



CIVE 440 - TRAFFIC ENGINEERING AND SIMULATION

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Course Description

Driver, vehicle and traffic flow characteristics; origin-destination studies, traffic studies and analysis, queuing theory applications, microsimulation, highway design and capacity analysis, non-motorized facility design, high occupancy vehicle lane design, public transportation priority design, parking analysis, traffic signal design and control, and traffic micro-simulation.

Course Meeting Times

Lectures – Tuesdays and Thursdays: 4:05 –5:25 PM (3h) Room: ENGTR 0070

Tutorials – TBD

Teaching Assistants Bismarck Ledezma Navarro bismarck.ledezmanavarro@mail.mcgill.ca
Meeting Hours: TBD
Joshua Stipancic joshua.stipancic@mail.mcgill.ca
Meeting Hours: TBD

Course Objectives

The main objectives of the course are:

- To provide students with the expertise in designing transportation facilities including highway design, non-motorized facility (pedestrian and bicycle) design, traffic signal design and bus priority signalization.
- To teach students the basic concepts of geometric design and traffic engineering while being acquainted with the practical tools (software) used by transportation agencies and firms. The course will be designed with specific emphasis on providing hands on experience with the Highway Capacity Manual, international practice, Canadian and local standards, and software (VISSIM).
- Students will apply the acquired knowledge and skills by completing a transportation design project (groups of 4-5).

Marking Scheme

Assignments	4 * 3.5 % = 14 %
Design Project	23 %
Class Participation	5 %
Mid-term exam	18 %
Final exam	40 %

Course Outline (Tentative)

Week 1	Introduction, review of fundamental transportation engineering concepts and models.
Week 2-3	Traffic studies and data collection. Design Studio: Introduction to VISSIM: basics, geometry, flow
Week 4-5	Design and capacity analysis of urban streets. Design Studio: VISSIM: conflict zones, traffic characteristics, desired speed
Week 6-8	Traffic flow theory and concepts.
Week 8	Midterm
Week 9-10	Traffic signal control systems Design Studio: VISSIM: traffic control devices
Week 11-12	Design and capacity analysis of freeways Design Studio: VISSIM: network analysis and capacity measurement
Week 13-14	Non-motorized facility design Design project presentations

Misc.

The faculty-standard calculator is required for the midterm and final.

Recommended Textbook

1. *Traffic Engineering* by William R. McShane and Roger P. Roess & cie, Prentice Hall, 4th ed., 2010.

Reference Texts

1. *Highway Capacity Manual*, TRB, October 2010.
2. Traffic flow Theory, Revised Monograph available for free at <http://www.fhwa.dot.gov/publications/research/operations/tft/>
3. *Traffic Engineering Handbook, 5th ed.*, Pline, James L. editor, Institute of Transportation Engineers, Washington, DC, 1999.
4. *Fundamentals of traffic engineering*, by Wolfgang S. Homburger & cie, 15th ed.
5. *Manual of Transportation Engineering Studies*, Robertson, H. Douglas editor, Institute of Transportation Engineers, Washington, DC, 1994.

6. *Signalisation routière, Normes Ouvrages routiers, Tome V, Volumes 1 et 2, 1ère édition*, Les Publications du Québec, Québec, 1999.
7. *Trip Generation Handbook: a Recommended Practice*, Institute of Transportation Engineers, Washington, DC, 2001.
8. *Trip Generation*, 6th ed, Institute of Transportation Engineers, Washington, DC, 1997.
9. *Traffic Access and Impact Studies for Site Development*, Institute of Transportation Engineers, Washington, DC, 1991.
10. *Traffic Flow Fundamentals*, Adolf D. May, Prentice Hall, 1990.
11. *Principles of Highway Engineering and Traffic Analysis* by Fred L. Mannering, Scott S. Washburn, and Walter P. Kilareski, Wiley, 4th ed., 2009.