Course title: Climate lab

Course code: NRC 101	**No. of credits:** 2	**L-T-P:** 14-0-28	**Learning hours:** 42
Pre-requisite course code and title (if any):			
Department: Energy and Environment			
Course coordinator(s): Dr Kamna Sachdeva		**Course instructor(s):** Dr Kamna Sachdeva	
Contact details: kamna.sachdeva@terisas.res.in			
Course type: Core		**Course offered in:** Semester 1	

Course description

The course is intended to provide practical knowledge to the students of MSc climate science and policy related to air pollution, water pollution and combustion processes. Also under this course students will be taught to study thermodynamic graphs to understand microphysical processes of the atmosphere.

Course objectives

- The course is intended to provide practical knowledge related to air pollution, water pollution & combustion processes.
- To provide basic practical understanding related to meteorology and its relationship with climates studies

Course content

Module	Topic	L	T	P
1.	Introduction to Sample collection techniques and error calculations	4		
2.	Air **Ambient monitoring:** SPM, RSPM, SOx, NOx Data analysis and interpretation	3		10
3.	**Water and soil** Dissolved oxygen: General considerations, environmental significance of dissolved oxygen, collection of samples for determination of dissolved oxygen, methods of determination. BOD: General consideration, nature of BOD reaction, method of measurement, application of data COD: General consideration, methods of measurement, application of data in environmental science Soil: soil moisture and organic carbon determination	4		10
4.	**Combustion** Calorific value determination and fuel efficiency calculations	1		4
5.	**Thermodynamic diagrams** Introduction of concepts of thermodynamic diagrams and its application in climate studies. Determination of cloud height and extreme weather 4events	2		4
		14		**28**

Evaluation criteria

- Viva test: 50%
- Practical/project: 50%

Learning outcomes

- Able to read basic thermodynamic diagrams for few atmospheric phenomenon and extreme event
- Students will be able to relate connection between environmental pollution and climate change issues

Pedagogical approach

Materials

Required Text

1. Standard Methods for the Examination of Water and Wastewater Published by APHA 15th ed.
2. Thomas D.P. (2003) Handbook of Weather, Climate and Water: Dynamics, Climate, Physical Meteorology, Weather Systems and Measurements, John Wiley and Sons, USA.

Suggested Readings

1. For heat of combustion tables of various fuels and organic compounds on Wikipedia, see: http://en.wikipedia.org/wiki/Heat_of_combustion#Heat_of_ combustion_tables
2. Harrison T., Shallcross D. and Henshaw S. (2006) Detecting CO_2–the Hunt for Greenhouse-gas Emissions, *Chemistry Review*, 15, 27-30.
3. Marshall J. and Plumb R.A. (2001) Atmosphere, Ocean and Climate, *Elsevier*, Amsterdam.
4. Seinfeld J.H. (1986) Atmospheric Chemistry and Physics of Air Pollution, *John Wiley & Sons*.
5. Wallace and Hobbs (2006) Atmospheric Science-an Introductory Survey, Second Edition, *Academic Press Elsevier.*

Journals

1. Combustion and Flame
2. Environmental Pollution
3. Environmental Science and Technology

Additional information (if any)

Student responsibilities

The students are expected to submit assignments in time and come prepared with readings when provided.

Course Reviewers

The course is reviewed by the following experts.

1. Dr Umesh Kulshreshta, Professor, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi.
2. Dr. Minal Pathak, CEPT, Ahemdabad, Gujarat.
3. Dr. Pankaj Mehta, Faculty, Jammu University, Jammu, Jammu and Kashmir.