FISH 558: Decision Analysis in Natural Resource Management (4 credits)

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OVERVIEW
The purpose of this course to expose students to how to use decision analysis to evaluate alternative management actions. The focus is on fisheries applications, but the models and techniques are applicable broadly in quantitative conservation biology. The course is based on two major themes: (a) what is decision analysis and what are the key steps when conducting a decision analysis; and (b) using Bayesian methods to determine the probabilities that should be associated with alternative states of nature.

FORMAT
Two 2-hour lecture laboratory sessions each week in which the instructor first introduces the theory behind the topic being discussed and illustrates the concepts using examples programmed in R. Depending on the topic, students apply the methods to additional examples in class. Students are evaluated based on four assignments and a project. The assignments are based on directly on the lecture material while the project is open-ended, with the aim that students apply the material covered in the course to a problem of their choosing.

LEARNING GOALS
- To understand decision analysis and its role in contemporary natural resource management.
- To be able to formula a natural resource management problem in the context of a decision analysis problem and to identify the elements needed to conduct a decision analyses.
- To improve familiarity with Bayesian techniques and methods for using Bayesian analysis as the basis for decision analysis.

TEXTS
There are no prescribed text – the material covered in class is covered in a variety of texts. A subset of these are:
1. Burgman, M.A., Ferson, S. and Akçakaya, H.R. 1994. Risk Assessment in Conservation Biology, Chapman & Hall.
2. Gelman, A., Carlin, J.B., Stern, H.S. and D.B. Rubin. 1995. Bayesian Data Analysis. Chapman and Hall.
3. Hilborn, R. and Mangel, M. 1997. The Ecological Detective. Princeton
4. **Hilborn, R. and Walters, C.J. 1992. Quantitative Fisheries Stock Assessment. Chapman & Hall.**

All the material is also covered in powerpoint slides and example R scripts which are posted on the class web-site.

Evaluation (CR/NC or Graded)
Grading is based on four assignments and a major project. There are no exams.

GRADING:
Assignments   [60%]
Research Project: [40%]

CLASS SCHEDULE

Week	Topic	Assignments
Week 1	Introduction to decision analysis	N/A
Week 2	Conducting projections Examples of decision analysis	Assignment #1 due
Week 3	Bayes rules Student presentations of project outlines	N/A
Week 4	Bayesian Integration us SIR Examples using SIR	N/A
Week 5	Bayesian integration using MCMC	N/A
Week 6	Introduction to Meta-analysis	Assignment #2 due
Week 7	State-space modeling	N/A
Week 8	Policy evaluation	Assignment #3 due
Week 9	Extinction risk estimation Adaptive Management	N/A
Week 10	Adaptive management Student presentations of projects	Assignment #4 due
Finals week	N/A	Project write up due