

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:

- “Operations Research, Principles and Practices”, A. Ravindran et al., John Wiley and Sons.
- “Water Resource Systems Planning and Analysis”, D.P Loucks et al., Prentice-Hall Inc., 1981.

- “Water Resources Systems Planning and Management: An Introduction to Methods, Models and Applications (with contributions from Jery R. Stedinger and Jozef P.M. Dijkma)”, D.P Loucks & E. van Beek, UNESCO Publishing, 2006.
- “Managing Water Resources: Methods and Tools for a Systems Approach”, S.P. Simonovic, UNESCO Publishing, 2009.
- “Hydrosystems Engineering and Management”, L.W. Mays & Y.K. Tung, McGraw-Hill, Inc., 1992.
- “Handouts and Journal Papers”