

HWRM-103 HYDROMETEOROLOGY (THEORY)

(02 Credit hrs)

PRE-REQUISITE: F.Sc or Equivalent

LEARNING OUTCOMES:

- This course will provide an introduction to the hydrometeorology to the students.
- The students will learn about the Air masses, Air fronts and the associated weathers.
- They will have the knowledge about different thermal and moist process in atmosphere.
- The students will get learn about formation and types of clouds and associated precipitations.
- They will become conversant with meteorological observations and instruments used.
- Student will be able to perform different analysis on the hydrometeorological data sets.

CONTENTS

This course provides an introduction to the hydrometeorology, weather, climate, precipitation, air masses and fronts, atmospheric stability and clouds, atmospheric process and circulation.

THEORY

Unit-I: Introduction

- 1.1 Basics of hydrometeorology
- 1.2 Applications of hydrometeorology
- 1.3 Local and global aspects of meteorology
- 1.4 Climate and weather. Seasons,
- 1.5 Structure of Earth's atmosphere
- 1.6 Energy and energy balance

Unit-II: Air Masses and Fronts

- 2.1. Air masses and its types
- 2.2. Atmospheric motion
- 2.3. Fronts, cold front, warm front, stationary fronts and associated weather systems

Unit-III: Atmospheric Process

- 3.1. Thermal processes
- 3.2. Adiabatic and nonadiabatic processes
- 3.3. Laps rates
- 3.4. Moist processes
- 3.5.** Condensation, air mass lifting, latent heat

Unit-IV: Clouds

- 4.1. Atmospheric stability and cloud formation.
- 4.2. Types and properties of clouds and associated weather

Unit-V: Observations:

- 5.1. Instruments for hydro meteorological data observation.
- 5.2. Hydro-meteorological network design and planning.
- 5.3. Climatological data measurements and accuracy.

Unit-VI: Precipitation analysis

- 6.1. Probable maximum precipitation
- 6.2. Depth-area-duration analysis
- 6.3. Intensity duration frequency analysis
- 6.4. Antecedent precipitation index

Unit-VII: Atmospheric Circulation Systems

- 7.1. Scales of Atmospheric Motion
- 7.2. Global Scale Circulation
- 7.3. Cyclones and Anticyclones
- 7.4. Monsoon Circulation, Small Scale Circulations

TEACHING – LEARNING STRATEGIES

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

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is 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 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 term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Shonk, J. (2013) *Introducing Meteorology: A Guide to the Weather (Introducing Earth and Environmental Sciences)* Dunedin Academic Press ISBN-13: 978-1780460024
2. Lackmann, G. (2012) *Multitude Synoptic Meteorology: Dynamics, Analysis, and Forecasting* American Meteorological Society ISBN-13: 978-1878220103
3. Ahrens, C, D. (2008) *Meteorology Today: An Introduction to Weather, Climate, and the Environment, 9th Edition* Cengage Learning ISBN-13: 978-0495555735
4. Ahrens, C, D. and Henson, R. (2017) *Essentials of Meteorology: An Invitation to the Atmosphere (Mind Tap Course List) 8th Edition* Cengage Learning ISBN-13: 978-1305628458
5. [Ackerman, S, A.](#) and [Knox, J, A.](#) (2013) *Meteorology: Understanding the Atmosphere 4th Edition* Jones & Bartlett Learning ISBN-13: 978-1284030808
6. Ahrens, C, D. (2014) *Essentials of Meteorology: An Invitation to the Atmosphere 7th Edition* Cengage Learning ISBN-13: 978-1285462363

HWRM-103 HYDROMETEOROLOGY (LAB)

(01 Credit hr)

PRE-REQUISITE: HYD-103 Introduction to Hydrology

LEARNING OUTCOMES:

- This course will provide practical aspects of hydrometeorology.
- The students will learn about the weather observatories and the equipment.
- They will have the knowledge about the measurement of atmospheric temperature and soil temperature.
- The students will get knowledge about the measure of other hydro climatological variables like precipitation, evaporation, wind speed etc.
- They will become conversant with estimation of evapotranspiration.

CONTENTS

This course provides an introduction to the practical measurements, calculations, and evaluation of meteorological phenomena in hydrology.

PRACTICAL

Unit-I: Introduction to Weather Observatory

- 1.1 Weather Instruments
- 1.2 Handling of meteorological instruments and weather data recording
- 1.3 Site selection, and considerations and precautions for weather observations

Unit-II: Weather Data:

- 2.1. Processing and tabulation of weather data
- 2.2. Presentation of weather data
- 2.3. Analysis of temperature and precipitation data

Unit III: Measurement of Temperature:

- 3.1. Measurement of maximum and minimum temperature
- 3.2. Measurement of soil temperature
- 3.3. Measurement of dew point temperature
- 3.4. Dry bulb and wet bulb thermometers

Unit-IV: Measurement of Precipitation:

- 4.1. Measurement of Precipitation
- 4.2. Recording and non-recording gauge
- 4.3. Measurement of snow

Unit-V: Estimation of Evaporation and Evapotranspiration

- 5.1. Measurement of wind direction and speed
- 5.2. Measurement and determination of evaporation
- 5.3. Measurement of transpiration
- 5.4. Solar radiation, estimation of evapotranspiration using different techniques.

TEACHING – LEARNING STRATEGIES

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

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

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

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
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