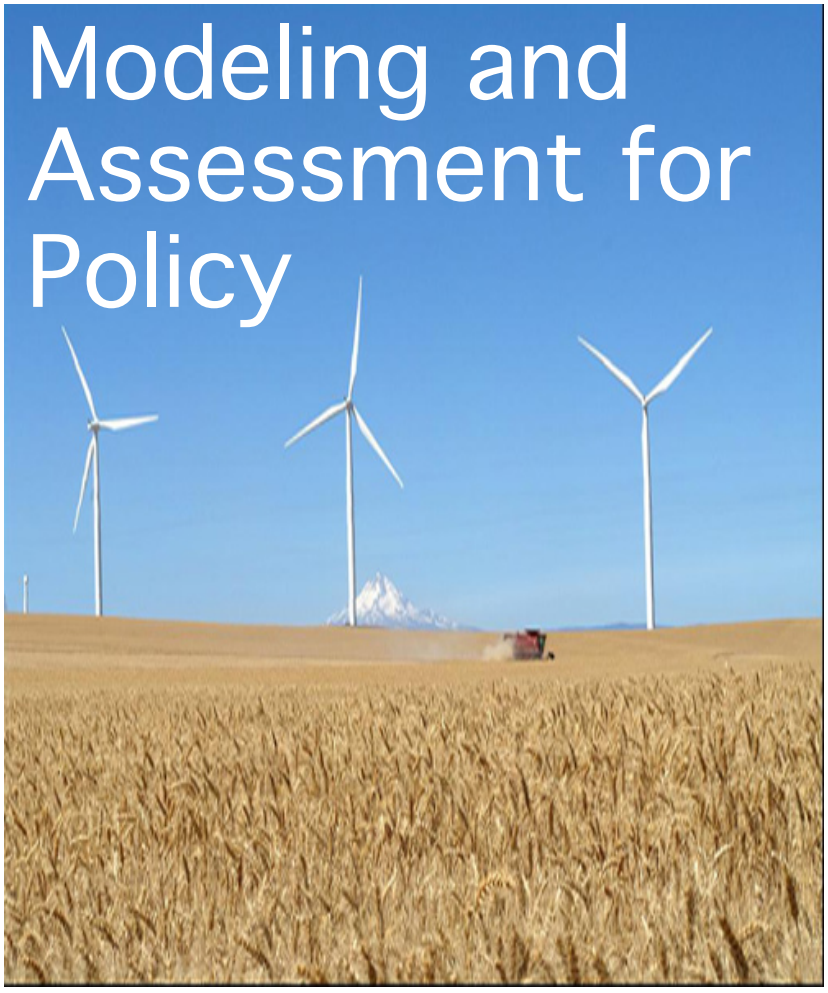
ESD.864 / 12.844

Modeling and Assessment for Policy

Prof. Noelle E. Selin
T/R 10:30-12:00



Learn tools and strategies for technically-focused policy analysis

This course is designed to provide students with the critical tools necessary to perform technically-focused policy analysis. Students will gain understanding and awareness of policy considerations in scientific assessment, practice using quantitative tools to conduct policy-relevant analyses, and evaluate the effectiveness of quantitative and scientific information in decision-making contexts. This is thus an appropriate course both for students who conduct policy-relevant science and engineering work, as well as those who are potential users of scientific analyses or quantitative output. As this class is cross-listed between the Engineering Systems Division and Department of Earth, Atmospheric and Planetary Sciences, several examples will be drawn from modeling of earth and environmental systems.

Further Information

MIT Catalog Subject Description

2013

Explores how scientific information and quantitative models can be used to inform policy decision-making. Develops an understanding of quantitative modeling techniques and their role in the policy process through case studies and interactive activities. Addresses issues such as analysis of scientific assessment processes, uses of integrated assessment models, public perception of quantitative information, methods for dealing with uncertainties, and design choices in building policy-relevant models. Examples focus on models and information used in earth system governance.

Learning Objectives: By the end of the semester, you should be able to:

1) Understand and apply tools and techniques used for technically-focused policy analysis

2) Identify best practices and limitations in using quantitative models for policy

3) Evaluate the effectiveness of scientific and technical advice in policy-making processes

4) Describe and analyze strategies to manage scientific and technical advice processes

5) Communicate technical results to policy audiences

more information and details on learning objectives on page 3

Who should take this class?

