College of Engineering

Department of Civil Engineering

CE 531 Traffic Flow Characteristics

Credit and Contact hours	3/ 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Required for a MSCE degree
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

Course Learning Outcomes	***Related Program Outcomes***
CLO1. Describe the microscopic and macroscopic characteristics of traffic flow.	**K1**
CLO2. Recognize the underlying mathematical models of traffic flow parameters and the fundamental relations among them.	**K1**
CLO3. Simulate traffic phenomena using different methods and tools.	**S1**
CLO4. Determine how traffic congestion starts and propagate.	**S1**
CLO5. Select and apply appropriate methods and techniques for analyzing real-life traffic-related problems.	**S1**

Student Outcomes related to this Course	**K1**. Recognize advanced engineering knowledge, concepts and techniques to identify, interpret and analyze complex and real-life engineering problems.

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<tr><td></td><td>S1. Provide solution for complex and real-life engineering problems through critical thinking and using modern engineering tools and identify its impact on social and ethical issues.</td></tr>
<tr><td>Topics Covered</td><td>
<table>
<tr><th>List of Topics</th><th>Related CLOs</th></tr>
<tr><td>1. Introduction to traffic flow characteristics (Flow, Speed & Density)</td><td>CLO2</td></tr>
<tr><td>2. Microscopic Flow Characteristic: Time Headway</td><td>CLO1</td></tr>
<tr><td>3. Macroscopic Flow Characteristic: Flow Rate and flow patterns</td><td>CLO1</td></tr>
<tr><td>4. Microscopic Speed Characteristic: Vehicular speeds</td><td>CLO1</td></tr>
<tr><td>5. Macroscopic Speed Characteristic: Mean speed, travel time and delay</td><td>CLO1</td></tr>
<tr><td>6. Microscopic Density Characteristic: Distance headway and car following models</td><td>CLO1</td></tr>
<tr><td>7. Macroscopic Density Characteristic: Density and its contour maps</td><td>CLO1</td></tr>
<tr><td>8. Traffic Stream Models: single regime and multiple regime</td><td>CLO3</td></tr>
<tr><td>9. Shock Wave Analysis</td><td>CLO4</td></tr>
<tr><td>10. Capacity Analysis: multilane facilities, ramps, weaving areas & Signalized intersections</td><td>CLO5</td></tr>
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<tr><td>Textbook(s) and Other Required Material</td><td>• Traffic Flow Fundamentals: By A. D. May; Prentice Hall, 1990 (ISBN: 0139260722)</td></tr>
<tr><td>Grading System</td><td>Assignments 20%
Term Project 20 %
Midterm Exam 20%
Final Exam 40%</td></tr>
<tr><td>Instructors</td><td>Dr. Seongkwan Mark Lee (2A55), email; slee@ksu.edu.sa</td></tr>
<tr><td>Date of Review</td><td>February, 2021</td></tr>
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