


College of Engineering Department of Civil Engineering		<div>جامعة الملك سعود King Saud University</div> <div>1957</div>
CE 504 Numerical Methods in Water Resources		
Credit and Contact hours	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)	
Required, or Elective	Elective	
Course Description	In this course, the students will be understanding the basic behavior of different numerical methods, their potential and their limitations. Decide for each particular problem, the numerical method that best suits the needs. Develop a critical attitude when interpreting the results obtained with different numerical calculation software. Understanding the properties of numerical methods, convergence and stability. Use and develop numerical methods applied to real problems in the field of Water Engineering.	
Prerequisites or Co-requisites	None	
Course Learning Outcomes	Students completing this course successfully will be able to:	
	Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)
	CLO1. Recognize the governing differential equations in related water resources for different applications. K1	SO1
	CLO2. Implement math and software to analyze the numerical methods used in water resources. S1	SO2
	CLO3. Solve problems using optimization numerical techniques in water resources fields. S1	SO2
CLO4. Effectively manage, individually or in groups, specialized tasks, projects, assignments, and research work with a high level of autonomy and responsibility. V2	SO7	
Student Outcomes related to this Course	SO 1 Recognize advanced engineering knowledge, concepts, and techniques to identify, interpret, and analyze complex and real-life engineering problems. 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. 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.	

Topics Covered	List of Topics		Related CLOs
	1. Introduction		CLO1, CLO2, CLO4
	2. Analytical method of solving ODE and PDE system of groundwater		CLO1
	3. Solving linear system in pipeline		CLO2, CLO3
	4. Linear optimization system of pipeline		CLO2, CLO3, CLO4
	5. Nonlinear system of water supply network		CLO3
	6. Finite difference method in solving groundwater movement		CLO1, CLO2, CLO4
Textbook(s) and Other Required Material	<ul style="list-style-type: none"> • Bear J., Hydraulics of Groundwater, McGraw-Hill International, 1979. • Haestad Methods, Donald V. Chase, Dragan A. Savic, Thomas M. Walski., Water Distribution Modeling, Haestad; 1st edition (April 1, 2001). • Students are encouraged to read different journal papers concerning planning and design of irrigation systems. 		
Grading System	Assignments	10%	
	Lecture Attendance	--	
	Project work	30%	
	Mid-term exams	20 %	
	Final Exam	40 %	
Instructors	Dr. Saleh Alhazloul		
Date of Review	March, 2025		