

Course title: Energy and Environment				
Course code: NRE 183		No. of credits: 3	L-T-P: 38-4-0	Learning hours: 42
Pre-requisite course code and title (if any): A good knowledge of Physics and Mathematics is expected from each of the student attending the course work. Students should have knowledge of Mathematics upto 10+2 level				
Department: Department of Natural Resources				
Course coordinator: Dr Vinay K Tyagi			Course instructor: Dr Vinay K Tyagi	
Contact details:				
Course type: Elective			Course offered in: Semester 3	
Course Description The course will provide the student a fair understanding of various energy resources, energy situation, energy production, utilization and the impact on environment, environment protection techniques/devices to protect the environment due to pollution arising out of use of various energy resources, global warming and climate change and the mitigation measures. Further the student will have a broad view of energy and environment policy of India.				
Course objectives				
<ol style="list-style-type: none"> 1. To explain the importance of conventional energy in the overall infrastructure of the country 2. To examine the status of conventional energy infrastructure vis-a-vis the projected economic growth 3. To assess the environmental impacts of use of conventional energy 4. To impart basic knowledge about methods/processes involved during the entire fuel chain of every conventional energy resource 5. To bring out the technoeconomic aspects of conventional energy utilisation 				
Course content				
SNo	Topic	L	T	P
1.	Introduction SI units, energy resources & classification, forms of energy, transformation of energy from one form to another, end uses of energy, energy scenario of world & in India, organization of energy sector in India, forms of pollution, energy use and environment linkage, acid rain, smog, haze, global warming, climate change	6	1	
2.	Conventional Energy <i>Coal and lignite:</i> Formation, reserves, mining, production and sectoral consumption, transportation, future demand, imports, quality of Indian coals, coal uses <i>Hydrocarbons:</i> Formation, reserves, production, refining, various petroleum products, sectoral consumption, movement of petroleum products, demand and imports, basic properties, uses <i>Nuclear energy:</i> Uranium resources, radioactivity, nuclear fission and fusion, nuclear reactors, nuclear fuel cycle, future of nuclear power and environmental issues	10	1	
3.	New & Renewable Energy Solar thermal energy; solar photovoltaic; hydroelectricity; tidal power, wind energy, wave energy, geothermal energy, biofuels, hydrogen, current potential, achievements and future prospects of	10	1	

	renewable energy in India and Environmental impacts			
4.	Environment protection techniques/devices Safety health and environmental issues during handling, storage, transportation and combustion of fuels, control of emission of sulphur dioxide (SO _x), oxides of nitrogen (NO _x), particulate matter, fluidized bed combustion, combined cycle power generation Energy use and global climate change, GHG emissions, carbon sequestration	10	1	
5.	Energy and Environment Policy of India : Introduction	2		
	Total	38	4	
Evaluation criteria				
<ul style="list-style-type: none"> ▪ 2 minor tests: 15% each ▪ Term paper presentation: 20% ▪ Major test: 50% 				
Learning outcomes				
<ol style="list-style-type: none"> 1. Current status of conventional energy scenario of the country and global scenario 2. Methods/processes/technologies for exploration, extraction and utilisation of conventional energy resources 3. Demand, indigenous supply and imports, pricing and taxation of various conventional energy sources 4. Role of public and private sectors in development of conventional energy infrastructure 5. Technoeconomic and environmental merits and demerits of conventional energy sources 6. R&D programmes in the conventional energy sector 				
Pedagogical approach				
Materials				
Required text				
<ol style="list-style-type: none"> 1. Boyle G. (2004) <i>Renewable Energy: Power for a Sustainable Future</i>, Oxford University Press, UK. 2. Kishore V.V.N. (2008) <i>Renewable Energy Engineering and Technology, Principles and Practice</i>, The Energy and Resources Institute, New Delhi. 				
Suggested readings				
<ol style="list-style-type: none"> 1. Boyle G., Everett B. and Ramage J. (Editors) (2003) <i>Energy Systems and Sustainability: Power for a Sustainable Future</i>, Oxford University Press, UK. 2. Kishore V.V.N. (Edited) (2008) <i>Renewable Energy Engineering and Technology–A Knowledge Compendium</i>, Published by TERI Press, printed at Rajkamal Electric Press, New Delhi, pp 925. 3. Ristinen R.A. and Kraushaar J.J. (2006) <i>Energy and the Environment</i>, John Wiley & Sons, Inc., USA. 				
Case studies				
Websites				
Journals				
<ol style="list-style-type: none"> 1. Biomass and Bioenergy 				

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| 2. International Journal of Energy and Environment
3. Renewable Energy |
| Additional information (if any) |
| Student responsibilities
Attendance, feedback, discipline, guest faculty etc |