

1.	Title of the course	Water Resources Planning and Management
2.	Course number	CE513L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To CE5025/7
6.	To be offered by	Department of Civil and Environmental Engineering
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	<p>Course Objective(s): This course will provide the student an introduction to the planning, design, and operation of water resources systems using mathematical optimization methods and models. The student will learn to apply basic economic analysis (engineering economic and microeconomic analysis) and operations research techniques (linear and nonlinear dynamic programming) and will apply them to various water resource allocation problems.</p>	
10.	<p>Course Content: Introduction: history of water resources development, water resources of India, problems and perspectives, conceptual framework. Economics of Water resources planning: cost-benefit analysis of water resources projects and water allocation. Uncertainty concepts in Water Resources Planning: methods for uncertainty analysis and applications. Systems Analysis: systems concepts, conventional and evolutionary optimization techniques, interfacing optimizers with process simulators for design and management applications, applications to water resources planning and management problems. Flood mitigation and management: structural and nonstructural measures, optimal flood mitigation plan, flood damage estimation. Optimal planning and operation of reservoirs, planning, decision support systems, sustainable development of water resources.</p>	
11.	<p>Textbook(s):</p> <ol style="list-style-type: none"> 1. Loucks D P, van Beek E, <i>Water Resources Systems Planning and Management: An Introduction to Methods, Models and Applications</i>, UNESCO (2005). 2. Vedula S, Mujumdar P P, <i>Water Resources Systems: Modelling Techniques and Analysis</i>, Tata McGraw Hill (2007). 	
12.	<p>Reference(s):</p> <ol style="list-style-type: none"> 1. Jain S K, and Singh V P, <i>Water Resources Systems Planning and Management, Developments in Water Science</i>, Elsevier Science (2003). 2. Neil G S, <i>Water Resources Planning</i>, McGraw Hill (1985). 3. Raju K S, Kumar D N, <i>Multicriterion Analysis in Engineering and Management</i>, Prentice-Hall (2014). 	