River Basin Modeling

Course Code	Credit Hours
CE-832	3+0

Course Description

To discuss the multi-purpose nature of river basins and approaches for their integrated planning and management. The students will be enabled to use various surface and groundwater models for simulating hydrological processes at basin level.

Textbook:

1 Maidment, D. R. (Editor in Chief) (1993). Handbook of Hydrology, McGraw-Hill, Inc.

2 Chow, V. T., Maidment, D. R. and L. W. Mays (1988). Applied Hydrology, McGraw-Hill Book Company.

3 Shaw, E. M. (1994). Hydrology in Practice, Third Edition, Chapman & Hall.

4 Box, G.E.P. and Jenkins, G. (1991). Time Series Analysis, Forecasting and Control, Holden Day, San Francisco, U.S.A.

Reference Book:

1 DHI (1993, 1994). MIKE - 11, and MIKE - 21, Reference Manuals, Danish Hydraulic Institute, Horsholm, Denmark.

2 ESCAP (1991). Manual and Guidelines for Comprehensive Flood Loss, Prevention and Management, United Nations, No. ST/ESCAP/933, Bangkok, Thailand.

3 Lin, H.K., Gupta, V.P., and Sorooshian, S. (1995). Artificial Neural Network Modeling of the Rainfall- Runoff Process, Water Resources Research, Vol. 31, PP. 2517 – 2530.

Prerequisites. Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Terms	30%
End Semester Exam	50%

Teaching Plan

Week No	Topics	Learning Outcomes
1-3	Concepts of Sustainability. Sustainability indicators, resources depletion, growth models, Planetary System Boundaries, footprints, prosperity Globalization, inter-connected world. River basin ecosystem monitoring. Implementation of survey techniques on wetlands and the recognition of environmental flow management	Understand and explain the multi-purpose nature of river basins and approaches for their integrated planning and management.
4-5	Strategic catchment planning – identification of pressures, management priorities, and stakeholders to develop integrated solutions.	Explain the linkages between major environmental water management problems, including water supply, flood risk, water quality, habitat conservation and restoration
6-7	Stakeholders in sustainability, Natural Water Resources. Anthropocene, Climate change, climate variability, Hydrological cycle, water balance, catchment terminology, River basin management, Water availability, surplus.	Analyze and interpret geospatial and temporal data, drawing justifiable conclusions in the context of integrated catchment management.
8	Water scarcity, water crisis, Stream morphology and land use.	
9	**Mid Semester Exam**	
10-11	River basin ecosystem conservation and management: policy context, role in integrated river basin management.	Understand the data, parameters, and scale requirements for modeling large river basin systems (surface water and groundwater systems), identifying social-ecological sustainability parameters.
12-13	geospatial valuation tools, adaptive river basin management plan, built on a hierarchy	

	of values, which identifies the management objectives, key stakeholders and response indicators.	
14-15	River basin ecosystem monitoring This includes the implementation of survey techniques on wetlands and the recognition of environmental flow management	Identify catchment-based solutions and devise an integrated river basin management plan based on existing data and documentation.
16	Strategic catchment planning – identification of pressures, management priorities, and stakeholders to develop integrated solutions.	
17-18	**End Semester Exam**	