

Course Code	Course Title	Credit Hours
ENE-805	Water Resources and Management	3 (3+0)

### Course Description

The course will introduce the process of planning, developing, and managing water resources, in terms of both water quantity and quality, across all water uses. It includes the institutions, infrastructure, incentives, and information systems that support and guide water management.

### Course Outline

**Water resources, its importance & distribution:** Covers the significance of water resources, global and regional distribution, and the essential role water plays in ecosystems, agriculture, and human activities.

**Hydrological Processes, Concepts of a Water Shed:** Introduces key hydrological processes like precipitation, infiltration, and runoff, along with watershed concepts and their importance in managing water resources.

**Components of Hydrologic Cycle Probability:** Explores the hydrologic cycle's components—precipitation, evaporation, and transpiration—emphasizing probabilistic methods to predict hydrological events and water availability.

**Groundwater Resources & its management:** Teaches groundwater flow dynamics, exploration methods, and sustainable management techniques to ensure long-term availability and quality of groundwater resources.

**Surface and groundwater resources of Pakistan:** Discusses the distribution, usage, and challenges of managing Pakistan's surface and groundwater resources, focusing on regional water supply and demand issues.

**Irrigation and drainage system of Pakistan:** Explores Pakistan's irrigation and drainage systems, covering their design, function, and role in supporting the country's agricultural productivity.

**Resource management problems and solutions:** Examines issues in water resource management, with a focus on SCARPS and tube wells, including their roles, challenges, and proposed solutions.

**Sustainable Management of water resources, Water conservation:** Covers strategies for the sustainable management of water resources, emphasizing conservation practices, efficient use, and technologies to reduce water waste.

**Pakistan Water Sector Policy:** Analyzes Pakistan's water sector policies, including frameworks for water resource management, regulatory measures, and future policy directions for sustainability.

### **Recommended Books**

1. Hydrology for Engineers, Geologists & Env. Professionals by S.E. Serrano (2<sup>nd</sup> Edition 2010)
2. Water Resource Planning and Management by Jery R. Stedinger (2017)
3. Water Resources Management: Principles, Methods, and Tools by Neil Grigg (2022)