**Course Name:**
Water Resource Systems Analysis 1

**Course Number:**
20647

**Credit:**
3

**Course Content (outline):**

- Concepts and Principles of Water Resources Management, Water resources systems planning and analysis, The role of operational research
- Linear Programming (LP)
  - Introduction
  - Formulating linear programming models
  - Graphical solution
  - The Simplex method
  - Sensitivity analysis
  - The concept of duality
  - Linearization methods and its application in water resource issues (Design and operation of dam, water quality management), Familiarity with GAMS, LINGO, … softwares.
- Nonlinear planning
  - Concepts and introduction to solving methods
- Dynamic Planning (DP)
  - Concepts and definitions
  - Formulating Dynamic Planning models
  - Optimal Principle
  - Dynamic programming with multiple state variables and its application in water resource issues (water allocation between several consumers, increasing capacity, exploitation of dam reservoir)
  - Simulation (Traditional design and analysis methods for dam)
  - Formulation of simulation models and their application in the design and analysis of single-purpose and multi-purpose reservoirs (water supply, dam control, Hydroelectric power production, ...)
- River Basin Modeling
- Specific models for optimization and simulation of dam reservoir
- Project

**References:**

• “Handouts and Journal Papers"