Economic Decision Analysis in Construction

Code	Credit Hours
CEM-803	3-0

Course Description:

This course introduces students to the techniques of building construction estimation and the concepts of building economic analysis, including the time value of money and life cycle costing. Students will be encouraged to discuss their ideas and findings in class with their peers and the course instructor, fostering a motivating and collaborative learning environment. The course will enable students to perform and evaluate present worth, future worth, and annual worth analyses on one or more economic alternatives. Additionally, students will learn to conduct and assess payback period and capitalized cost analyses. They will also be equipped to carry out and evaluate benefit/cost, life cycle, and breakeven analyses on various economic alternatives.

Text Books:

1. Donald G. Newnan, Ted G. Eschenbach, and Jerome P. Lavelle. (2004). Engineering Economic Analysis. 9th Edition. Oxford University Press, USA.

Prerequisites:

Nill

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Terms	25%
Term Project	10%
ESE	45%

Teaching Plan

Week No.	Topics	Learning Outcome
1	Introduction to EDA	Introduction. The Decision-Making Process. The Principles of Engineering Economy. The Rent Paid for Use of Money. Simple and Compound Interest. Cost Concepts. Cost Terminology. Break Even Analysis. Estimation. Accounting Principles.
2-3	Accounting and Financial Decision Making	Accounting: The basis of decision making Financial Status for Buisness: The balance Sheet, Income statement, The cashflow statement Usinng Ratio to make decisionsL Liquidity analysis, Profitability analysis, Market Value Analysis, Limiation of financial ratios
4-6	Interest Rate and Economic Equivalence	Time Value of Money. Why Consider Return to Capital? Cash Flow. Interest Calculations. Single Sums of Money. Series of Cash Flows. Continuous Compounding. The Concept of Equivalence. The Value of a Single Payment Now Compared to a Single Payment in the Future (P/F, F/P). Single Payment Compound Amount Factor (F/P). Nominal and Effective Interest. Continuous Interest. Resale or Salvage Value. Comparison of Alternatives. The Value of One Future Payment Compared to a Uniform Series of Payments (F/A, A/F). The Future Sum of Periodic Deposits. Applications for F/A & A/F Equations. Negative Interest Rate. Rates, Fares, and Tolls. Fund Flow Problems. The Value of One Present Payment Compared to a Uniform Series of Payments (P/A, A/P). Installment Loan. P/A Equation. Amount of the Final Payment in a Series. More Than One Compounding Period Occurs Between Payments in a Series.
7-8	Arithmetic vs Geometric Gradient	Arithmetic Gradient, G: The Constant Increment to a Series of Periodic Payments. Future Values of Gradient Amounts (F/G). Uniform Series Values of Gradient Amounts (A/G). Present Worth Values of Gradient Amounts (P/G). Geometric Gradient, The Constant Percentage Increment. Payment Series Changing by a Constant Percentage. Future Lump Sum or Equivalent Uniform Series Payments of a Geometric Gradient Series. Comparison of the Geometric Gradient to the Arithmetic Gradient.

9	MID TERM	
10-12	Present Worth Analysis, Annual Equivalent Worth Analysis	Present Worth Method of Comparing Alternatives. Comparison of Alternatives with Equal Life Spans. Comparison of Alternatives with Unequal Life Spans. Present Worth When a Series of Payments Starts at the Present, Past or Future. Financing a Loan. Sunk Costs. Subsidy by Means of Low Interest Rates. Annual Payments Method for Comparing Alternatives. Comparing Equivalent Uniform Series. Converting the Three Types of Cash Flow into an Equivalent Uniform Series. Geometric Gradient. Given the Annual Series, Find the Gradient. Selecting the Alternative by Comparison of Equivalent Annual Worth. Future Worth Method of Comparing Alternatives. Comparing Future Worth. Cost of Financing. Problems of Growth. The “Do Nothing” Alternative.
12-15	Rate of Retun Analysis	Rate of Return Method. Basics of ROR. Concurrent Income and Costs. Multiple Rates of Return. Incremental Rate of Return (IROR) on Required Investments. Comparison with Equal Life Spans. MARR, the Minimum Attractive Rate of Return. Comparing Different Life Spans. Comparing Alternatives by the ROR Versus the IROR. Break Even Comparisons. The Break Even Point Involving Incomes (Benefits) and Costs. Limitations of Break Even Analysis. Break Even Costs, Find Unknown Life. Benefit/Cost Analysis. Comparing Benefit to Costs. Several Methods for Calculating B/C Ratio. Comparing of B/C Results with Rate of Return. Evaluating Costs of Life and Personal Injury. Cost Effectiveness: Utility/Cost Method of Evaluating Intangible
16-17	Depreciation and Corporate Tax	Asset Depreciation, Economic Depreciation, Factors inherent in asset deprectiation, Book depreciation methods, Tax Depreciation Methods Inflation. Nature of Inflation. How Inflation Works. Inflation in engineering Cost Estimating. Taxes and Inflation. Comparison of Alternatives in an Environment of Inflation. Projects with Financing.