This course is appropriate for graduate students (Master's or PhD) who are interested in technically-focused policy analysis. I expect that this course will draw students with varied backgrounds, including both natural and social sciences. For example, such students may include (but are not limited to) those with ongoing research in areas of modeling (including science, engineering, economics, etc.), those studying the role of scientific information in policy processes, or those with career interests in interpreting scientific results for decision-making.

Prerequisites

Some familiarity with concepts of science, technology and policy (for example, at the level of ESD.10, ESD.103, or ESD.S41) will be assumed in the class. For those who do not have this background, supplemental readings will be posted on the course web site.

Teaching Staff

Prof. Noelle E. Selin is Assistant Professor of Engineering Systems and Atmospheric Chemistry in the Engineering Systems Division and Department of Earth, Atmospheric and Planetary Sciences. Her research uses modeling to inform decision-making strategies on air pollution, climate change and hazardous substances.

Assignments and Grading

Problem Sets: 30%

There will be three problem sets over the course of the semester. They will count for 10% of your grade each

Policy Memo: 40%

You will complete a policy memo, due at the end of the semester, to practice communicating the results of technical assessment to a policy audience.

Class Case Study: 20%

Each student will be assigned to a group, and present a case study on a particular model or assessment during a class meeting.

Participation: 10%

You are expected to attend class and participate actively in class discussions.

This class will be graded on a standard A-F scale, and it is a 9-unit class. There will be no final exam. Details about the assignments are on page 4.

Goals and Topics

Courtesy of Hans Pama on flickr. CC-BY.

Course Structure

This course is a designed to be interactive and incorporate active learning. Problem sets will be assigned to develop your familiarity with class themes. We use a case-study approach to identifying key lessons about the benefits and limitations of particular tools and best practices in technically-focused policy analysis. Details about assignments, problem sets, and course policies are on page 4.

Objective

Technically-focused policy analysis is complex. There are no easy answers or plug-and-play approaches that you need only learn and apply. To conduct effective analyses, one needs deep understanding of relevant analytical tools, their advantages and limitations, and a broad understanding of previous experiences: what worked, what didn't, and why. This subject will help you develop and practice these abilities. This subject is a survey catering to diverse backgrounds. Students should not expect to become advanced practitioners in specific modeling techniques, but rather to gain familiarity with quantitative methods, and their role in policy. For alternative or advanced subjects, please see the teaching staff for suggestions.

What to expect

The course is designed to be interactive: please come to class prepared and ready to engage in activities and discussions. Some questions have no "right" answers: be ready to develop and defend your own point of view while striving to understand the views of others - both important skills for future policy makers and advisors.

Topics:

We will cover five themes over the course of the semester, each covering an important concept in technically-focused policy analysis.

1. Verification and Validation

In model-building, verification and validation are important quality control procedures. Learn what they are, when to use them, and their limitations.

2. Assessment Design and Evaluation

What are best practices to structure a scientific assessment process? How do we know if scientific advice is effective or not? You'll develop a toolbox of approaches that have worked to inform effective assessments in the past.

3. Benefit-Cost Analysis

A critical tool for evaluating policy. When is calculating a monetary value useful? How would you do it? How do you balance present and future values, and how can you quantify the unquantifiable?

4. Systems Modeling

Modeling for policy often involves complex, coupled systems. What are the principles involved in modeling these systems? What are some relevant techniques to understand this complexity?

5. Integrating Interests and Politics

How do we understand the influence of participants with different interests in a scientific assessment process? What values are brought to the table by scientists and engineers, and how can others' values be taken into account?

Course Policies

Details about assignments and course policies:

Please give us 48 hours notice for any extension requests.

No late problem sets or assignments will be accepted after the solution set is out (typically one week later).

Assignments should be submitted on Course website.

Please submit all assignments in pdf format. We will comment on and return assignments electronically as well, minimizing paper use.

Class attendance, readings, and participation are all key to your learning.

To encourage this, participation will count as 10% of your final grade.

