

Transportation Economics and Decision Making

Instructor	: Sabya Mishra	Office	: ES Rm 112D
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Objective

Familiarize the student with the economic analysis techniques and principles. Use these economic analysis principles for management, engineering, and financing small and large scale infrastructures.

Course Description:

The course is a comprehensive discussion in decision making using engineering economic analysis. The course involves the use of mathematical tools required to understand the economic analysis principles to aid decision making process.

References

Ref. 1: Winfrey, R. (1969). “Economic Analysis for Highways,” International Textbook Company / Engineering / Math, 6th edition, ISBN: 0700222448, pages: 923, PA.

Ref. 2: Blank, L.T., and Tarquin, A. (2004). “Engineering Economy,” McGraw-Hill Science / Engineering / Math, 6th edition, ISBN: 0072918632, pages: 800, NY.

Ref. 3: Newman, D. G., Eschenbach, T. G., and Lavelle, J. P. (2004). “Economic Analysis.” Oxford University Press, 9th edition, ISBN: 0195168070, Pages: 624 , NY.

Ref. 4: Small, K. A. (2007). “Urban Transportation Economics: Fundamentals of Pure and Applied Economics.” Routledge, 7th edition, ISBN: 3718651696, Pages: 185, NY.

Course Outline¹

Week	Topic	Homework
Week-1	The economic decision making. Examples of engineering economic analysis. Rational for decision making. Simple, intermediate, and complex problems in decision making.	
Week-2	Estimation of Costs and Benefits. Cash flow diagrams. Fixed, variable, marginal, and average cost. Benefit estimation techniques.	

¹ This is a tentative outline and is subject to change depending upon schedule of a few invited speakers.

Week-3	Interest rates and equivalence. Simple and compound interest with uniform and gradient factors.	Homework-1
Week-4	Measures of effectiveness of economic analysis: Net Present Worth, Equal uniform return, Internal rate of return, payback period. Selection of term project.	Homework-2
Week-5	Value of time, concept of consumer surplus, equity issues in investment decision making.	Homework-3
Week-6	Incremental analysis, sensitivity and analysis, selection of portfolios, rationing capital among competing projects.	Homework-4
Week	Topic	Homework
Week-6	Incremental analysis, sensitivity analysis, scenario analysis, selection of portfolios, optimal investment techniques. Rationing capital among competing projects.	
Week-7	Midterm Examination	
Week-8	Basic aspects of depreciation, conventional and modified depreciation methods, examples of depreciation methods.	Homework-5
Week-9	Selection of Minimum Attractive Rate of Return (MARR), sources of capital, choice of capital source, cost of capital, opportunity cost, examples of selection of MARR	Homework-6
Week-10	Non-deterministic future events, the concept of uncertainty and risk. Simulation concepts in uncertainty and risk. Difference between deterministic and non-deterministic approach in economic analysis.	Homework-7
Week-11	Pricing, investment, and industrial organization. The economies of scale. The elasticities of investments.	Homework-8
Week-12	Financing infrastructures. Economic / financial analysis in the public and private sector. Revenue generation enhancement techniques. Case studies of economic analysis in large scale infrastructure projects.	Homework-9
Week-13	Student Term Project Presentation	Homework-10
Week-14	Final Examination	

Grading:

Mid-term	: 25%
Homework (10 during the semester)	: 20%
Student Presentation and Report	: 30%
Final Exam	: 25%

Course Requirements:

1. There will be 10 homework assignments. They will be due beginning of the class. The purpose of these assignments is to allow students to apply economic analysis techniques to enhance decision making process.
2. There will be a mid-term and a final exam. The intent of this exam is to apply the techniques to a number of problems dealing in economic analysis.
3. There will be a term project. The intent of this term project is to develop engineering decision making and paper-writing techniques.