

Engineering Economics (3-2-0)**Course objectives:**

After completing this course students will be able to:

1. Understand and describe the basic concept of economics, cost accounting and time value of money.
2. Assist in the valuation of engineering projects in the public and private sectors to take decisions.
3. Analyzes the project risk and relate the concept of ecological limit and economic development.
4. Calculate depreciation, taxation and its application in analysis.
5. Identify different financing options and use to a limited extent, general accounting procedures.

Course Contents:

Chapter	Course	Text Materials (Book Name/Author; Chapter/Page Number)
1.	<i>Basics of Engineering Economics</i>	(3 hrs)
1.1	Definition of Economics, Demand, the Law of Diminishing Utility, Marginal Utility, Supply, Law of Supply, Law of Supply and Demand	Handout
1.2	Engineering Economics, Principles of Engineering Economy and its application	CEE/CSPark; Preface/XIX-XXI (What is “Contemporary” About Engineering Economics? Goal of the Text, Overview of the Text); Chapter:1/ Engineering Economics Decisions/4-17
2.	<i>Cost Concept and Fundamentals of Cost Accounting</i>	(3 hrs)
2.1	Cost Terminology: Manufacturing Cost and Non-Manufacturing Cost	CEE/CSPark; Chapter:8 General Cost Terms/388-390
2.2	Cost of Business Decision: Differential Cost and revenue; Opportunity cost, Sunk Cost and Marginal Cost	CEE/CSPark; Chapter:8 Future cost for Business Decisions/400-409
3	<i>Time Value of Money</i>	(4 hrs)
3.1	Interest, Simple Interest, Compound Interest, Normal Rate of interest, Effective Rate of interest	CEE/CSPark; Chapter:3 Interest: The cost of money/54-63; Chapter:4 Nominal and Effective Interest Rates/136-143
3.2	Economic Equivalence: Present Worth, Future Worth and Annual Worth	CEE/CSPark; Chapter:8 Economic Equivalence/63-71
3.3	Development of Formulas for Equivalence Calculation	CEE/CSPark; Chapter:8 Development of Interest Formulas/71-107
4.	<i>Basic Methods of Engineering Economic Studies</i>	(7 hrs)
4.1	Minimum Attractive Rate of Return- MARR	CEE/CSPark; Chapter:5 Initial Project Screening Method/216 EE/Sullivan; Chapter 5 MARR/192
4.2	Payback Period Method ~ Simple and Discounted	CEE/CSPark; Chapter:5 Initial Project Screening Method/210-216
4.3	Equivalent worth Methods; Present worth Method; Future worth Method and Annual worth Method.	CEE/CSPark; Chapter:5 Discounted Cash Flow Analysis/216-223; Variations on Present Worth Analysis/223-231
4.4	Rate of Return Method: Interest Rate of Return (IRR) Method and External / Modified Rate of Return (ERR/MIRR) Method.	CEE/CSPark; Chapter:7 Rate of Return/324-327; Methods for Finding Rates of Return/327-338; Internal Rate of Return Criterion/338-352
4.5	Benefit Cost Ratio Method	CEE/CSPark; Chapter:16 Benefit Cost Ratios/840-846
5.	<i>Comparative Analysis of Alternatives</i>	(6 hrs)
5.1	Comparing Mutually Exclusive Alternatives having same useful life by Payback Period Method Equivalent Worth Method ;Rate of Return Method and Benefit Cost Ratio Method	CEE/CSPark; Chapter:5 Comparing Mutually Exclusive Alternatives/232-249
5.2	Comparing Mutually Exclusive Alternatives having different useful lives by Repeatability Assumption, Co-terminated Assumption, Capitalized Worth Method	CEE/CSPark; Chapter:5 Comparing Mutually Exclusive Alternatives/232-249
5.3	Comparing Mutually Exclusive, Contingent and Independent Project in Combination	Handout
6.	<i>Risk Analysis</i>	(4 hrs)
6.1	Origin/Sources of Project Risks.	CEE/CSPark; Chapter: 12 Origins of Project Risk/586
6.2	Method of Describing Project Risks; Sensitivity Analysis, Breakeven Analysis, Scenario Analysis.	CEE/CSPark; Chapter:12 Methods of Describing Project Risk/588-595
7.	<i>Ecological Limits and Economic Development</i>	(3 hrs)
7.1	Economic Theory and Ecological Limits	ELED/SGR/Chapter: 2 Economic Theory and Ecological Limits
7.2	Concept of Sustainable Development	ELED/SGR/Chapter: 3 Concept of Sustainable Development
7.3	Ecological Footprint	ELED/SGR/Chapter: 5 Ecological Footprint
7.4	Overcoming Ecological Limits	ELED/SGR/Chapter: 15 Overcoming Ecological Limits
8.	<i>Depreciation and Corporate Income Taxes</i>	(5 hrs)

