FEB 745: SURFACE HYDROLOGY (60 HOURS)

COURSE OUTLINE

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Introduction

Hydrology is an earth science studying the circulation and distribution of global water and encompassing elements of other disciplines, such as geology and geophysics, meteorology and climatology, ecology and engineering.

Hydrological Engineers play a key role in integrated water resources assessment and management.

This course has been designed to present the principles of advanced hydrology at a postgraduate level. The course will enable the students to understand, describe and quantify the physical and bio-geochemical processes of the hydrological cycle so that they can better plan, manage and engineer natural water resources.

Topics covered will include hydrological cycle and the water budget, flood and drought frequency analysis and stream flow use of mathematical programming, simulation and empirical modelling, stochasitic and deterministic hydrology and hydrometry, Field exercise on site investigation, design, construction and maintenance of an earth dam.

Contents

- Hydrologic cycle, systems concept, Atmospheric hydrology; Hydrologic processes, precipitation, evaporation, surface flow, sub-surface flow,; hydrologic model classification;
- Hydrologic statistics, statistical parameters, fitting a probability distribution, testing goodness of fit, frequency analysis, and reliability analysis
- Unit hydrograph, various response functions and their interrelationships
- Reynold's Transport Theorem, continuity equation, momentum equation, and energy equation;
- Dam investigation, design, construction and maintenance

Mode of Delivery

Lectures and tutorials will be supplemented by problem solving assignments and field investigation of earth dam and design.

Examination and assignments

Final Examination	70 Marks
Class presentations and assignments	20 Marks
CAT	10 Marks

Week	Topic	Hours	Mode of delivery
1	Hydrologic cycle, water budget	2	Lecture and class exercises
2	Mathematical models of watershed hydrology	2	E learning platform
3	Unit hydrograph, Derivation of the S Curve	2	Class exercises
4	Stochastic hydrology: Random Variables, fitting a probability distribution, testing goodness of fit, flood frequency analysis	2	Class exercises
5	Stochastic hydrology: Random Variables, fitting a probability distribution, testing goodness of fit, flood frequency analysis	2	Student exercises
6	Data generation	2	Exercises
7	Stochastic and empirical models	2	Lectures
8	Student presentations on stochastic hydrology, Nzoia Case Study	2	Class
9	Reynold's Transport Theorem, continuity equation, momentum equation, and energy equation	2	Lectures
10	Classification of dams, site investigation of dams	6	Field work CAT and exercises
11	Field work on dam investigation and design		
12	Presentation of dam work		
13	Examination	2	Classroom

References