

WATERSHED MANAGEMENT

Code CE-888	Credit Hours 3-0
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Course Description

The primary objective of this course is to develop an understanding of the processes and fluxes of mass and energy within a watershed and how land use changes potentially affect these processes. To learn how science-based management principles may be applied to watershed systems.

Text Book:

1. Timothy Ward (Ed.), *Watershed Management: Planning for the 21st Century*: San Antonio, Texas August 14-16, 1995: Proceedings of the Symposium Sponsored by the Watershed Management Committee, ASCE, 1995
2. Thomas E. Davenport et al, *The Watershed Project Management Guide*, CRC Press, 2002
3. Raj Vir Singh, *Watershed Planning and Management*, Yash Publishing House, Bikaner, India

Reference Book:

1. R. Lal (Ed.), *Integrated Watershed Management in the Global Ecosystem*, CRC Press, 1999
2. Paul A. DeBarry, *Watershed Management: Processes, Assessment and Planning*, John Wiley & Sons, 2004
3. James Westervelt, *Simulation Modeling for Watershed Management*, Springer Verlag, 2001
4. J. V. S. Murty, *Watershed Management (2nd Edition)*, New Age International Pub. (P) Ltd.
5. John Lyon, *GIS for Water Resources and Watershed Management*, Taylor & Francis, 2003
6. E. M. Tideman, *Watershed Management: Guidelines for Indian Conditions*, Omega Scientific Publishers
7. Michael A. Ports & David Renetzky (Ed.), *Watershed Management*, ASCE, 2004
8. Vijay P. Singh, *Hydrologic Systems: Watershed Modeling*, Prentice Hall, 1989

Prerequisites

Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Terms	30%
ESE	50%

Teaching Plan

Week No	Topics	Learning Outcomes
1	Introduction	Introduction to Watershed Management:- What is a watershed? Why manage on a watershed basis? Watershed delineation
2-3	Watershed Hydrology	The Hydrologic Cycle, Water Balance Climate and precipitation Soils and infiltration Interception and evapotranspiration Groundwater Streamflow and runoff
4	Water chemistry	Aquatic ecosystems (eutrophication, habitat disturbance, etc.), Social and economic systems
5	Issues in Water Resources	Point source pollution, Agricultural non-point source pollution, Erosion, Urban non-point source pollution, Water scarcity, Flooding, Drinking water protection, Wastewater treatment and septic systems
6-8	Watershed Assessment and Tools	Introduction to Watershed Assessments & Tools Predicting Hydrologic, Hydraulic, Water quality, & Sediment Transport Response Using a Modeling Approach
9	MID TERM EXAM	
10-12	Mechanics and Meanings of Geographic Information Systems	Introduction to Remote Sensing Reading Contour Maps and Their Applications for Watershed Management, Managing Watershed with Information Technology/ GIS/ Modeling Techniques
13-14	Soil Erosion and Sedimentation	Soil, Runoff, and Agricultural Non Point Source Pollution Soil Erosion and Sediment Control Techniques Overview Survey Techniques
15-17	Legal and Institutional Tools	Clean Water Act, Pakistan government agencies, Drain Code, Land use planning and zoning, Watershed organizations Watershed Management Plans Lessons Learned in Watershed Management, Restoration techniques, Stakeholders, Outreach and education
18	End Semester Exams	