

Evaluation and Decision Making for Infrastructure Systems
INTRODUCTION, STRUCTURE AND PRINCIPAL ASSIGNMENTS

OBJECTIVES

In this course we will learn to evaluate options to support infrastructure system investment and management decisions. While we will focus on public sector transport choices, the concepts and methods apply to other transport and private sector choices, as well. We will cover a variety of approaches, emphasizing creative problem solving, examine a series of real or realistic cases together and use those cases as contexts for learning concepts and tools for use in evaluation, decision support, problem solving, and research.

Students will learn by doing in this course! It is not possible to learn and earn a good grade unless you are an active and effective participant in discussions and problem-solving activities.

STRUCTURE

There will be no class Tuesday, January 13th because of the Annual Meeting of the Transportation Research Board, but we plan to resume on Thursday, January 15th. We will focus on a series of case studies, each related to one or more tools or concepts. Below we list some of the cases we expect to discuss, and the concepts and tools we plan to cover.

TOPICS & CASES

1. Introduction: framework and definitions.
- II. Before & after evaluation: applications and research problems.
- III. *A priori* evaluation problems (economic and cost effectiveness methods)
- V. *A priori* evaluation: large problems with controversy and uncertainty
- VI. Forecasting, models, and the use of technical information in decision making

TOOLS & CONCEPTS

1. Problem formulation & Conceptual Modeling
2. Data collection methods: objective, behavior, qualitative , attitudinal
3. Experimental design and some statistics
4. Models of Decision Making
5. Methods for treating uncertainty
6. Economic evaluation: benefit-cost analysis, time streams & discounting
7. Cost-effectiveness analysis
8. Costing and finance

ASSIGNMENTS AND GRADING

1. Intelligent **class participation will account for about 20% of your term grade.** You are expected to participate in class discussions! No exceptions.
2. Every other week, starting on Tuesday, January 22nd, student teams will give short presentation (15 minutes only) and lead a discussion on some specific evaluation issue, problem, or concept involved in a contemporary infrastructure project or evaluation study. Topics and teams have been assigned in another handout document. In this exercise students will be teaching the class new ideas or methods. Take this seriously, prepare fully and thoughtfully, and keep within the allotted time limit. **(20% of your grade).**
3. On most Thursdays, a one page response paper will be assigned, due the following Tuesday, based on a contemporary issues, readings, or class discussion. Collectively these **weekly papers will be worth 20% of your grade.**
4. The primary assignment for this course is the preparation of a serious research paper due at the start of the last class session. This is described in some detail below. It will contribute **40% of your term grade.**

READINGS

A reading list will be distributed, serving as a master bibliography. Readings are related to lecture topics and should be read in the order in which they will be covered. Priority items are marked. Please pace your reading to keep up with class discussions. Some readings will be distributed, others will be available as electronic resources, on the Electronic Reserve System (ERS), or on physical reserve at Northwestern's (Transportation) Library (<http://nucatl.library.nwu.edu/>).

RESEARCH PAPER

Your major assignment for this course is preparation of a substantial research paper dealing in some way with infrastructure evaluation. You must devote a significant effort to this paper-- throughout the course, not just at the end! You might perform an evaluation for a real problem, develop a thorough plan to solve an evaluation problem, or explore in detail an important substantive or methodological issue in evaluation research. The topic for your paper must be approved in advance by Prof. Schofer: you must submit a one sheet objective statement to serve as a basis for this approval by January 23rd. You will need to do some research, and perhaps to consult with Prof. Schofer, in the process of selecting your topic. Several topic ideas are listed below, but you are free to select your own:

- A. Review and critique the criteria used by the Federal Transit Administration to evaluate new starts, investment in new high capital cost transit facilities:

<http://www.fta.dot.gov/library/policy/ns/nserp.htm>
<http://www.fta.dot.gov/library/legal/fr12700.html>
<http://www.fta.dot.gov/library/policy/ns/grqanda.htm>

- B. What is the value of mobility? How can you assess this, and how can the resulting information and/or methods be used to evaluate investments in transportation service and facility improvements?
- C. There is a developing literature on errors in forecasting – intentional and otherwise: D.H. Pickrell, “A desire named streetcar: fantasy and fact in rail transit planning in North America,” *Journal of the American Planning Association*, Vol. 58, pp. 158-176, 1992; B. Flyvbjerg, M. S. Holm, and S. Buhl, “Underestimating Costs in Public Works Projects - Error or Lie?” *American Planning Association Journal*, pp. 279-295, Summer, 2002

Review this literature, relate it to a specific stream of projects (e.g, topics A and E) make specific recommendations for improving the evaluation of major transportation projects. Consider the implications for model quality as well as application.

- D. The Midwest High Speed Rail Initiative proposes a network of “high” speed train service centered on Chicago. Review the proposal, especially the evaluation, compare it to other high speed rail proposals in the US, and to services in other countries, and prepare an evaluation of this concept.
<http://www.dot.state.wi.us/opa/images/mwrailsum.pdf>

You may write about any other high speed rail proposal in the US, or prepare a cross-cutting paper on HSR that examines critical decision issues.

- E. Review the experience with all recent implementations of light rail transit in the U.S. (i.e., past 20 years). Use available data and published reports to profile the cities that have “new” LRT systems, assess the success of these systems, comparing ridership to costs (capital and operating), and identifying success factors in the characteristics of the cities, the design of the LRT, and other variables.
- F. The concept of car sharing is being tested in several U.S. cities, and active programs are in place in Europe. Identify, integrate, and review evaluations of this concept and develop an overall evaluation, or a proposal for a new evaluation.
- G. Review and evaluate the value pricing experiment on I-15 in San Diego, California, or other value pricing projects, emphasizing evaluation methods.
- H. Review and integrate all available evaluation material on the London road pricing scheme and draw inferences for other communities considering access metering.

- I. Use available data and reports to assess the risks associated with travel in large (15 passenger) vans compare with travel in other automobiles and vans. Suggest policies and actions for making the use of these large passenger vehicles safer.

This paper must represent a **major** research effort. If you have never written a serious research paper before, you may wish to talk with Prof. Schofer for additional guidance. This product must be well-structured, well-argued, and written in good English with a mature style. It must be typed, double-spaced, with 1 inch margins. It should be 15 pages or less, not counting a one page executive summary (required), figures, and references. It should be bound (only) with a staple in the upper left corner. No covers!

CRITICAL DATES - these interim products will be components of your paper grade!

27 January	Submit 1page statement of the topic for your paper and your proposed approach.
5 February	Submit 1.0 page conceptual model with explanatory text, which will serve as the foundation for the analysis in your paper.
9-13 February	Meet with Prof. Schofer to discuss paper progress in detail (you can meet at any time, but this is a required checkpoint).
11 March	Deliver completed paper.

RELATIONS WITH INSTRUCTOR

Professor Schofer will generally be available to talk with you in A332 Tech after classes, from approximately 3:30 until 5:00 p.m. or later. You may also find him in Tech L255. You may arrange another appointment time if you prefer. Or, you may use e-mail or telephone for questions, advice, and appointments:

j-schofer@northwestern.edu; telephone 491-8795 or 5221.

Do not hesitate to ask questions, raise course-related issues of importance to you, or seek help.