College of Engineering

Department of Civil Engineering

CE 534 Traffic Flow Operation and Control

Credit and Contact hours	3/ 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Required for a MSCE degree
Course Description	The course will give master 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.
Prerequisites or Co-requisites	Nome
Course Learning Outcomes	Students completing this course successfully will be able to

Course Learning Outcomes	***Related Program Outcomes***
CLO1. Recognize the fundamentals of traffic flow theories and identify the characteristics which will be used to differentiate traffic flow conditions.	**K1**
CLO2. Analyze and model different real-life traffic flow conditions.	**S1**
CLO3. Develop effective traffic flow control strategies for different road hierarchies	**S1**
CLO4. Design necessary traffic control devices for a target road and make a managing and operating plan.	**C2**
CLO5. Assess, evaluate and justify traffic control strategies in real-life conditions.	**C4**

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.

C2. Design novel advanced Civil Engineering systems and evaluate its performance and effectiveness for engineering practice and its impact on society.</td></tr>
<tr><td>Topics Covered</td><td>
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<tr><th>List of Topics</th><th>Related CLOs</th></tr>
<tr><td>1. Introduction, Traffic Study and Data Collection</td><td>CLO1</td></tr>
<tr><td>2. Expressway Traffic Management Systems, Multi-modal Traffic Management</td><td>CLO1</td></tr>
<tr><td>3. Car Following Models, Cell Transmission Model & Coordinated Ramp Metering</td><td>CLO1</td></tr>
<tr><td>4. Traffic Assignment, Urban Traffic Signal Control</td><td>CLO2</td></tr>
<tr><td>5. Control of Bus Operations, Preferential Treatment of Bus Systems</td><td>CLO3</td></tr>
<tr><td>6. Introduction to Logistics</td><td>CLO4</td></tr>
<tr><td>7. Macroscopic Fundamental Diagram (MFD)</td><td>CLO5</td></tr>
<tr><td>8. Network Level Traffic Management & Control with MFDs</td><td>CLO5</td></tr>
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<tr><td>Textbook(s) and Other Required Material</td><td>

Introduction to Traffic Flow Theory: An introduction with exercises, 1st Edition, by V.L. Knoop (2017)
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)
Overseas Management of Traffic Congestion and Travel Demand (Traffic Infrastructure- Roads, Highways, Bridges, Airports and Mass Transit), by Jordana R. Salamone (2011)

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<tr><td>Grading System</td><td>
Assignments 15%
Lecture Attendance 5%
Term Project 20 %
Midterm Exam 20%
Final Exam 40%
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<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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