

BSE 11022
Hydrology and Meteorology

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Course Code	BSE 11022
Title	Hydrology and Meteorology
Pre-requisite	
Co-requisite	
Status	

Learning Outcome

On completion of the course, students should be able to;

- Describe hydrological cycle and its processes
- Measure, estimate and analyse the hydrologic cycle parameters
- Estimate runoff and explain the effect of land use on rainfall-runoff relationships
- Differentiate weather, climate and microclimate

- Explain the importance of weather forecasting in agriculture
- Explain the basis for climatic and agro-climatic zones in Sri Lanka.

Course content:

- Hydrologic cycle and its components,
- Measurements of Hydrologic cycle components:
 - Precipitation, Evapo-transpiration, Infiltration, Runoff
- Types and forms of precipitation.
- Storms, occurrence, variation and measurement of rainfall. Rain gauges,
- Computation and analyses of data. Plotting of mass curve and rainfall, intensity curve.

- Run-off- Definition, types, factors affecting, estimation and measurement of runoff,
- Runoff analysis,
- Weather, climate and micro-climate,
- Elements of weather and climate, Earths' atmosphere: Composition and structure, Formation and classification of clouds,

- Weather forecasting for agriculture,
- Introduction to monsoons,
- rainfall seasons,
- Climate Zones, Agro-Climatic Zones in Sri Lanka.
- Field visit

- Practical sessions on
 - ??????
 - ??????

Method of Teaching and Learning:

- A combination of lectures, practical sessions including field studies, computer based learning, assignments and small group discussions.

Assessment:

- In-course assessment and end of semester examination.

Recommended reading:

- Das M.M. & M.D. Saikia (2009). Hydrology. PHI Learning Pvt. Ltd., India.
- Lakshmi, V. (2001). Land surface Hydrology, Meteorology, and Climate: Observations and Modeling. John Wiley & Sons.
- Karamouz, M. (2012). Hydrology and Hydroclimatology: Principles and Applications. CRC press.
- Suresh, R. (2008). Watershed Hydrology. 2nd Edition. Standard Publishers Distributors, Delhi, India.

- End semester exam : 70
- Continuous evaluation : 30
- Attendance – 80% (Compulsory)

- Earth

- Solid - Geosphere : Geology, Geomorphology, Mineralogy, Seismology

- Liquid – hydrosphere : Hydrology

- Gases – Atmosphere : Meteorology

- Hydrology + Meteorology = Hydrometeorology

- Hydrology
 - deals with occurrence, circulation and distribution of water in the earth, their physical and chemical properties and their reaction with the environment
 - main concern is - quantities and time distribution of water passing through the various phases

Phases –

- Atmosphere – water vapor and clouds
- Earth surface – snow, ice, dew, mist, water in streams, lakes and oceans
- Below surface – soil moisture and groundwater

- Hydrology of a region affected by
 - Weather pattern
 - physical factors related to topography, geology, vegetation
 - Human activities (urbanization etc)

Climate and Weather

- Climate ?
 - largely dependent on geographical position on the earth's surface
 - deals with long term conditions
 - Important Climatic Factors: ?
 - precipitation and its mode of occurrence, humidity, temperature and wind, all of which directly affect evaporation and transpiration
 - Weather ?
 - Day to day variation of the climatic factors

Importance of meteorology and hydrology

- Estimation of water resources
- Study the processes such as precipitation, runoff, evaporation and their interactions
- Study problems such as floods and droughts and strategies to combat them
- weather forecasting
- preparation of cropping calendar
- determination of suitable cropping system

- irrigation designing
- construction of dam, culverts, reservoirs
- designing soil conservation practices

Hydrologic Cycle

- natural circulation of water from the oceans and land surface to the air, air to land, and back to the ocean
- driving force - radiant energy of the sun

Water in the earth

Source	Volume (10^6 km^3)	%	Exchange Rate (Year)
Ocean	1338.0	96.5	3000
Groundwater (fresh and saline)	23.4	1.69	5000
Ice sheets, glaciers	24.4	1.72	8000
Surface water	0.19	0.014	7
Soil moisture	0.0165	0.0012	1
Rivers	0.00212	0.0002	0.031
Atmospheric vapor	0.00129	0.001	0.027 (10 days)

Basic Hydrological Cycle Components

- Draw the hydrological cycle on the board – interactive exercise
 - Step 1: Students will draw the cycle on a paper
 - Step 2: Students will draw the cycle on the board adding different components from each ones diagrams