ARE 277: Natural Resource Economics (PhD Level, every winter)

The goal of the course is to introduce students to the major intellectual themes and methods in natural resource economics. The distinguishing characteristic of natural resource problems is that they involve decision-making over time and hence the conceptual core for this field is capital theory or dynamic economics. To achieve the goal, the specific objectives of the course are:

- to expose students to the classic literature in the field to build economic intuition and to understand the evolution of ideas and techniques and the main theoretical conclusions in the field
- to expose students to the history of natural resource management to gain an understanding of the current policy and politics around natural resource management
- to provide students with a wide range of applied dynamic problems to build their skills for solving various types of resource and dynamic problems

The course will cover the optimal management of **renewable resources**, such as fish, trees, rangeland, and groundwater. The coverage of fisheries will be grounded in the classical literature and will provide you with the foundation from which to address important policy questions. The key insight from the application of dynamic analysis to fish populations is that they can be viewed as a stock that produces a yield much in the same way that financial assets produce dividends. We will discuss both deterministic and stochastic formulations of the fishery management problem.

The discussion of forestry management will introduce a set of analyses that investigates the **optimal timing** of single decisions or a sequence of decisions that must be made at discrete points in time, such as the decision to cut a forest or sell an asset whose value is increasing. Casting forestry management as an optimal timing problem dates back to Faustmann, who was a German Forester in the 19th century. Some more recent advances include addressing the optimal management of multiple-aged stands and managing the forests for multiple-uses, including conservation of species and carbon sequestration.

We will also cover **exhaustible resource** problems, where the decisions are on the rate of extraction of oil, minerals, or another finite resource pool. Early insights into these problems were developed by Hotelling in a 1931 paper, entitled "The Economics of Exhaustible Resources." One of the important and timely issues is how current rates of extraction of a resource are altered by different resource bases (e.g., oil shale), technologies (e.g., wind and solar power), and climate change policies.

In addition to covering the classical literature, we will discuss (time permitting) papers that span issues from groundwater management, invasive species management, adaptive management (passive and active learning), and epidemiological-economic modeling.