INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**MASTER OF TECHNOLOGY in CHEMICAL ENGINEERING**
SEMESTER	**3**
COURSE TITLE	**CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT**
COURSE CODE	**01OE9005**
COURSE CREDITS	**3**

Objective:

1 To gain the knowledge of climate change for achieving the goal of sustainable development.

Course Outcomes: After completion of this course, student will be able to:

1 Understand the connection between climate change and human activities and the physical basis of the natural greenhouse effect.

2 Discuss the policies and legislation of international and national legislative frameworks.

3 Apply sustainable development approach in industries.

4 Identify ways of achieving sustainable goals

Pre-requisite of course: To utilize knowledge of climate change for achieving the goal of sustainable development.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**Basics of climate change** Science of climate change, Global warming, Way and means, Global Carbon Cycle, Greenhouse gases & Carbon emissions, Natural and enhanced greenhouse effect, Methane & climate change, Nitrous oxide & climate change, , CFCs & climate change, Comparison of various IPCC reports, important findings of IPCC AR5, Impacts of climate change – Global and India	8

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Contents : Unit	Topics	Contact Hours
2	**Climate change mitigation, Carbon Capture and Sequestration (CCS)** GHG emission trends, Climate change mitigation policies, Mitigation technologies for transport, infrastructure, industry, waste, energy sector, Renewable and alternative energy, Green building, Carbon Capture in Industries, Modalities and Procedures, Fossil Power Generation with CCS: Development for Technology and Deployment, CO2 Properties and Geological Storage, CO2 Storage through Enhanced Hydrocarbon Recovery, Enhanced Oil Recovery (EOR), Enhanced Coal Bed Methane Recovery	14
3	**Climate Policies and legislation** International and national legislative frameworks- UNFCCC, IPCC and Kyoto protocol: Scientific and implementation bodies of Kyoto, Kyoto mechanisms- CDM, , Joint implementation and Emission Trading, Carbon markets- CERs, Environmental Economics	8
4	**Sustainable Development** Principles of Sustainable Development: Emergence of the concept of Sustainable Development, Definitions, Industrialization, Globalization and Environment, Sustainable Development Goals and International Contribution: Components of sustainability, Action plan for implementing sustainable development, , Socio-economic Sustainable Development Systems, Role of developed countries in the sustainable development of developing countries, Demographic dynamics and sustainability	10
Total Hours		**40**

Textbook :

1 Climate Change: Science, strategies & solutions, Eileen Clausen, Vicki Arryo Cochran and Debra P. Davis, Eileen Clausen, 2001

References:

1 Climate change: a multidisciplinary approach , Climate change: a multidisciplinary approach , William James Burroughs, William James Burroughs, 2007

2 Cites Carbon Capture: Sequestration and Storage (Issues in Environmental Science and Technology), Cites Carbon Capture: Sequestration and Storage (Issues in Environmental Science and Technology), R E Hester and R M Harrison, R E Hester and R M Harrison, 2009

3 Introduction to Carbon Capture and Sequestration , Introduction to Carbon Capture and Sequestration , Berend Smit, Jeffrey A Reimer, Curtis M Oldenburg and Ian C Bourg, Berend Smit, Jeffrey A Reimer, Curtis M Oldenburg and Ian C Bourg, 2014

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
30.00	30.00	20.00	20.00	0.00	0.00

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board, may also use any of tools such as collaborative learning, demonstration, role play, Quiz, brainstorming, MOOCs, Active Learning Assignments etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Viva examination will be conducted at the end of semester for evaluation of performance of students.

Supplementary Resources:

1. https://epgp.inflibnet.ac.in/
2. https://swayam.gov.in/
3. https://www.sciencedirect.com/science/article/pii/S136403212200822X
4. https://www.sciencedirect.com/science/article/abs/pii/S0959652620348770

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