8.1	Depreciation and its causes, Asset Depreciation and Accounting Depreciation	CEE/CSPark; Chapter:5 Asset Depreciation/431-437
8.2	Basic Method of Depreciation, Straight Line Method, Declining Balance Method, Sinking Fund Method, Sum of Year Digit Method, Unit of Production Method, Modified Accelerated Cost Recovery System (MACRS)	CEE/CSPark; Chapter:5 Book Depreciation Methods/437-446; Tax Depreciation Methods/446-452 Handout
8.3	Introduction to Corporate Income Tax, Taxation Law, Depreciation Rate, Personal Tax, VAT	Handout CEE/CSPark; Chapter:5 Corporate Taxes/459-462
8.4	After Tax Cash Flow Estimate, General Procedure for Making After Tax Economic Analysis	CEE/CSPark; Chapter:9 Income Tax Rate to Be Used in Economic Analysis/468-472; Need for Cash Flow in Engineering Economic Analysis/472-476 EE/Sullivan; Chapter 7 General Procedure for Making After Tax Economic Analysis/327-331; Computation of ATCFs/331-343
9.	Enterprise Financing and Capital Investment	(4 hrs)
9.1	Method of Financing : Equity Financing, Debt Financing and Capital Structure	CEE/CSPark; Chapter:15 Methods of Financing/778-786
9.2	Cost of Capital: Cost of Equity, Cost of Debt and Calculating Cost of Capital	CEE/CSPark; Chapter:15 Cost of Capital/787-795
9.3	Project Funding Mechanism: Governmental Budget, Public Private Partnership and Private Investment	CEE/CSPark; Chapter:15 Cost of Capital/832-856 Handout
9.4	FIRR, EIRR and Return on Equity	CEE/CSPark; Chapter:2 Using Ratios to Make Business Decisions/40
10.	Basis Accounting Procedure	(6 hrs)
10.1	Accounting Terminologies: Asset and Liabilities, Fundamental Equation of Accounting	CEE/CSPark; Chapter:2 Accounting: The Basis of Decision Making/21-22
10.2	Financial Statements: The Balance Sheet, Income Statement and Cash Flow Statement	CEE/CSPark; Chapter:2 Financial Status for Businesses/22-33
10.3	Using ratios to make Decisions: Debt Ratio, Current Ratio, Quick Ratio-Acid Test Ratio, Inventory Turnover Ratio, Total Asset Turnover, Profit Margin on Sales, Return on Total Assets, Price Earnings Ratio and Book Value Per Share	CEE/CSPark; Chapter:2 Using Ratios to Make Business Decisions/33-43

Text Book:

Chan S. Park, *Contemporary Engineering Economics*, PHI Learning Private Limited. **(All students will get e-copy of this book.)**

References:

1. E Paul De Garmo. William G Sullivan and James A. Bontadelli, *Engineering Economy*, MC Milan Publishing Company
2. James L., Riggs, David D. Bedworth and Sabah U. Randhawa, *Engineering Economics*, Tata McGraw Hill Education Private Limited
3. N. N. Borish and S. Kaplan, *Economics Analysis for Engineering and Managerial Decision Making*, MCGraw Hill Publishing Company
4. Adhikari, D. *Principles of Engineering Economics Analysis*, Global Publication, Nepal
5. Sen Gupta, Ramprasad, *Ecological Limits and Economic Development*, Oxford University Press.

Internal Evaluation Scheme:

S. No.	Evaluation Criteria	Marks
1.	5 Mini Test	15
2.	5 Assignment	15
3.	Internal Final Assessment	15
4.	Attendance	5
	Total	50