

## CE 531 Traffic Flow Characteristics

Credit and Contact hours	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)												
Required, or Elective	Required												
Course Description	An overview of microscopic and macroscopic traffic flow characteristics (flow, speed & density), and their associated techniques such as traffic Stream modeling, capacity and level of service analysis, shock wave analysis, supply-demand analysis, queuing analysis, and simulation modeling.												
Prerequisites or Co-requisites	CE 436: Traffic Engineering or equivalent												
Course Learning Outcomes	Students completing this course successfully will be able to:												
	<table><tr><th>Course Learning Outcomes (CLOs)</th><th>Related Student Outcomes (SO)</th></tr><tr><td>CLO1. Describe the microscopic and macroscopic characteristics of traffic flow. K1</td><td>SO1</td></tr><tr><td>CLO2. Recognize the underlying mathematical models of traffic flow parameters and the fundamental relations among them. K1</td><td>SO1</td></tr><tr><td>CLO3. Simulate traffic phenomena using different methods and tools. S1</td><td>SO2</td></tr><tr><td>CLO4. Determine how traffic congestion starts and propagate. S1</td><td>SO2</td></tr><tr><td>CLO5. Select and apply appropriate methods and techniques for analyzing real-life traffic-related problems. S2</td><td>SO3</td></tr></table>	Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)	CLO1. Describe the microscopic and macroscopic characteristics of traffic flow. K1	SO1	CLO2. Recognize the underlying mathematical models of traffic flow parameters and the fundamental relations among them. K1	SO1	CLO3. Simulate traffic phenomena using different methods and tools. S1	SO2	CLO4. Determine how traffic congestion starts and propagate. S1	SO2	CLO5. Select and apply appropriate methods and techniques for analyzing real-life traffic-related problems. S2	SO3
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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 3 Investigate scientific research problems independently or through teamwork using critical thinking, appropriate techniques, advanced tools, and management principles.												

<b>Topics Covered</b>	<b>List of Topics</b>	<b>Related CLOs</b>
	1. Introduction to traffic flow characteristics (Flow, Speed & Density)	<b>CLO 1</b>
	2. Microscopic Flow Characteristic: Time Headway	<b>CLO 1</b>
	3. Macroscopic Flow Characteristic: Flow Rate and flow patterns	<b>CLO 1,2</b>
	4. Microscopic Speed Characteristic: Vehicular speeds	<b>CLO 1,2</b>
	5. Macroscopic Speed Characteristic: Mean speed, travel time and delay	<b>CLO 1,2</b>
	6. Microscopic Density Characteristic: Distance headway and car following models	<b>CLO 1,2</b>
	7. Macroscopic Density Characteristic: Density and its contour maps	<b>CLO 1,2</b>
	8. Traffic Stream Models: single regime and multiple regime	<b>CLO 2,3,4,5</b>
	9. Shock Wave Analysis	<b>CLO 3,5</b>
	10. Capacity Analysis: multilane facilities, ramps, weaving areas & Signalized intersections	<b>CLO 3,5</b>
<b>Textbook(s) and Other Required Material</b>	<ul style="list-style-type: none"> <li>Traffic Flow Fundamentals: By A. D. May; Prentice Hall, 1990 ISBN: 0139260722</li> </ul>	
<b>Grading System</b>	Project progress report -Part one	2.5%
	Project progress report -Part Two	2.5%
	Assignment	15%
	Mid-term exam	20%
	Project – Final report and oral presentation	20%
	Final Exam	40%
<b>Instructors</b>	Dr. Saif Abdulaziz S Alarifi	
<b>Date of Review</b>	November, 2024	