

STUDY TOPICS FOR HYDROLOGY MIDTERM

Water stores and pathways on Earth, range of space and time scales, basic physical quantities and laws, basic properties of water

Major water types: Atmospheric water, surface water, groundwater, soil water

Where most of the world's water is bound up

The Hydrological Cycle and its "issues"

Drainage basin hydrological processes: Precipitation, Evaporation, Transpiration, Evapotranspiration, Interception, Infiltration, Percolation & Groundwater Recharge, Runoff and Overland Flow, Interflow/Soil Water Flow, Groundwater Flow

The concept of the Water Balance (or water budget), usage of water budgets via measurement and modeling

The Importance of Hydrology to Society

Global Hydrology and the atmosphere

Laws of radiant energy exchange

Atmospheric structure and dynamics

Environmental lapse rate

Global energy budget

Latitudinal energy transfers

General circulation, teleconnections

Types of precipitation: convective, orographic, cyclonic, frontal

Pressure gradient force, Coriolis effect, friction, pressure and wind belts

Global hydrologic cycle

Artificial precipitation/cloud seeding

Measuring precipitation: precipitation type, depth, intensity, duration, return period/recurrence interval

Calculating frequency of events or the return period/recurrence interval

Non-recording vs. recording gages

Point measurements, sampling issues, effects of surroundings

Areal precipitation, arithmetic mean, Thiessen polygons, isohyetal method

Doppler radar as an alternative; calibration/validation

Molecular nature of Evaporation, latent heat of vaporization and condensation

Importance of condensation nuclei

Collision coalescence vs. Bergeron effect

Dew point temperature, relative humidity, elevation that clouds form, the "mountain problem"

Actual evapotranspiration vs. potential evapotranspiration

Dry adiabatic lapse rate vs. saturated (or wet/moist) adiabatic lapse rate

Drivers of evaporation rates

The mechanism of transpiration

Measurement of evaporation and evapotranspiration, pan evaporation vs. lake evaporation, lysimeters, water budget approach

Spatial variation in evaporation rates

Wilting point and Field capacity

Estimating evaporation rates through equations based on other variables: Thornthwaite, Blaney-Criddle, Penman-Monteith

Vapor pressure vs. saturation vapor pressure, relationship of saturation vapor pressure with temperature, relationship between evaporation/condensation/vapor pressure vs. saturation vapor pressure

Condensation and the concept of "saturation" (what is actually happening at the molecular level)