

Traffic Engineering

Instructor	: Sabya Mishra	Office	: Engr. Science Bldg. 112B
Class Hours	: TR 9:40-11:05 am	Email	: smishra3@memphis.edu
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Objective

To present an in-depth view of traffic engineering 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

The required text book and a set of reference books are listed below. I will distribute materials from the reference books in the class as needed.

Text: Traffic Engineering; By William R. McShane, Roger P. Roess, Elena S. Prassas, Prentice Hall, fifth edition, 2019. (ISBN: 0136135730)

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

Ref. 5: Highway Capacity Manual, Transportation Research Board, National Research Council, Washington D.C., 2010.

Homework Policy:

Homework will be due in the beginning of the class. In case of uncertain circumstances, the student will talk to the instructor and the homework will be accepted after 48 hours of the deadline. No more extensions will be allowed for homeworks. If you are sending homework by email, then keep the email subject and file name as CIVL_Course#_HW#_Student_Name

Grading Scale:

The final course grades are determined by performance on five components: homeworks, laboratory (field) work, an in-class exam, a group term project, and a final exam. The weight of each of these factors is as follows:

Homework (6 during the semester)	: 20%
Mid-term	: 25%
Student Presentation and Report	: 15%
Final Exam	: 25%
Labs	: 15%

These components are designed to work together: the exams focus on concepts, while the course project involves application and skills involved in engineering practice. The homeworks and lectures give you a chance to learn these skills and practice them throughout the semester. The midterm exam will take place roughly halfway through the semester. The final exam is comprehensive but focuses on material since the midterm. The final grade will be based on the overall performance throughout the course and the grading system will be as follows:

93-100: (A);
80-92: (B);
70-79: (C);
60-69: (D),
59 or lower: (F).

Safety

Students will be required to collect field data for this course. This will involve entering, crossing, or standing beside roadways. Students in the roadway right-of-way must wear orange reflective vests (provided by instructor). Students must take all other normal safety precautions during these activities.

Academic Integrity and Student Conduct:

Expectations for academic integrity and student conduct are described in detail on the website of the Office of Student Judicial and Ethical Affairs (<http://saweb.memphis.edu/judicialaffairs>). Please take a look, in particular, at the sections about “Academic Dishonesty,” “Student Code of Conduct and Responsibilities,” and “Disruptive Behaviors.” I will expect students to be aware of these guidelines and to conduct themselves accordingly. Reasonable and appropriate accommodations as needed will be provided to students with disabilities who present a memo from Student Disability Services (SDS).

Special Needs

Any student who anticipates physical or academic barriers based on the impact of a disability is encouraged to speak with me privately. Students with disabilities should also contact Disability Resources for Students (DRS) at 110 Wilder Tower, 901-678-2880. DRS coordinates access and accommodations for students with disabilities.

Inclement Weather Policy

In the event that inclement weather requires the cancellation of classes at the University of Memphis, local radio and television media will be notified. Additionally, the University of Memphis has established an inclement weather hotline 901-678-0888. <http://hss.memphis.edu/SyllabusGuidelines.html> - Top%20of%20Page

Class Schedule

The course schedule is subject to change depending on the progress in the class, field trips and availability of guest speakers. Course website: <http://www.ce.memphis.edu/4162/>

Week	Date	Topic	Text / Reference	Homework Assignment	Due Dates
1	8/27/2019	Traffic flow characteristics: macroscopic	Chapter 5	HW-1 Assigned	
		Traffic flow characteristics: microscopic	Chapter 5 and 6		
2	9/3/2019	Traffic flow models	Chapter 6		HW-1 Due
		Traffic data collection: Volume studies	Chapter 10		
3	9/10/2019	Lab-1: Volume studies	Chapter 10		
		Traffic data collection: Speed studies	Chapter 11	HW-2 Assigned	
4	9/17/2019	Lab-2: Spot speed studies	Chapter 11		
		Statistical applications in traffic engineering: sample size	Chapter 11 and Hand outs		
5	9/24/2019	Intersection control	Chapter 15		HW-2 Due
		Traffic control devices	Chapter 15		
6	10/1/2019	Intersection Signal Timing Design: pretimed signals	Chapter 18 and 19	HW-3 Assigned	Project Schedule Due
		Lab-3: Signal Design in class exercise / phase diagram			
7	10/8/2019	Data Collection – NO CLASS			
		Mid-term Exam		Exam 1	
8	10/15/2019	Fall Break - NO CLASS			
		Signal timing design: actuated signals	Chapter 20		
	10/22/2019	Signal coordination for arterials and networks	Chapter 21	HW-4 Assigned	Project Update #1 Due
		Software demonstration: HCS and Synchro			
10	10/29/2019	Visit to Region 4 Traffic Management Center (TMC)			
		Fundamental concept of uninterrupted flow facilities	Chapter 28		
11	11/5/2019	Basic freeway segments and multi-lane highways	Chapter 28	HW-5 Assigned	HW-4 Due
		Data collection if remaining (NO CLASS)			
12	11/12/2019	Field visit sign and signal shop			Project Update #2 Due
		Weaving, merging, and diverging (HCM Examples)	Chapter 29 and 30		
13	11/19/2019	Left turn bay design	Hand Outs	HW-6 Assigned	HW-5 Due
		Queuing theory and Shockwave analysis	Hand Outs		
14	11/26/2019	Highway traffic safety, Lab-4 Collision Diagram	Chapter 12 and Hand Outs		HW-6 and Draft Project Report Due
		Thanksgiving Break - NO CLASS			
15	12/3/2019	Course Project Presentation			Project Presentation
		Study Day (Thurs.)			
16	12/10/2019	Final Reports due (Friday)			Final Project Report Due
		Final Exam		Exam 2	