Course title: Economics of Climate Change				
Course code: NRC 145	**No. of credits:** 3	**L-T-P distribution:** 35-07-0	**Learning hours:** 42	
Pre-requisite course code and title (if any): Basic course in environmental and resource economics (offered in Second semester)				
Faculty: Dr Arabinda Mishra	**Department:** Department of Natural Resources			
Course coordinator (s): Dr Arabinda Mishra	**Course instructor (s):** Dr Arabinda Mishra			
Contact details:				
Course type	**Compulsory**	~~**Core**~~	**Elective**	
Course offered in	**Semester 1**	**Semester 2**	~~**Semester 3**~~	**Other**

Course Description

This is a foundation-level course for students ideally with prior exposure to the basics of economic analysis. The aim is to develop an understanding of the economic framework of decision-making in which policy issues related to climate change mitigation and adaptation are currently being debated at the international level.

The specific issues that students would be discussing in the course are as follows: How is the climate system linked to economic growth? What is 'business-as-usual' and what are its consequences in economic terms? Why do we need a 'global deal' on climate change and why is it so challenging to secure international cooperation on this issue? What solutions do we have from science and technology to deal with unavoidable climate change and at what cost? What policy instruments and institutional arrangements can we avail of–nationally and internationally–to bring about actions necessary to prevent atmospheric concentration of GHG emissions from reaching 'dangerous levels'? How do we factor in distributional considerations–intra as well as inter-generational–while deciding on actions to deal with climate change? What political and economic considerations are influencing the course of international negotiations on climate change?

The expected learning outcomes include a clear understanding of the science-policy linkage in dealing with the climate change problem, an ability to examine the economics that being used at global and local levels for making choices on climate action, as well as an appreciation of the ethical issues involved in climate policy.

Course objectives

Course content

SNo	Topic	L	T	P
1.	Introduction to the course: the persisting disconnect between climate change science and policy;core economic issues; basic premises and approach of this course	2		
2.	Climate change as a market failure: the atmospheric commons; stock and flows of emissions; GHG emissions as externalities; impacts of	4		

	climate change over time and space; uncertainty and irreversibility; international cooperation as a public good and the free-rider problem			
3.	Coping with climate change: vulnerability assessment; the concept of adaptation; types of adaptation; costs of coping with climate change	5		
4.	Acting on climate change: assessing damages (market and non-market) from emissions; nature and range of mitigation actions; modeling approaches and evaluation of avoided damages; the ethical dimension and problem of discounting	8	3	
5.	Policy instruments: direct regulation; emission taxes and abatement subsidies; tradable permits: EU-ETS, a case study; cap-and-trade in the USA; other regional trading systems; choice of instrument (trading vs. taxation, price vs. quantities, fiscal impacts, distributional considerations); Coasian solutions; voluntary action	12	4	
6.	Political economy of international climate policy and negotiations: global trends in the causes and levels of emissions; long-term stabilization goals and commitments of industrialized nations; developing country participation;the Kyoto protocol and its mechanisms (CDM, JI and ETS);other climate instruments under the UNFCCC (NAMAs, REDD+, etc); adaptation funding; technology transfer and IPRs	4		
	Total	**35**	**7**	

Evaluation criteria

- Short assignments (5 in number): 30%
- One mid-term exam: 30%
- Major exam: 40%

Learning outcomes

Pedagogical approach

Materials

Required text

1. Barrett S. (2003) *Environment and Statecraft*, New York, Oxford University Press.
2. *Climate Change* (1995) *Economic and Social Dimensions of Climate Change*, ed. Bruce J., Lee H. and Haites E., Cambridge, Cambridge University Press.
3. *Global Climate Change: The Science, Economics and Politics*, ed. Griffin J., Cheltenham: Edward Elgar.
4. Nordhaus W. (1994) *Managing the Global Commons*, Cambridge, MA, MIT Press.
5. *Reducing Global Carbon Dioxide Emissions: Costs and Policy Options*, ed. Gaskins D. and Weyant J. and Stanford C.A., Energy Modeling Forum, Stanford University

Suggested readings

1. Nicholas S. (2007) *The Economics of Climate Change: The Stern Review*, Cambridge, Cambridge University Press.
2. Shardul A. and Sam F. (Eds.) (2008) *Economic Aspects of Adaptation to Climate Change: Costs, Benefits and Policy Instruments*, Paris, OECD, World Bank, 2009.
3. *World Development Report 2010: Development and Climate Change*, Washington, DC: World Bank.

Research Papers

1. Aldy J., Barrett S. and Stavins R. (2003) Thirteen Plus One: A Comparison of Alternative Climate Policy Architectures, *Climate Policy* 3, 373–97.
2. Fischer C. (2004a) Emission Pricing, Spillovers and Public Investment in Environmentally Friendly Technologies, Discussion Paper 04–02, Washington, DC, Resources for the Future.
3. Fischer C. and Newell R. (2005) Environmental and Technology Policies for Climate Mitigation, Working paper, Washington, DC, Resources for the Future.
4. Jacoby H. and Ellerman A. (2004) The Safety Valve and Climate Policy, *Energy Policy*,32, 481–91.
5. Kolstad C. (1996) Learning and Stock Effects in Environmental Regulation: The Case of Greenhouse Gas Emissions, *Journal of Environmental Economics and Management*,31, 1–18.
6. Manne A. and Richels R. (2004) The Impacts of Learning-by-Doing on the Timing and Costs of Co2 Abatement, *Energy Economics* 26, 603–19.
7. Newell R. and Pizer W. (2003b) Regulating Stock Externalities under Uncertainty, *Journal of Environmental Economics and Management,* 45, 416–32.
8. Nordhaus W. (1982) How Fast Should we Graze the Global Commons? *American Economic Review*,72, 242–6.
9. Pindyck R. (2000) Irreversiblities and the Timing of Environmental Policy, *Resource and Energy Economics* 22, 233–59.
10. Pizer W. (1999) Optimal Choice of Policy Instrument and Stringency under Uncertainty, The Case of Climate Change, *Resource and Energy Economics,* 21, 255–87.
11. Pizer W. (2002) Combining Price and Quantity Controls to Mitigate Global Climate Change, *Journal of Public Economics,*85, 409–34.
12. Tol R. (2005) The Marginal Damage Costs of Carbon Dioxide Emissions: An Assessment of the Uncertainties, *Energy Policy,*33, 2064–74.
13. Tulkens H. (1998) Cooperation versus Free Riding in International Environmental Affairs: Two Approaches, In *Game Theory and the Environment*, ed. N. Hanley and H. Folmer. Cheltenham: Edward Elgar.
14. Weitzman M. (1974) Prices vs. Quantities, *Review of Economic Studies,* 41, 477–491.
15. Weitzman M. (1998) Why the Far-distant Future should be Discounted at the Lowest Possible Rate, *Journal of Environmental Economics and Management,* 36, 201–8.
16. Wigley T., Richels R. and Edmonds J. (1996) Economic and Environmental Choices in the Stabilization of Atmospheric Co2 Concentrations, *Nature*,379, 240–3.
17. Williams R. (2002) Prices vs. Quantities vs. Tradable Quantities, Working Paper No. 9283, Cambridge, MA, NBER.

Case studies
Websites

Journals
1. Development Economics
2. Environmental Economics

Additional information (if any)

Student responsibilities
Attendance, feedback, discipline, guest faculty etc