DEPARTMENT OF CIVIL ENGINEERING

## CIVL 7904/8904 Traffic Flow Theory

<b>UNIVERSITY OF MEMPHIS</b>
Spring 2014

Instructor	:	Sabya Mishra	Office	:	Engr. Science Bldg. 112D
Class Hours	:	TR 5:30-6:55 pm	Email	:	smishra3@memphis.edu
Room	:	Engr. Tech Bldg. Rm 220	Office Hours	:	Monday 3:00 – 5:00 pm
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### **Objective**

To present an in-depth view of traffic flow theory and principles, the effect of traffic control strategies on traffic flow characteristics, distinction between macroscopic, mesoscopic & microscopic flow, the relationship between speed, density and flow using a family of traffic flow models, and queuing phenomenon.

### **Course Description:**

This course will introduce to students the theories that seek to describe in a precise mathematical way the interactions between the vehicles, their operators, and the infrastructure. Different models and theories that characterize the flow of highway traffic, signalized and unsignalized intersections will be presented. A number of softwares will be introduced that are currently used in practice and in research to perform traffic impact studies using macroscopic, mesoscopic and microscopic traffic simulation. PREREQUISITES: CIVL 3161 or equivalent.

#### **Text Book and References**

Text: Traffic Flow Fundamentals: By A. D. May; Prentice Hall, 1990 (ISBN: 0139260722)

Ref. 1: Traffic Flow Theory & Control: By D. L. Drew; McGraw Hill, 1964 (ISBN: 0070178313)

Ref. 2: Traffic Flow Theory: A Monograph; TRB Special Report 165, 1975 (Free Download)

- **Ref. 3:** Traffic Flow Theory: A State of the Art Report; TRB Special Report, 2001 (Free Download)
- **Ref. 4:** Traffic Engineering; By William R. McShane, Roger P. Roess, Elena S. Prassas, Prentice Hall, 2010. (ISBN: 0136135730)
- **Ref. 5:** Probability Concepts in Engineering Planning and Design (Vol 1) by A.H.S Aug & W.H Tang; Wiley, John & Sons, 1984, (ISBN: 047103200X)
- **Ref. 6:** Highway Capacity Manual, Transportation Research Board, National Research Council, Washington D.C., 2010.

# Course Outline<sup>1</sup>

Week	Торіс	Reference
	Course Organization, Introduction and Basic Concepts (No first class of the	Chapter 1
1	first week because of TRB Annual Meeting)	
	Fundamental Diagram of Traffic Flow, Relationship between Speed,	Chapter 10
2	Density and Volume	
3	Uninterrupted Flows/Unsignalized intersections	Ref. 4 and 6
4	Signalized intersections	Ref. 4 and 6
5	Software Application	Demonstration
	Forms of Mathematical Distributions in Traffic Flow; Evaluating and	Chapter 7 (Ref. 1 and
6	Selecting Distributions	5)
7	Microscopic Flow Characteristics: Headway Distribution Models	Chapter 2, and 8, Ref. 5
8	Mid-Term Exam	
9	Spring Break	
	Macroscopic Flow Characteristics: Temporal Flow, Spatial Flow and	Chapter 3
10	Distribution Functions	
	Microscopic Speed Characteristics: Speed Trajectories, Mathematical	Chapter 4
11	Distributions, Sample Sizes	
	Microscopic Density Characteristics; Car Following Theory and	Chapter 6 and Ref.2, 3
12	Application	
13	Traffic Stream Models; Individual Models and Stream of Models	Chapter 10, 4, Ref.2,
14	Queuing Analysis; Determining and Stochastic Approaches	Chapter 10, 12, Ref.1
15	Project Presentations	
16	Final	

# <u>Grading:</u>

Mid-term	:	25%
Homework (4 during the semester)	:	16%
Student Presentation and Report	:	25%
Final Exam	:	25%
Class Participation	:	9%

<sup>&</sup>lt;sup>1</sup> This is a tentative outline and is subject to change depending upon schedule of few invited speakers.