

Transportation Economics and Finance

Course Objective

Public finance is the field of economics that studies government activities and the alternate means of financing government expenditures. It stresses the allocation of resources for the public good, including the raising and spending of money. Engineering economics further focuses on the economic viability of proposed solutions to public problems or issues, which take the form of programs and projects. This course introduces the student to the theories and practical applications of the economics of public policy as it relates to transportation and more specifically, transportation projects.

The objective of the course is to provide recognition of the financial implications of public policy decisions and a practical understanding of the basic principles of engineering economic analysis and application to transportation projects. Beginning with an introduction to basic economic concepts such as time value of money and opportunity cost, students will learn to utilize business tools, including Net Present Value (NPV), Break-Even Analysis, and Return on Investment (ROI) to evaluate and justify engineering alternatives based on costs and benefits.

In addition, the finance function will be studied in the context of the organizational environment as well as the broader economy. Students will study the goals and constraints of public funding, including analysis of local, state and federal government surface transportation financing systems. Various methods of transportation finance and funding for different modes will be explored including traditional government funded projects, privatization, and innovative financing methods such as PPP. Budget development, capital programming and the preparation of financial plans to secure revenue will be emphasized. Also highlighted will be a review of the effect of transportation projects on the economy.

Course Description

Following is a week-by-week description of the course:

- Week 1: **Introduction to Public Finance/Introduction to Transportation Economics & Finance**
- Fundamental principles of government finance
 - Public goods and government finance, public choice
 - Costs of government activity, including both practical costs and economic costs
 - Limitations of the economic approach to public finance and policy
 - State & regional issues
 - Federal fiscalism, federal legislative issues

Week 2:

Fundamental Principles of Economics

- Basic principles/theories: scarcity, opportunity cost, rationality, efficiency and marginalism, supply and demand
- Markets, efficiency and the role of government
- Externalities or unintended consequences and their true costs
- Economics of public policy
- Pricing policies: user fees, fares, tolls, impact fees

Week 3:

Basic Principles of Accounting/Finance

- Time value of money, inflation, project escalation, depreciation
- Cost accounting: unit costs, direct vs. indirect, mission vs. support, fixed vs. variable, base vs. incremental
- Calculation and use of fully allocated costs
- Performance measures: cost per mile, hour, trip, recovery ratio
- Return on Investment (ROI), Net Present Value (NPV), Break Even analysis
- Case studies of application of financial tools to transportation decisions

Week 4:

Principles and Effects of Taxation/Revenue Sources & Analysis

- Objectives of taxation: accountability, equity and efficiency
- Taxes and tax structures: gas taxes, property taxes, real estate transfer, payroll, vehicle registration, intergovernmental transfers
- User fees: cover % of costs, modify behavior
- Elasticity impacts and models
- Financial capacity/financial condition/financial trends and monitoring

Week 5:

Government Expenditure Analysis & Evaluation

- Transportation system network
- Transportation programs and projects
- Operations analysis
- Federal, state and local spending plans, focusing on transportation
- Project delivery methods: design-build, construction manager at risk, design-build-operate-maintain
- Managing capital costs using strategies/tools: analytical delivery, weighted matrix, optimal risk-based

Week 6:

Resource Allocation/Budgeting Process

- Organizational environment & the management control process: programming, budget development, operations, evaluation
- Federal, state & local budget development
- Financial planning, Transportation Improvement Plans (TIP)
- Budgetary decision making & analysis: operating vs. capital
- Budget strategies: incrementalism, zero based budgeting, cross functional analysis
- Budget types: line item, activity based, performance, program
- Managing alternatives & establishing priorities

- Week 7: **Economics of Transportation**
- Commerce Act: movement of goods and services
 - Federal, state and local government structures
 - Infrastructure: maintenance, enhancement, expansion
 - Costs to achieve state of good repair (SOGR): asset condition assessment
 - Project prioritization & evaluation criteria: cost effectiveness, land use, mobility improvements, operating efficiencies, environmental benefits
 - Consumer behavior: congestion pricing, zoning, parking

- Week 8: **Strategic Planning & Infrastructure Development**
- Infrastructure planning: Long Range Plans/Transportation Improvement Plans
 - Transportation solutions: various modes, new roadways, transit, road widening, managed lanes, intelligent transportation systems, signal coordination
 - Transportation demand modeling: data sources, travel time savings
 - Congestion management process: increase supply/ reduce demand
 - Alternatives Analysis (AA): locally preferred alternative (LPA)
 - Federal process and oversight: FHWA/FTA/FAA/FRA
 - Regional planning: role of Metropolitan Planning Organizations (MPO)
 - Responsibilities of State Departments of Transportation (DOT)

- Week 9: **Transportation Funding and Financing**
- Basics of transportation funding sources: federal & state formula and discretionary, self-generated/local
 - Federal, state and local roles and responsibilities
 - Key legislation
 - Debt instruments: letter of credit, commercial paper, bonds
 - Debt structures: sizing, cash flows, marketplace, credit ratings
 - Innovative financing: infrastructure banks and loan programs (TIFIA & SIB), Tax Increment Financing (TIF)
 - Public Private Partnerships /P3: leases, joint development, availability payment structures, value for money

- Week 10: **Class Presentations/Summary**
- Students present group project to the class
 - Impact of transportation programs and projects in the context of the overall economy

Exam Week: **Final Exam**

Text: TBD

Grade Determination

Midterm exam	25%
Final Exam	25%
Paper/Project	25%
Class Discussion/Homework	25%