Course title: Mitigation of Climate Change			
Course code: NRC 132	**No. of credits:** 3	**L-T-P:** 28-14-0	**Learning hours:** 42
Pre-requisite course code and title (if any): Energy and environment & Basics of climate science courses of first semester			
Faculty: Dr Kamna Sachdeva	**Department:** Department of Natural Resources		
Course coordinator (s): Dr Kamna Sachdeva	**Course instructor (s):** Dr Kamna Sachdeva		
Contact details:			

Course type	**Compulsory**	**Core**	**~~Elective~~**	
Course offered in	**Semester 1**	**~~Semester 2~~**	**Semester 3**	**Other**

Course Description

The course focuses on mitigation strategies applicable to different sectors for climate change. The strategies are discussed from the perspectives of the developing countries. It is based on the preamble of IPCC fourth assessment report (AR 4) on mitigation of climate change and provides answers to questions such as:

- What can be done to avoid climate change from anthropogenic activities?
- What are the strategies to implement these actions?
- How climate mitigation policies are aligned with Sustainable Development policies?

Course objectives

1. Impart knowledge about emission scenarios and its translation to future climate impacts
2. To give overview of GHG emission calculation methods and mitigation strategies

Course content

SNo	Topic	L	T	P
1.	**Overview of climate change impacts**: Overview of climate change and its impacts; time series trends of important climate variables- temperature and precipitation, Introduction to mitigation of GHGs and stabilization scenario; characteristics of mitigation in regional and national context; long term and short term mitigation options; Linkages between mitigation and adaptation of climate change	**8**	**4**	
2.	**Emissions Scenario of GHGs**: Emission computation techniques: integrated assessment models, EIA& Life Cycle Assessment. Methodologies for regional GHG inventories, GHGs emission estimate reporting.	**8**	**4**	
3.	**Sector based approaches for reducing GHG emission**: Sectors – transport, power, agriculture, municipal waste, specific industries, and buildings.		**6**	
4.	Mitigation from cross sector perspective and its linkages with sustainable development- case study based approach.	**4**		
5.	**Policy Instruments**: market based approaches (CDM, REDD, REDD plus); Co-operatives arrangements for implementation; National Action Plan on Climate Change (mitigation specific missions); Nationwide policies for alternate energy programmes; alternate energy crops programmes and afforestation; Regulatory approaches (command and control, flexible mechanism and	**8**		

	voluntary measure), Micro level initiative (Panchayti Raj institutions)			
	Total	**28**	**14**	

Evaluation criteria

- Tutorials/assignment: 20%
- 2 minor tests: 15% each
- 1 major test (end semester): 50%

Learning outcomes

1. A profound view about climate vulnerability and the impacts of advancing climate change
2. Understanding of different adaptation and resilience possibilities, and
3. Have a good overview of various challenges and conflicts of implementation.

Pedagogical approach

Materials

Required text

1. Banerjee K.K.(1995) Global Warming Database Technology Options in Power and End-use Sectors Using Fossil Fuels, New Delhi.
2. Gupta M.(2006) Restricting Greenhouse Gas Emissions: Economic Implications for India, New Delhi.

Suggested readings

1. Hardy J.(2003) Climate Change: Causes, Effects and Solutions, John Wily & Sons.
2. Nakicenovic N. (Eds) (1993) Integrative Assessment of Mitigation, Impacts and Adaptation to Climate Change, Austria.
3. Sathaye J. and Meyers S.D.(1995) Greenhouse Gas Mitigation Assessment: AGuidebook, Kluwer.
4. Thomas S.(2003) Policy Instruments for Environment and Natural Resource Management, RFF Publication, Washington DC.
5. Tiwari G.N.(2003) Greenhouse Technology for Controlled Environment, New Delhi.

Case studies

Websites

Journals

1. Atmospheric Environment
2. Climate Dynamics
3. Coal
4. Combustion Technologies
5. Energy Policy
6. Global Environmental Change
7. Renewable Energy
8. Review of environmental economics and policy
9. Solar Energy
10. Sustainable and Renewable Energy reviews

Additional information (if any)

Reports

1. ADB 2009 Report,TheEconomics of Climate Change in South Asia: A Regional Review, Asian Development Bank, Phillipines.

2. Economics of Greenhouse Gas Limitations: Methodological Guidelines, Halsnaes K., Callaway J.M. and Meyer H.J.(1998a) Roskilde, Denmark, UNEP Collaborating Centre on Energy and Environment.
3. International Energy Technology Collaboration and Climate Change Mitigation, Case Study 1: Concentrating Solar Power Technologies, Philibert C., 2004: OECD Environmental Directorate, IEA, Paris.
4. International Energy Technology Collaboration and Climate Change Mitigation, Case Study 4: Clean Coal Technologies, PhilibertC. and PodkanskiJ. (2005) International Energy Agency, Paris.
5. IPCC (1996)Technical Paper 1-Technologies, Policies and Measures for Mitigating Climate Change, Watson, R.T., M.C. Zinyowera and R.H. Moss (eds).
6. IPCC (1996) Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses, Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change,*Cambridge University Press*, Cambridge, United Kingdom and New York, NY, USA.
7. IPCC (2007) Climate Change 2007: Mitigation of Climate Change, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds) *Cambridge University Press*, Cambridge, United Kingdom and New York, NY, USA.
8. World Bank (1998) Greenhouse Gas Assessment Handbook: APractical Guidance Document for the Assessment of Project-level Greenhouse Gas Emissions, Washington, D.C., World Bank Global Environment Division.

Other Reports from

1. IEA
2. OECD
3. UNFCCC
4. World Bank

Student responsibilities

Attendance, feedback, discipline, guest facultyetc