Quizzes

To give you an opportunity to measure your learning progress, we will ask you to complete several online quizzes during the semester. These will help you identify what topics and readings you might need to revisit, and help us to see whether any concepts need further discussion in class. To encourage you to complete the quizzes, without being punitive, each will be worth 1% of your participation grade.

A detailed listing of dates, topics, and assignment due dates is on page 5.

As always, feel free to contact the teaching staff with any questions or concerns. For general Q&A, we have a Forum on the class web site.

Class Case Studies

Over the course of the semester, you will, as part of a small group, research and present one case study of modeling and assessment for policy to the rest of the class. These are noted in the syllabus as Class Case Study #1-6. At the beginning of the semester, you will let us know your top three choices and we will assign you to a group. General instructions, as well as a one-page briefing with initial topic references will be provided by the instructors four weeks prior to your presentation date. One week before your presentation, your group will circulate a short briefing paper to the class on the case (maximum 5 pages single-spaced) as well as any additional background readings you suggest for preparation. On the day of your presentation, please prepare 20-30 minutes of presentation and discussion questions for the class. As part of developing this case, each group will meet with the teaching staff to discuss both substantive case study lessons and presentation plans. Your briefing paper and class presentation will be worth 15% of your final grade; your group will also be asked to comment on another's presentation (5%). More details about our specific expectations for the case study will be circulated separately.

Problem Sets

There will be three problem sets, focused on some of the main topics of the course: verification and validation; assessment design and evaluation; and systems modeling. Each problem set is designed to provide you with hands-on experience in using and evaluating tools for technically-focused policy analysis. Each problem set will be 10% of your final grade.

Policy Memo

Many of you are working on technical issues with policy relevance in your own Master's or PhD thesis projects. To help you identify policy issues embedded in the technical topic of your choice, you will be asked to write a policy memo. The goal of this memo is to help you learn to communicate the results of a technically-focused policy analysis to an interested but non-technical audience. During two class sessions towards the end of the class, you will have the opportunity to present and share these memos with your classmates. We will comment on draft policy memos submitted on or before April 25. This is worth 40% of your grade.

Topics and Readings

Readings will be posted on Course website and should be completed before class. You can expect several additional readings to be added for the class case studies: these will be chosen by your classmates.

Schedule Overview: Spring 2013

Date	Topic	Assignment
Tuesday, February 5	Introduction	
Thursday, February 7	Science-Policy Review	
Tuesday, February 12	Verification and Validation	
Thursday, February 14	Evaluating Assessments	
Thursday, February 21	Case Study: Acid Rain in Europe / Case Study: Fisheries	
Tuesday, February 26	Guest Lecture: (Goentzel, humanitarian logistics)	
Thursday, February 28	Guest Lecture (Solomon, Climate Change and IPCC Case Study)	PS 1: Verification and Validation
Tuesday, March 5	Energy Modeling workshop (guest: Travis Franck, Climate Interactive)	
Thursday, March 7	Guest Lecture: (Zoepf, Transportation)	
Tuesday, March 12	Class Case #1: NASA / Discussion across cases	
Thursday, March 14	Energy Modeling simulation	
Tuesday, March 19	System Modeling	PS 2: Assessment Design/Evaluation
Thursday, March 21	Class Case #2: Economic Modeling/ Model Credibility Exercise	
Tuesday, April 2	Class Case #3: Oil Spill/ Risk I	
Thursday, April 4	Guest Lecture (Sunderland, Models at EPA)	
Tuesday, April 9	Class Case #4: Clean Air / Risk II	PS 3: System Modeling
Thursday, April 11	Benefit-Cost Analysis	
Thursday, April 18	Class Case #5: Sports Statistics / Uncertainty I	
Tuesday, April 23	Uncertainty II / Model Building Intro	
Thursday, April 25	Collaborative Model-Building Exercise	draft policy memo (optional)
Tuesday, April 30	Interests and Politics: Participatory Methods	
Thursday, May 2	Class Case #6: Cancer Screening / Lessons Across Cases discussion	
Tuesday, May 7	Policy memo roundtable practice (optional)	
Thursday, May 9	Policy Memo Roundtable #1	Policy Memo Due
Tuesday, May 14	Policy Memo Roundtable #2	
Thursday, May 16	Synthesis and Wrap-up	

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