

Course Code ESE-816	Credit Hours (Th-Pr) 3.0-0	<u>Economics Evaluation of Thermal (Elective)</u>	Contact Hrs/Week (Th-Pr) 3.0-0	Total Contact Hrs (Th-Pr) 45-0
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Course Outline:

1. Project Cycle, Features of energy projects, project identification and development, cost concepts and financial calculations, economic evaluation of energy projects, financial evaluation of projects, environmental considerations in project evaluation, financing energy projects, risk analysis, life cycle analysis, economic analysis of public utilities, development and evaluation of CDM projects, case studies.

2. **Eligibility Criteria:**

B.E in Mech., Elect (Power), Chemical, Industrial, Process
B.S (4-years) Or M.Sc. degrees in Physics

a. **Recommended Books:**

S/N	Title	Author(s)	Assigned Code	Remarks
(1)	Contemporary Engineering Economics	Park, C.S	PS	Text
(2)	Economic Evaluation of Projects in the Electricity Supply Industry	Khatib, H	KH	Reference
(3)	ADB Guidelines for the Economic Analysis of Projects	Asian Development Bank	ADB	Reference
(4)	<i>Integrated Energy Development and Economics of Energy Projects</i>	Heredia, J,	HJ	Reference

Course Objectives

3. Understanding the project cycle is important because of lumpy nature of most energy projects and their wide socio-economic and environmental impacts. Its importance has increased in the era of deregulated and privatized energy industries, and in view of global concern about sustainable development of energy projects. The main objective of this course is to provide a comprehensive understanding of the

concepts and methodologies for project identification, project preparation, project evaluation and project financing.

Learning outcome:

4. The students will be able to appreciate the entire scope of energy projects and their appraisal. The logical project design and development sequence of energy sectors projects includes technical aspects, economics, environmental and financial considerations. Life cycle analysis is an important part of any renewable energy project. The attendees will be able to conceive and design relevant projects in the light of Kyoto Protocol inclusive of CDM credits.

5. **Topics Covered**

No.	Topics	Text Book	Contact Hours
a.	Introduction to thermal energy projects 1. Features of energy projects 2. Project cycle 3. Context of energy projects	PS	4
b.	Project preparation and Development 1. Project Identification 2. Project proposal preparation 3. Pre-feasibility and Feasibility studies 4. Budgeting 5. Project approval and implementation	PS	5
c.	Cost concepts and financial calculations 1. Cost concepts 2. Time value of money 3. Interest formulas and equivalence 4. Inflation 5. Depreciation	PS	5
d.	Economic evaluation of thermal energy projects 1. Alternative methods of project evaluation 2. Economic vs. financial evaluation 3. Valuation of costs and benefits 4. Sensitivity analysis and break-even analysis	PS	5
e.	Financial evaluation of thermal energy projects 1. Elements of financial costs 2. Financial structure and project feasibility 3. Revenue streams: Effects of assumptions and pricing	PS	4

	4. Sensitivity analysis		
f.	Environmental Issues in thermal energy projects <ol style="list-style-type: none"> 1. Evaluation of Environmental Impacts 2. Methods of Economic Evaluation of Environmental Impacts 3. Effects of Environmental Regulations in Project Evaluation 	PS	4
g.	Financing of thermal energy projects <ol style="list-style-type: none"> 1. Sources of funds and the cost of capital 2. Project financing 3. Raising funds in the international market 	PS	4
h.	Risk analysis in thermal energy project development <ol style="list-style-type: none"> 1. Origins of project risk 2. Methods of describing project risk 3. Measurement of investment worth under risk 	PS	4
i.	Life cycle analysis (LCA) of thermal energy projects <ol style="list-style-type: none"> 1. Life cycle cost analysis 2. Other aspects of life cycle analysis 3. LCA applications in energy projects 	PS	3
j.	Development of projects Under Clean Development Mechanism <ol style="list-style-type: none"> 1. Prerequisites of a CDM project 2. CDM project cycle 3. Estimation of baseline GHG emissions and certified emission reductions 4. Financial Valuation of a CDM project 5. Carbon market and financing issues in CDM projects 	PS	4
k.	Energy Policy Issues <ol style="list-style-type: none"> 1. Energy Independence and Depletion policy. 2. Environmental Issues: 3. Climate change and the energy sector 4. Kyoto Protocol 5. Governance Issues; Extractive Industries Transparency Initiative. Alternative Energy 		3