ENSC-402: CLIMATE CHANGE **(03 Credit hrs)**

PRE-REQUISITE:

LEARNING OUTCOMES

At the conclusion of this course, students will be able:

- To carry out research, teaching, and consultancy in the field of climate change and adaptation.
- To discuss how a changing climate translates into impacts
- To highlight the most vulnerable regions and sectors of the climate change
- To recognize uncertainties in climate change science
- To use the current knowledge to discuss climate change adaptation and mitigation options

CONTENTS

The focus of the course is climate change impacts and the human response to climate change, including efforts to adapt to climate change, as well as efforts to achieve long term sustainability by avoiding or reducing the negative impacts of climate change

THEORY

Unit-1 Climate and Weather

1.1 Introduction to climate change
1.2 Weather forecasting and climate change
1.3 modeling of climate change
1.4 types of climate change models

Unit-2 Climate change drivers and consequences

2.1 Climate change drivers and clues
2.2 Identify the anthropogenic drivers of climate change
2.3 Analyze different climate change scenarios and their implications
2.4 Environmental and health insecurities and adaptation in the climatic zone.

Unit-3 Climate change Adaptation

3.1 Introduction to Climate Change Adaptation
3.2 Potential adaptation strategies in different sectors
3.3 Ways to measure vulnerability
3.4 Linkages between climate change adaptation and community development

Unit-4 Climate change mitigation

4.1 Carbon sequestration
4.2 Transition to carbon-neutral energy sources
4.3 Carbon and global warming
4.4 Conventional mitigation measures
4.5 Five-step methodology for preparing a low-emission climate-resilient
4.6 Geoengineering Technologies
4.7 Integrated climate change mitigation
4.8 Climate adaption and sustainable development

Unit-5 Impacts of the climate change

5.1 Impacts of climate change
5.2 Atmospheric phenomenon's
5.3 Food insecurity
5.4 Water quality

5.5 Climate Change and Wetlands, desertification, shrinkage of lakes and rivers
5.6 Agriculture
5.7 Flora and fauna, and mass extinction,
5.8 cryosphere to water

Unit-6 Climate Change Policy

6.1 Overview of planning processes for climate change
6.2 Adaption to climate change
6.3 Climate change policy and social change
6.4 International climate change negotiations,
6.5 The Role of National and Sectoral Institutions in Climate Change Planning
6.6 Protocol and agreement
6.7 Climate finance and politics

TEACHING-LEARNING STRATEGIES

- Lecture-based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is a continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments, and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes, etc.

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is a continuous assessment. It includes classroom participation, attendance, assignments, and presentation, homework, attitude and behavior, hands-on activities, short tests, quizzes, etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on a term paper, research proposal development, fieldwork, and report writing, etc.

RECOMMENDED TEXTBOOKS / SUGGESTED READINGS

1. Beer, T., Li, J., & Alverson, K. (2018). *Global Change and Future Earth: The Geoscience Perspective (Special Publications of the International Union of Geodesy and Geophysics)*. Cambridge: Cambridge University Press.

2. Klepp, S., & Chavez-Rodriguez, L. (2018). *A critical approach to climate change adaptation: Discourses, policies and practices.* Routledge.
3. Ramakrishna, A., & Gill, S. S. (2018). *Metabolic adaptations in plants during abiotic stress*. CRC Press.
4. Lipper, L., McCarthy, N., Zilberman, D., Asfaw, S., & Branca, G. (2017). *Climate smart agriculture: building resilience to climate change*. Springer Nature.
5. Ussiri, D. A., & Lal, R. (2017). *Carbon sequestration for climate change mitigation and adaptation.* Cham, Switzerland: Springer International Publishing.
6. Juha, I., Uitto, J., & Robd, V. B., (2017). *Evaluating Climate Change Action for Sustainable Development,* Springer.
7. Avery, E. H. (2017). *A Global Threat: The Emergence of Climate Change Science*, Cavendish Square Publishing L.L.C.

Assorted Research Papers / Further Reading: As suggested by the instructor.