

## CE 528 Water Resources Systems Analysis

<b>Credit and Contact hours</b>	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)												
<b>Required, or Elective</b>	Required												
<b>Course Description</b>	Introduction to system engineering optimization by calculus, linear and nonlinear programming, dynamic programming, simulated annealing, chance constraints modeling, and decision analysis. Applications for water resources problems.												
<b>Prerequisites or Co-requisites</b>	None												
<b>Course Learning Outcomes</b>	<p>Students completing this course successfully will be able to:</p> <table> <thead> <tr> <th>Course Learning Outcomes (CLOs)</th><th>Related Student Outcomes (SO)</th></tr> </thead> <tbody> <tr> <td><b>CLO1.</b> Recognize and explain the main concepts of water resources systems. K1</td><td><b>SO1</b></td></tr> <tr> <td><b>CLO2.</b> Determine appropriate methods and techniques for analyzing water resources systems problems. S1</td><td><b>SO2</b></td></tr> <tr> <td><b>CLO3.</b> Criticize and discuss scientific research papers and different methodologies related to water resources systems issues. S3</td><td><b>SO4</b></td></tr> <tr> <td><b>CLO4.</b> Demonstrate professional engineering and ethical values in assigned projects, assignments, and research work with high academic integrity. V1</td><td><b>SO6</b></td></tr> <tr> <td><b>CLO5.</b> Effectively manage work plans and assigned tasks in individual coursework and assignments, group projects, and research work. V2</td><td><b>SO7</b></td></tr> </tbody> </table>	Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)	<b>CLO1.</b> Recognize and explain the main concepts of water resources systems. K1	<b>SO1</b>	<b>CLO2.</b> Determine appropriate methods and techniques for analyzing water resources systems problems. S1	<b>SO2</b>	<b>CLO3.</b> Criticize and discuss scientific research papers and different methodologies related to water resources systems issues. S3	<b>SO4</b>	<b>CLO4.</b> Demonstrate professional engineering and ethical values in assigned projects, assignments, and research work with high academic integrity. V1	<b>SO6</b>	<b>CLO5.</b> Effectively manage work plans and assigned tasks in individual coursework and assignments, group projects, and research work. V2	<b>SO7</b>
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<b>Student Outcomes related to this Course</b>	<p>SO 1 Recognize advanced engineering knowledge, concepts, and techniques to identify, interpret, and analyze complex and real-life engineering problems.</p> <p>SO 2 Provide solutions for complex and real-life engineering problems through critical thinking and the use of modern engineering tools, and identify their impact on social, global, cultural, environmental, safety, and economic factors.</p> <p>SO 4 Criticize and discuss scientific research reports /papers related to Civil Engineering issues with a high level of ethics proficiency and communication skills, independently, or as a teamwork.</p> <p>SO 6 Demonstrate scientific integrity, ethical responsibility, and academic values in scientific publications, research projects, and thesis work.</p> <p>SO 7 Effectively manage, individually or in groups, specialized tasks and activities in coursework, projects, assignments, and research work with a high level of autonomy and responsibility.</p>												

<b>Topics Covered</b>	<b>List of Topics</b>		<b>Related CLOs</b>
	1. Introduction to water resources systems analysis.		<b>CLO 1,2,3</b>
	2. Water Distribution Operation Modeling.		<b>CLO 1,5</b>
	3. Storm Sewer Design Modeling.		<b>CLO 3,4</b>
	4. Water Reuse Planning Models.		<b>CLO 1,2,4</b>
	5. Reservoir Operation Modeling.		<b>CLO 1</b>
	6. Regional Water Supply Planning Models.		<b>CLO 1,2</b>
	7. Case study: Saudi Arabia, and project presentation.		<b>CLO 3,4,5</b>
<b>Textbook(s) and Other Required Material</b>	<ul style="list-style-type: none"> <li>• Dependent</li> <li>• Students</li> </ul>		
<b>Grading System</b>	Lecture Attendance	--	
	Project work (distributed in 1st week)	40%	
	Mid-term Exam	20 %	
	Final Exam	40 %	
<b>Instructors</b>	Dr. Faisal M. Alfaisal		
<b>Date of Review</b>	March, 2025		