

## CE 534 Traffic Flow Operation and Control

<b>Credit and Contact hours</b>	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)										
<b>Required, or Elective</b>	Required										
<b>Course Description</b>	The course will give students an overview of concepts in traffic operations and control. Primarily this course will focus on the application of traffic control methods and devices to improve capacity and safety of urban street systems. Emphasis will also be put on the computer aids and the new technology of signal systems, and highway operations.										
<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> Identify the fundamentals of traffic flow theories and its characteristics to differentiate traffic flow conditions. K1</td><td><b>SO1</b></td></tr> <tr> <td><b>CLO2.</b> Analyze different real-life traffic flow conditions. S1</td><td><b>SO2</b></td></tr> <tr> <td><b>CLO3.</b> Develop effective traffic flow control strategies for different road hierarchies. S1</td><td><b>SO2</b></td></tr> <tr> <td><b>CLO4.</b> Perform traffic control strategies in real-life conditions. S1</td><td><b>SO2</b></td></tr> </tbody> </table>	Course Learning Outcomes (CLOs)	Related Student Outcomes (SO)	<b>CLO1.</b> Identify the fundamentals of traffic flow theories and its characteristics to differentiate traffic flow conditions. K1	<b>SO1</b>	<b>CLO2.</b> Analyze different real-life traffic flow conditions. S1	<b>SO2</b>	<b>CLO3.</b> Develop effective traffic flow control strategies for different road hierarchies. S1	<b>SO2</b>	<b>CLO4.</b> Perform traffic control strategies in real-life conditions. S1	<b>SO2</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>										

<b>Topics Covered</b>	<b>List of Topics</b>		<b>Related CLOs</b>
	1. Introduction, Traffic Study and Data Collection		<b>CLO 1</b>
	2. Expressway Traffic Management Systems, Multi-modal Traffic Management		<b>CLO 1</b>
	3. Car Following Models, Cell Transmission Model & Coordinated Ramp		<b>CLO 2</b>
	4. Traffic Assignment, Urban Traffic Signal Control		<b>CLO 2,4</b>
	5. Control of Bus Operations, Preferential Treatment of Bus Systems		<b>CLO 3</b>
	6. Introduction to Logistics		<b>CLO 1-4</b>
	7. Macroscopic Fundamental Diagram (MFD)		<b>CLO 1,4</b>
	8. Network Level Traffic Management & Control with MFDs		<b>CLO 4</b>
<b>Textbook(s) and Other Required Material</b>	<ul style="list-style-type: none"> <li>• Introduction to Traffic Flow Theory: An introduction with exercises, 1st Edition, by V.L. Knoop (2017)</li> <li>• Global Practices on Road Traffic Signal Control: Fixed-Time Control at Isolated Intersections, 1st Edition, by Keshuang Tang, Manfred Boltze, Hideki Nakamura, Zong Tian (2019)</li> <li>• Overseas Management of Traffic Congestion and Travel Demand (Traffic Infrastructure- Roads, Highways, Bridges, Airports and Mass Transit), by Jordana R. Salamone (2011)</li> </ul>		
<b>Grading System</b>	Homework Assignments	20%	
	Midterm Exam	20%	
	Research Paper/Project	20%	
	Final Exam	40%	
<b>Instructors</b>	Dr. Mohammed Hamad O Almannaa		
<b>Date of Review</b>	November, 2024		