

<b>Course title:</b> Energy - Resources, Policy, Technology and Finance				
<b>Course code:</b> NRE 184   <b>No. of credits:</b> 2   <b>L-T-P:</b> 28-2-0   <b>Learning hours:</b> 30				
<b>Pre-requisite course code and title (if any):</b>				
<b>Department:</b> Department of Natural and Applied Sciences				
<b>Course coordinator(s):</b> Dr Sapan Thapar   <b>Course instructor(s):</b> Dr Sapan Thapar				
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<b>Course type:</b> Elective   <b>Course offered in:</b> Semester 2				
<b>Course description</b> Provides an overview on energy, encompassing resources, technologies, policies, finance and management. The course introduces concepts on energy transition and carbon markets.				
<b>Course objectives</b>				
<ul style="list-style-type: none"> <li>▪ To provide an overview on energy supply and demand, along with resources (both fossils and non-fossils)</li> <li>▪ To understand energy policies, regulations and Sectoral value chain</li> <li>▪ To gain knowledge on energy technologies, project management and finance</li> <li>▪ Cover fundamentals on Energy Transition, Net-Zero, Decarbonization, Just Transition</li> </ul>				
<b>Course content</b>				
<b>Module</b>	<b>Topic</b>	<b>L</b>	<b>T</b>	<b>P</b>
1.	<b>Resources, Supply and Demand</b> Resource classification (oil, gas, coal, electricity, RE) Sectoral value chain (Upstream- downstream) Energy Production, Consumption, Trading Indian Scenario	4	0	0
2.	<b>Institutions &amp; Governing Structure</b> Policies, Regulations and Schemes - Power, Coal, Oil & Gas, Solar, Wind, Hydro, Biomass Key Stakeholders – Government/ Ministries, Regulators, Corporate, PSUs, Agencies, Research Institutions	6	0	0
3.	<b>Technological Overview</b> Energy Resource Assessment Technology Overview - coal, hydro, gas, solar, wind, biomass, nuclear Power Sector - Generation, Transmission and Distribution Petroleum Refining, LNG End-use Applications	4	0	0
4.	<b>Energy Finance and Economics</b> Project Management – Contracts, Business Models Techno-commercial Assessment Techniques Risk Assessment Funds – Types, Sources, Costs Terms and conditions of finance Discounted cash flow analysis Key Financial ratios - LCOE, IRR, NPV Pricing/ Tariff Determination Process	4	2	0

5.	<b>Energy Efficiency and Management</b> Policies and Regulations Bureau of Energy Efficiency Schemes and Initiatives Energy Audit and Management Techniques	4	0	0
6.	<b>Energy Transition and Decarbonization</b> Energy Related GHG Emissions Role of UNFCCC, Net Zero goals Technologies- GH2, RE, CCUS, NbS, EVs, Smart Grid Concept of Just Transition Overview of Carbon Markets	6	0	0
	<b>Total</b>	<b>28</b>	<b>2</b>	<b>0</b>
<b>Evaluation criteria</b>				
<ul style="list-style-type: none"> <li>▪ Test 1: 15%</li> <li>▪ Test 2: 15%</li> <li>▪ Assignment/Tutorials: 20%</li> <li>▪ Test 3: 50%</li> </ul>				
<b>Learning outcomes</b>				
By the end of this course, the student will be able to:				
<ul style="list-style-type: none"> <li>▪ Identify different energy resources and demand-supply trends</li> <li>▪ Describe key features of energy supply chain, including key stakeholders</li> <li>▪ Explain working principle of energy technologies</li> <li>▪ Understand role of policy and finance in sectoral development</li> <li>▪ Appreciate importance of energy transition in combating climate change</li> </ul>				
<b>Pedagogical approach</b>				
The course will be delivered through classroom lectures. Relevant case studies shall be discussed in class so that students are introduced to the latest stage of development in the subject.				
<b>Materials</b>				
<b>Textbooks</b>				
<ol style="list-style-type: none"> <li>1. Hedley, D. (1981). <i>World energy: The facts and the future</i>. Euromonitor Publications.</li> <li>2. Siddiqui, T. A. (1976). <i>World energy</i>. Holt-Saunders.</li> <li>3. Kishore, V. V. N. (Ed.). (2010). <i>Renewable energy engineering and technology: Principles and practice</i>. TERI Press. ISBN 9788179932216.</li> <li>4. Chatterji, M. (1981). <i>Energy and environment in the developing countries</i>. John Wiley.</li> <li>5. Mangone, G. J. (1979). <i>Energy policies of the world: India, Japan, Taiwan</i> (Vol. 3). Elsevier.</li> <li>6. Thapar, S. (2024). <i>Renewable energy: Policies, project management and economics</i>. Springer Nature Singapore. <a href="https://doi.org/10.1007/978-981-99-9384-0">https://doi.org/10.1007/978-981-99-9384-0</a></li> <li>7. Bureau of Energy Efficiency. (2009). <i>The action plan for energy efficiency</i>. Bureau of Energy Efficiency.</li> <li>8. Bureau of Energy Efficiency. (2008). <i>National mission for enhanced energy efficiency</i>. Government of India, Bureau of Energy Efficiency.</li> <li>9. Kreith, F., &amp; Goswami, D. Y. (2007). <i>Handbook of energy efficiency and renewable energy</i>. CRC Press.</li> </ol>				

**Journals**

1. Energy
2. Energy Policy
3. Renewable Energy
4. Renewable and Sustainable Energy Reviews
5. Biomass and Bioenergy
6. Energy for Sustainable Development

**Website**

1. Government Ministries (Power, RE, Coal, Oil & Gas, Nuclear)
2. Agencies and Regulators (NITI Aayog, BEE, CERC, PNGRB, PPAC)
3. IEA, IRENA, World Bank

**Student responsibilities**

The students are expected to submit assignments in time and come prepared with readings when provided.

**Course Developed by**

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**Course Reviewers**

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