvester’s problem (production)

Pollution and Climate & Ocean Change

12/2   Externalities in markets
       Callan & Thomas Ch. 3
       IPCC Summary for
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Reading Material</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/7</td>
<td>Policy options (Taxes, subsidies, transferable permits)</td>
<td>Mankiw 203-209</td>
<td>Policymakers</td>
</tr>
<tr>
<td>12/9</td>
<td>Application to climate change (or ag. runoff)</td>
<td>Callan &amp; Thomas Ch. 5</td>
<td>Greenberg 2013</td>
</tr>
<tr>
<td>12/15</td>
<td>461 FINAL EXAM</td>
<td>Mankiw 6</td>
<td></td>
</tr>
<tr>
<td>12/15</td>
<td>561 FINAL PROJECT DUE NOON</td>
<td>Applied Political Economy</td>
<td></td>
</tr>
</tbody>
</table>