Co-funded by the Erasmus+ Programme of the European Union

Climate Change, Impacts and Adaptation in Himalaya

Semester -III: July - December 2020

Coordinator	Prof. Prakash C. Tiwari
Credits	100 Marks [4 ECTS]* 75 Marks End Semester Examination and 25 Marks Assignment
Lecturers	Decided in Departmental Meeting
Level	M.A./M.Sc.
Host institution	Department of Geography, Faculty of Arts, Kumaun University, Nainital
Course duration	One Semester [July - December]

Summary

This one full semester course provides the Master level students of Geography basic understanding of climate change and its fundamental concepts; and knowledge about the rends of Climate Change in Himalaya. Besides, it will also introduce students to climate change induced natural disasters, climate change vulnerability assessment; and methods, techniques and approaches of climate change adaptation in Himalaya. The course includes individual assignments.

Target Student Audiences

Semester - III Students of M.A./M.Sc.

Prerequisites

Required Courses (or equivalents):

- Environmental Management
- Ecology
- Introduction to Computer Science or Information Technologies,
- Environmental Management

Aims and Objectives

This course has been designed with a view to help students in developing a comprehensive understanding and knowledge of the impacts of climate change in Himalaya and the need of evolving and implementing effective adaptation strategies. The main objectives of the course are: (i) to help students in understanding the increasing impacts of climate change on natural and socio-economic systems in Himalaya; (ii) to provide students with the state-of-art recent knowledge about the climate change induced natural disasters in Himalaya; and (iii) to appraise students about the need of developing effective climate change adaptation strategies and mainstreaming climate change adaptation in development planning.

**** Note: Kumaun University has Mark System at all Levels***

SUNRAISE Erasmus+ CBHE project Sustainable Natural Resource Use in Arctic and High Mountainous Areas

General Learning Outcomes:

By the end of the course, successful students will:

- The students would be able to understand and demonstrate the most recent and critical knowledge of climate change and climate change adaptation science
- The students would be able to reflect upon critically and to formulate judgements about the fundamental concept and science of climate change
- The students would be able to make application of the acquired knowledge in helping government agencies and rural communities in designing appropriate climate change adaptation plans
- Would be able to apply their scientific understanding for evolving policy and community oriented techniques, tools and methods for climate change vulnerability and risk assessment
- The students would be able to communicate conclusions and the underpinning rationale about the climate change vulnerability assessment techniques, tools and methods to specialist as well as to non-specialist audiences

Overview of Sessions and Teaching Methods

The course will make most of interactive and self-reflective methods of teaching and learning including mainly lectures and presentations. It will start with an overview of climate change science and global climate change trends. Subsequent sessions will combine interactive lecturing on different course components divided up into 5 Units, and individual assignments. The third part of the course is built around supervised preparation of short interdisciplinary dissertation by students.

Course Workload

The table below summarizes course workload distribution:

Activities	Learning outcomes	Assessment	Estimated workload Per Semester (hours)
In-class activities [3 Hours Lecture Per Week Per Paper]			
Lectures and Presentations	**Unit I - Elements of Climate:** The students would be able to understand and demonstrate very clearly the fundamental concept of climate change	End Semester Written Examination	09
Lectures and Presentations	**Unit II - Trends of Climate Change in Himalaya:** The students would be able to reflect upon critically the trends and spatio-temporal patterns of climate change over the Himalayan mountains	End Semester Written Examination	09
Lectures and Presentations	**Unit III - Climate Change Induced Natural Disasters:** The students would be able to formulate judgements on the interrelationships among climate change and natural disasters	End Semester Written Examination	09
Lectures and Presentations	**Unit IV - Climate Change Vulnerability and Risk**: The students would be able to apply the acquired knowledge in assessing the	End Semester Written	09

	natural and socio-economic vulnerabilities and risks associated with climate change	Examination	
Lectures and Presentations	**Unit V - Climate Change Adaptation in Himalaya:** The students would be able to demonstrate and apply their knowledge and understanding in formulating climate change adaptation and disaster risk reduction plans	End Semester Written Examination	09
Independent work [5 Hours Per Week Per Paper Self Study Including Writing Assignments]			
- Individual Assignments	Would be able to critically reflect upon their ability to interpret data, and to use the concepts, tools, and methods for communicating information and knowledge	Individual Presentations	75
Total			***120***

Grading

The students' performance will be based on the following:

- Written performance at the end Semester Written Examination 75%
- 25% based on the evaluation of 2 individual Assignments and attendance in classroom lectures

Course Schedule: Semester- III: July - December 2020

Course Assignments

The Structure of Course Assignments will be as follows:

- The Course Teacher will set 5 detailed answer Questions one each from 5 Units.
- Each of the students will have answer 2 questions of his/her choice before the commencement of the Semester End Examinations.

