This course is directed to the overall design of transportation systems. Emphasis will be upon the principles of systems analysis as they relate to the planning, design, operation, and evaluation of transportation systems. The central feature of the course is a project and/or a seminar delivery to be coordinated with class activities.

Discussion Outline
(The schedule and selection of topics may vary depending on class interests)

Introduction, Current Issues in Transportation (1 week)
Land use/transportation interaction, finance, sustainability, operations, impacts, quality of life. Read Vuchic, Chapter 1 and 2

Project Planning (1 week)
Project objectives, scope, approach, project management.

The Systems Design Process (3-4 weeks)
Fundamental concepts, definitions, methodology, problem definition and formulation, search, explanation, evaluation, interpretation, planning, current engineering, uncertainties, strategies, and contingencies. Model building, forecasting, development of insight. Read Vuchic, Chapter 3, 4

The Transportation Problem (2 weeks)
What is a problem, symptoms, trends, sub-problems, considerations, relevant factors, social, economic and environmental considerations. Vuchic, chapter 5

Transportation Supply (2 weeks)
Elements of technology, technology as a variable, continuum of transportation, innovation and creativity, some future concepts. Demand modification, transportation control measures. Vuchic chapter 6

Evaluation (4-5 weeks)
The analysis of costs, sunk cost, opportunity cost, non-quantifiable costs, uncertainty
Measuring effectiveness, values, benefits of transportation, social impact, economic impact, environmental impact. Vuchic chapter 7, 8

Cost-effectiveness evaluation, standardized approach, objectives, goals, criteria, economic framework. Fallacies and misconceptions, difficulties. Examples. Interpretation and strengthening the choice, break-even analysis, contingencies, sensitivity analysis, feasibility, implementation planning.

**Summary and Wrap-up (1 week)**

**Book:** Vuchic, V., *Transportation for Livable Cities.*

**Grading:** Grading will be based on project seminar work (60%) and a midterm and a final exam (20% each). The final will likely be a take home exam. Grades will be based on relative performance rather than an absolute scale.

**Projects:** A project/seminar will be a key element of the class. The project will be concerned primarily with the emerging issues in transportation as given below. Progress reports are due the first Wednesday of the month. A draft of the reports will be due November 26th and the final report is due December 10th. Seminars will be scheduled for the last half of the semester and should be about 30 minutes long.

**Class Project: Transportation 2050**

The overall theme of the class project will be to develop plans, policies, projects, actions and strategies that address the issue of transportation in the year 2050. We would like to develop a coordinated set of projects (chapters) that can be posted on the web to provide background and suggestions related to this broad topic. Assume you are doing this project in response to a request for proposals from the Secretary General of the United Nations. The project will have separate chapters covering some of the following topics. Each of these will also be presented in a seminar as well as a written report.

**Problems and Issues:**

**Sustainable Transportation:** What systems of transportation can be used as part of a process of development of self-sustainable communities? The interaction between transport, land use, energy use and environmental conditions should be explored. You can discuss this topic in terms of what is happening in the United States or some other country or groups of countries.
Future Energy Prospects and Transportation: What are the prospects for future energy supply and what potential technological changes or other changes are needed to cope with them?

Population, Economic and Technological Trends: Examine changing characteristics of the population, impacts of global economy, telecommunications technology, etc and their potential impacts on transportation systems and services.

Transportation and New Urbanism: What changes in techniques and procedures can be used to make transportation compatible with new urbanism/smart growth principles?

Transportation and Smart Growth: Define what is smart transportation growth policy is and indicate a program of action that a local unit of government could follow.

Land Use and Transportation: How strong is the land use transportation connection and what policies or approaches could be used to have the two work together in a better way?

Planning approaches

Improved Forecasting Methods: What are the prospects for better methods for travel forecasting and data analysis? Discuss the status of TRANSIMS, use of GIS in transportation planning, land use modeling, traffic modeling/travel forecasting integration.

Transportation/Urban Interaction in Older Neighborhoods: The areas near the center of any large urban area have unique problems, which may or may not be associated with transportation. A project could be used to examine these problems and to better understand the role of transportation in the process of neighborhood rescue.

Neighborhood Transportation Planning: How can the transportation and project development process be used to improve systems at the neighborhood scale?

Low Density Public Transportation: It is nearly impossible to provide economically viable public transportation in low-density urban and suburban areas with the existing types of public transportation. A project could be used to develop public transportation systems that could operate successfully in low-density urban areas.

Analysis Techniques for Policy/Demand Management Options: Recently there have been increasing discussions of nontraditional means for dealing with transportation issues. Current modeling techniques are limited in their ability to analyze the impacts of these alternatives. How can or should the planning process be modified?
Risk/Contingency Analysis: Identify possible contingencies and propose a method for dealing with them.

Design and Project Level Techniques

Context Sensitive Design: How should the project design process be modified for future conditions?

Value Engineering: What is the value of value engineering? How should it be done? When? By whom?

Project 1: Develop an outline and procedure for conducting the study. Indicate what topic you would like to focus on, sources you expect to use, and schedule for the project. Due Sept. 24.

Project 2: Review the article, “Transportation – 1993” and write an updated version of the article, “Transportation – 2030” following a similar format. Due Oct 1.

Project 3: Be prepared to debate the issues and misconceptions described by Vuchic in Chapter 5 of his book. October 15.