

**RUTGERS UNIVERSITY**  
**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**

**180-536 Transportation Systems Analysis**

**Fall Semester**

**Instructor:** Dr. Maria Boilé  
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**Texts:** **O:** Paul J. Ossenbruggen. Fundamental Principles of Systems Analysis and Decision-Making. John Wiley & Sons, Inc. 1994  
**M:** Marvin L. Manheim. Fundamentals of Transportation Systems Analysis. Volume 1: Basic Concepts. MIT Press, 1984.

**Grading:**

Homework	20%
Term Project	30%
Exam 1	20%
Exam 2	30%

**Course description**

Emphasis on transportation systems analysis and decision making using concepts from economics, engineering, public policy analysis operations research and management science. Theoretical principles are applied to a variety of real-life situations arising in transportation systems. Use of computer applications and case studies.

**Course Outline**

<b>WEEK</b>	<b>TOPIC</b>	<b>PRIMARY READING</b>
1	Introduction – The Systems Approach	O1, M1
2-3	Linear and Network Models	O1, O2
4	Performance Functions	O6, M5
5-6	Transportation System Performance	O6, M6, M7
7	Dimensions of Consumer Choice	M11
8-9	Travel – Market Equilibration in Networks	M12
10	The Evaluation Method	M9
11-12	A Network Analysis	M13
13	Risk Analysis	O5
14	Ethics of Analysis and the Role of the Professional	M15

## ***Detailed Course Outline***

- Introduction
  - The Systems Approach
- Linear and Network Models
  - Network Models
  - Transportation and Transshipment Models
- Performance Functions
  - Vehicle Cycle and Its Components
  - Using Cost Functions
  - Congestion and Capacity
- Transportation System Performance
  - System Reliability
  - Derived Distributions
  - Congestion Models
- Dimensions of Consumer Choice
  - Choice Dimensions and their Implications
  - Simultaneous and Sequential Choice Structures
- Travel – Market Equilibration in Networks
  - Network Structure
  - Composite Networks
  - Equilibration Techniques
- The Evaluation Method
  - Purpose of Evaluation
  - Steps of the Evaluation Method
  - Issues to be Considered
- A Network Analysis
  - Example Applications
- Risk Analysis
  - A Probabilistic Concept
  - Risk-Benefit-Cost Analysis
- Ethics of Analysis and the Role of the Professional
  - Setting Objectives
  - Achieving Objectives
  - Decision Making
  - The Ethics of Analysis