COURSE CODE: **GIE-451**

COURSE NAME: **ELEMENTS OF WEATHER**

CREDIT HOURS:
Theory = 02
Practical = 01
Total = 03

CONTACT HOURS:
Theory = 32
Practical = 48
Total = 80

PREREQUISITES: Nil

MODE OF TEACHING:

Instruction:	Two hours of lecture per week	67%
Practical:	Three hour of Lab work per week	33%

COURSE DESCRIPTION:

This is an introductory course examining the physical properties of the atmosphere, radiation heating and cooling, precipitation, clouds, weather disturbances, climate controls, map reading, and application of the scientific method in analyses of the weather elements. Writing assignments, as appropriate to the discipline, are part of the course.

COURSE OBJECTIVES:

This course introduces the basic elements of weather patterns of world in general and Pakistan in specific. Concepts are reinforced through laboratory exercises using historical and real-time weather observations and maps.

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):

The course is designed so that students achieve following PLOs:

1	Engineering Knowledge:	☑	7	Ethics:	☐
2	Problem Analysis:	☑	8	Individual and Collaborative Team Work:	☐
3	Design/Development of Solutions:	☐	9	Communication:	☐
4	Investigation:	☐	10	Project Management:	☐
5	Tool Usage:	☐	11	Lifelong Learning:	☐
6	The Engineer and Society:	☐			

COURSE LEARNING OUTCOMES (CLOs):

Upon successful completion of the course, students will be able to:

No.	CLO	Domain	Taxonomy Level	PLO
1	Describe the composition and vertical structure	Cognitive	2	1

	of the atmosphere.			
2	Analyse weather conditions using weather maps and imagery, recognizing patterns depicted by isobars, fronts, and local weather elements	Cognitive	4	2

PRACTICAL APPLICATIONS:

This course will enable student to understand the basics of weather patterns and use of advance modern tolls to analyses and predict them.

TOPICS COVERED:

Theory:

Week	Topics
1	Introduction to Weather
2	Difference between weather and climate
3	Weather information and maps
4	Atmosphere
5-6	Atmospheric circulation
7	Air pressure
8	Humidity. Clouds, precipitation.
9	Wind. Planetary circulations.
10	Local Winds and Monsoons
11-12	El Niño / Southern Oscillation Events
13	Humidity. Clouds, precipitation.
14	Climate Change/Global Warming
15	Aerosols Remote Sensing
16	Satellite Applications: Weather Forecasting
17-18	**ESE**

Practicals:

No.	Topics
1	Principles of remote sensing techniques
2	Interpretations if different meteorological satellites imagers
3	Meteorological applications of remote sensing from satellites
4	Weather satellite data downloading
5	Weather satellite data pre-processing
6	Weather satellite data analysis
7	Filed visit to meteorological department
8	Meteorological applications of remote sensing from satellites
9	Image analysis for weather forecasting
10	Microwave remote sensing for weather forecasting
11	Project Presentations

TEXT AND MATERIAL:

Textbook (s):

a. A World of Weather: Fundamentals of Meteorology by Nese Jon M and Grenci Lee M in 2011. ISBN-13: 978-0757594267

References Material:

a. Tsay, S. 2006. Remote sensing of the atmosphere and clouds. (1st edition). Bellingham, WA: SPIE.

b. Dobesch, H., P. Dumolard& I. Dyras 2007. Spatial interpolation for climate data. (1st edition). London: ISTE.

c. Gebremichael, M. & F. Hossain 2010. Satellite rainfall applications for surface hydrology. (1st edition). Dordrecht: Springer.

ASSESMENT SYSTEM:

1. **CLOs Assessment**

Cognitive	**Psychomotor**	**Affective**
Spreadsheet	-	-

2. **Relative Grading**

Theoretical / Instruction			67%
	Assignments 10%		
	Quizzes 10%		
	Mid Semester Exam 30%		
	End Semester Exam 50%		
Practical Work			33%
Laboratory Work		*70%*	
	Laboratory Attendance 20%		
	Laboratory Report 20%		
	Laboratory Quiz 30%		
Viva/Quiz		*30%*	
Total			**100%**