



ENGINEERING HYDROLOGY

PROF. SREEJA PEKKAT

Department of Civil Engineering
IIT Guwahati

TYPE OF COURSE : New | Core | UG

COURSE DURATION : 12 Weeks (24 Jan' 22 - 15 Apr' 22)

EXAM DATE : April 24, 2022

INTENDED AUDIENCE : Undergraduate students in Civil Engineering

INDUSTRIES APPLICABLE TO : Basic civil engineering infrastructural companies.

COURSE OUTLINE :

This course on engineering hydrology aims to impart knowledge on the processes that secure the most valuable natural resource: WATER. It deals with the complex interaction and pathways of water connecting atmosphere, lithosphere and hydrosphere. This course will give an idea on how the hydrological science is mathematically quantified for engineering applications to manage water resources. The knowledge acquired in this course will be pre-requisite for different advanced level courses in post-graduate. The course starts with the explanation of hydrological processes related to atmosphere, surface and subsurface regime. This is followed by the explanation on hydrological analysis, which is mandatory for the design of hydraulic structures. The course ends with basic discussion on hydrological statistics important for dealing significant amount of data and its uncertainties, which forms the backbone of hydrological analysis.

ABOUT INSTRUCTOR :

Prof. Sreeja Pekkat is an Associate Professor in the Water Resources Planning and Management Division, Department of Civil Engineering, Indian Institute of Technology Guwahati. Since then she has taught the course on Engineering Hydrology multiple times till date. She received her Ph.D. degree from IIT Bombay. Her research interests include Urban Flood Modeling, Infiltration and Artificial Recharge, Climate Change, Transient Flow Analysis and River Mechanics. She has published around 30 peer reviewed journals and several conference/seminar proceedings. She was a recipient of the Prof. R. J. Garde Research Award-2017 by the Indian Society for Hydraulics (ISH) for outstanding research in the field of Water Resources. She is a member of ASCE and Indian Society for Hydraulics. She is a reviewer for several national and international journals.

COURSE PLAN :

Week1: Course contents, Hydrologic cycle, Global water budget, Catchment, System concept, Reynolds transport theorem, Conservation laws

Week 2: Atmospheric water, Water vapor dynamics, Precipitable water, Precipitation, Types of precipitation

Week 3: Terminal velocity, Thunder storm cell model, Forms of precipitation, Measurement of Rainfall, Rain gauge network, Representation and analysis of rainfall, Average rainfall

Week 4: Evaporation, Measurement and estimation, Evapotranspiration, estimation and measurement

Week 5: Subsurface water, Unsaturated flow, Infiltration, Measurement of infiltration, Estimation of abstractions

Week 6: Surface water, Catchment storage concept, Runoff generation and factors affecting runoff, Measurement streamflow, Rainfall-Runoff relationships, Streamflow hydrograph and Direct runoff hydrograph

Week 7: Hydrograph analysis, Response functions of linear systems, Unit hydrograph theory

Week 8: S hydrograph, Instantaneous unit hydrograph, Synthetic unit hydrograph

Week 9: Flood routing, Reservoir routing, Channel routing

Week10: Probabilistic and statistical methods for of hydrologic data, Fitting probability distribution

Week 11: Probability distributions for hydrologic variables, Frequency analysis, Extreme value distributions

Week 12: Estimation of design floods, Frequency Analysis