

Course title: Climate change, water resources and agriculture				
Course code WSW 183	No. of credits 3	L-T-P distribution: 42-0-0	Learning hours: 42	
Pre-requisite course code and title (if any) :				
Department: Department of Regional Water Studies				
Course coordinator(s): Dr. Nirupam Dutta			Course instructor(s): Dr Nirupam Dutta	
Contact details:				
Course type: Elective			Course offered in: Semester 3	
Course description				
Globally, climate variability as witnessed by changes in long-term climatic conditions is adversely affecting the outcomes in the agricultural sector especially with respect to distribution of water resources leading to extended periods of moisture stress. This has serious implications for food security, social stability and welfare of the general population. Keeping this in mind, this course plans to introduce to the inter-linked topics in climate change, water resources and agriculture by building up on the basic concepts and issues pertaining to climate change and their implications for water resources and thereby agriculture. The course further develops theoretical as well as empirical models/approaches for assessing impacts of climate change in agriculture through variability in spatial and temporal distribution of water resources as well as those for adaptation and mitigation strategies for counteracting the same. These will be further followed by examining important cross-country empirical studies using different approaches. The course, with an essentially economic perspective will have a substantial focus on water resources.				
Course objectives				
<ul style="list-style-type: none">▪ Introduce students to perspectives on inter-linkages between climate change, water resources and agriculture▪ Introduce them to theoretical and empirical models of climate change in agriculture by building up on basic concepts▪ Enable the students to explore the extent of impact on agricultural sector through possible effects on water resources and the possible adaptation and mitigation strategies being employed▪ Familiarise the students with various empirical studies to help them grasp the concepts				
Course content				
Module	Topic	L	T	P
1	Introduction- Main Issues in Climate Change, Water Resources and Agriculture: Definition and scope, the global scenario, role of climate in affecting the reliability in distribution of water flows and agricultural production, uncertainties, distributional effects, social and economic implications	6	0	0
2	Tools for Assessing Climate Change Impacts on Agriculture: Agro-Economic Models, Economic Management Models, Inter-temporal Net Revenue Approach, Ricardian Analysis, Empirical Yield Models, Agro-ecological Zone Based Modeling, vulnerability and sensitivity analysis	10	0	0
3	Tools for Assessing Adaptation to Agricultural Impacts of Climate Change: Micro-behavioral economics model of global warming, Geographically Scaled Micro-econometric Models of Adaptation (G-MAP),	6	0	0
4	Adaptation and Mitigation Strategies: Conservation tillage, watershed development, micro-irrigation, system of rice intensification, portfolio diversification, GHG emissions, biofuels, rainfall insurance, technological innovations, improvisation	10	0	0
5	Political Economy of Climate Change, Water and Agriculture: Regulatory and Institutional Challenges, Water Rights, Community Participation, Subsidies and Incentives, Conflict Resolution, Institutional Design, Risk, Reliability and Ambiguity	10	0	0
	Total	42	0	0
Evaluation criteria				
Mid-Term	35%			

End-Term Exam	35%
Paper Presentation	15%
Quizzes	15%
Learning outcomes Students will be able to appreciate the core issues related to climate change, water resources and agriculture Using real world data and appropriate tools, students will be to assess the impacts of climate change on various agricultural parameters and the significance of the associated factors. Based on the exposure to the course work the students will develop skills needed to devise and fine-tune appropriate adaptation and mitigation measures for agricultural activities with specific focus on water resources under field conditions.	
Pedagogical approach Classroom teaching will involve black board, power point presentations, building up on basis concepts,-derivations and empirical study analysis. The sessions will be interactive.	
Materials Textbooks (Tentative) <ol style="list-style-type: none"> 1) Mendelsohn Robert (ed.) (2001) <i>Global Warming and the American Economy</i>, Edward Elgar, Cheltenham 2) Markandya Anil, Galarraga Ibon & de Murieta Elisa Sainz (2014) <i>Routledge Handbook of The Economics of Climate Change Adaptation</i>, Routledge, Oxon and New York. 3) Shreshtha Sangam (2014) <i>Climate Change Impacts and Adaptation in Water Resources and Water Use Sectors</i>, Springer, Switzerland 4) Ruth Matthias & Ibarraran Maria E. (2009) <i>Distributional Impacts of Climate Change and Disasters</i>, Edward Elgar, Cheltenham 5) Rosenzweig Cynthia and Hillel Daniel (2008) <i>Climate Variability and the Global Harvest</i>, Oxford University Press, New York. 6) Seo S. Noggol (2015) <i>Micro-Behavioral Economics of Global Warming</i>, Springer, Switzerland. 7) Dinar Ariel & Mendelsohn Robert (eds.) (2011) <i>Handbook on Climate Change and Agriculture</i>, Edward Elgar, Cheltenham 8) Mendelsohn, Robert & Dinar Ariel (2009) <i>Climate Change and Agriculture</i>, Edward Elgar, Cheltenham Some Suggested Reading (For a better understanding of the issues and perspectives in finer details) <ol style="list-style-type: none"> 1) Hillel Daniel & Rosenzweig Cynthia (eds.) (2011) <i>Handbook of Climate Change- Impacts, Adaptation and Mitigation</i>, Imperial College Press, London. 2) Ludwig Fulco, Kabat Pavel, van Schaik Henk & van der Valk Michael (2009) <i>Climate Change Adaptation in the Water Sector</i>, Earthscan, London. 3) Sinnott Armstrong Walter & Howarth Richard B. (eds.) (2005) <i>Perspectives on Climate Change: Science, Economics, Politics and Ethics</i>, Elsevier Limited, Oxford. 4) OECD (2009) <i>The Economics of Climate Change Mitigation: Policies and Options for Global Action Beyond 2012</i>, OECD, Paris 5) Patt Anthony G., Schroter Dagmar, Klein Richard J.T. & de laVega-Leinert Christina A. (2009) <i>Assessing Vulnerability to Global Environmental Change</i>, Earthscan, London. Journals American Economic Review American Journal of Agricultural Economics Agricultural Economics Global Environmental Change Ecological Economics World Development	
Additional information (if any)	
Student responsibilities	

The nature of the course demands that the students shall attend all lectures. It is expected that students will submit assignments on time, take all class tests. Discipline will be maintained in class at all times.

Course Reviewers:

1. Prof Narender Kanhe, Principal, Guru Nanak Institute of Engineering and Management, Nagpur.
2. Prof Ram Karan Singh, Department of Civil Engineering, King Khalid University, Saudi Arabia.