Literature

- P. Wester, A. Mishra, A. Mukherji, A. B. Shrestha (eds), The Hindu Kush Himalaya Assessment: Mountains, Climate Change, Sustainability and People, Springer Nature Switzerland AG, Cham. pp., 2019
- World Bank, South Asia's Hotspots Impacts of Temperature and Precipitation Changes on Living Standards, Report Preview Spring 2018, World Ban Group, Washington D.C. 2018
- S. Irudaya Rajan, R. B. Bhagat eds, Climate Change, Vulnerability and Migration, Routledge, India, 2018
- M.S.S. Rawat et al. (eds), Environment, Resources and Development of the Indian Himalaya, Transmedia Publication, Srinagar, Garhwal, Uttarakhand, India, 2018
- Tor H. Aase, Climate Change and the Future of Himalayan Farming, Oxford University Press, 2017
- Velma Grover et al.(eds), Global Change and Mountains: Consequences, Responses and Opportunities, Science Publishers, CRS Press, Taylor and Francis, USA, 2015
- E. Grohmann et al. (eds), Environmental Deterioration and Human Health: Natural and Anthropogenic Determinents, Springer, Dordrecht, 2014
- Ning, Wu; Rawat, G.S.; Joshi, S.; Ismail, M.; Sharma, E. (Eds) High-altitude rangelands and their interfaces in the Hindu Kush Himalayas. Kathmandu: ICIMOD, 2013
- Jean Palutikof et al. (eds.) Climate Adaptation Futures, Wiley Publishing Company, U.K., 2013

- C. Margottini et al. (eds), Landslide Science and Practice, Vol. 4, Springer-Verlag, Berlin, Heidelberg, Germany, 2013
- Velma Grover (ed) Impact of Climate Change on Water and Health, CRC Press, Taylor and Francis Group, 2013
- G. Rasul and M. Karki (eds) Policy Priorities for Sustainable Mountain Development, Kathmandu: International Center for Integrated Mountain Development, 2008
- Huddlestone, B., Ataman, E. and d'Ostlanl, L. F., Towards a GIS-based analysis of mountain environments and populations, FAO, Rome, 2003
- ICIMOD, Mountains of the world: ecosystem Services in a Time of global and climate change: seizing opportunities meeting challenges Framework paper prepared for the Mountain Initiative of the Government of Nepal by ICIMOD and the Government of Nepal, Ministry of Environment [https://lib.icimod.org/search?page=1&size=20&q=climate%20change]
- IPCC, Climate change: Impacts, adaptation, and vulnerability, Part A: Global and sectoral aspects, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Summary for policymakers, Cambridge University Press, Cambridge, United Kingdom and New York, USA, 2014 www.ipcc.ch › pdf › assessment-report › ar5_wgII_spm_en
- Tse-ring, K., Sharma, E., Chettri, N., Shrestha, A. (eds), Climate change vulnerability of mountain ecosystems in the eastern Himalayas. Climate change impact on vulnerability in the eastern Himalayas-synthesis report. Kathmandu: ICIMOD, 2010 [https://lib.icimod.org/search?page=1&size=20&q=climate%20change]
- M. Beniston, Environmental change in mountains and uplands. London, 2000.
- Food and Agricultural Organization, Food Security in Mountains – High time for action. Brochure of the International Mountain Day 2008. http://www.mountaineering.ie/documentbank/uploads/IMD08%20brochure.pdf
- Food and Agricultural Organization, International Year of the Mountains. Food and Agriculture Organisation of the United Nations, Rome, 2002.
- Food and Agricultural Organization, Land-water linkages in rural watersheds. Land and Water Bulletin 9. Food and Agriculture Organisation of the United Nations, Rome, 2002
- Martin J. Haigh, Headwater control: integrating land and livelihoods, paper presented at the International conference on Sustainable Development of Headwater Resources. United Nation's International University, Nairobi, Kenya, September, 2002.
- ICIMOD, Mountains of the World –Ecosystem Services in a Time of Global and Climate Change: Seizing Opportunities – Meeting Challenges. Framework paper prepared for the Mountain Initiative of the Government of Nepal by ICIMOD and the Government of Nepal, Ministry of Environment, 2010 https://lib.icimod.org/search?page=1&size=20&q=climate%20change
- ICIMOD, The Changing Himalayas: Impact of Climate Change on Water Resources and Livelihoods in the Greater Himalayas. ICIMOD, Kathmandu, Nepal, 2009
- IPCC, Climate change 2007: The scientifi c basis. Working Group I contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report. Cambridge: Cambridge University Press, 2007 www.ipcc.ch › pdf › assessment-report › ar4_wgII_spm_en
- IPCC, Climate Change: Impacts, adaptation and vulnerability. Working Group II contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report. Cambridge: Cambridge University Press, 2007 www.ipcc.ch › pdf › assessment-report › ar4_wgII_spm_en
- Messerli, B. and Ives, J. D. (eds), Mountains of the world – A global priority. A contribution to Chapter 13 of Agenda 21. New York: Parthenon, 2007