Hydrology

Course # EAES 3266

Credits 6

Pre-requisites and Co-requisites: None

Course Description

This course on physical and 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 the atmosphere, lithosphere and hydrosphere. This course will give an idea on how 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 an 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 with significant amounts of data and its uncertainties, which forms the backbone of hydrological analysis

Course Learning Outcomes

Upon completion of the course students will be able to:

- Undertake hydrological investigations of natural and urban catchments.
- Estimate floods for engineering design and planning.
- Conceptually design and estimate flows of a minor drainage network.
- Apply a range of common techniques, such as flood frequency analysis, probabilistic rational, regional methods to estimate design peak flows in rural areas.
- Apply runoff-routing methods, rainfall hyetograph estimation, and model calibration and prediction to estimate flood hydrographs.
- Compare and evaluate (e.g. how they work, what their limitations are) a number of methods for determining peak flows and flood hydrographs for urban and rural areas, including flood frequency analysis, the probabilistic and deterministic rational methods, the regional method and runoff routing methods.
- Solve an engineering design problem in the context of the conceptual design of a small urban drainage system by applying the deterministic rational method to estimate peaks flow in urban areas and comparing various urban drainage design options.
- Define and comprehend key concepts related to drought risk assessment, including the use of stochastic models, such as the lag-one autoregressive model, and yield estimation methods for water supply systems, including water storage behavior analysis.

- Apply and evaluate stochastic modelling techniques and water storage behavior analysis to estimate the yield of a small rural water supply system.
- Produce technical reports developed by teams at the standard required by the engineering profession.

Course Assignments and Grading

Item	**Weight**
Class performance & activities	5%
Lab assignments	5%
Data collection, analysis & reports	15%
Short field work & report	5%
Mid-term exam	20%
Group project & presentation	15%
Workshop Quiz & paper	10%
Final exam	25%