McMaster University | ENGINEERING

COURSE OUTLINE

COURSE INFORMATION

Course Name: Introduction to Transportation Engineering Course Code: CIV ENG 3K03

Session Offered: Fall 2022

Calendar Description:

"A transportation impact study serves as the focus for group projects, and provides the context for application of material on traffic flow characteristics, capacity and control for signalized and unsignalized intersections, and travel demand forecasting. Safety; social impacts."

Instructor(s): Moataz Mohamed Phone: ext. 24912

Email: mmohame@mcmaster.ca Office Hours/Contact: Mondays (10:00-11:00) Zoom

Class Schedule Day(s): Mondays & Wednesdays Time: 08:30-09:20 Location: MDCL-1305

Tutorial Schedule Day(s): Wednesdays (10:30-12:20) BSB-137 Thursdays (08:30-10:20) ABB-136

1. COURSE OBJECTIVES

This course introduces the fundamentals of transportation systems, as well as the application of mathematical and engineering principles to address a wide array of transportation issues. The course introduces several major transportation aspects and is developed in five overarching themes. Theme one introduces the transportation engineering discipline and discusses the challenges and opportunities of contemporary transportation systems. Theme two focuses on travel behaviour and the four-step urban transportation demand model. Themes three and four detail the design and operation procedures, respectively, for transportation systems and focus on various topics that include; geometric cross-section, earthwork, traffic flow, and traffic controls. Lastly, the course concludes with remarks on "*What constitutes a good transportation system?*" from an engineering perspective, with emphasis on the evaluation of transportation projects as it relates to economic evaluation models and environmental impact assessments.

Through this course, you will develop the following CEAB graduate attributes and indicators:

A03 – Investigation;

3.2 Synthesizes *the results of an investigation to reach valid conclusions.*

A04 – Design

4.4 Justifies and reflects on design decisions, giving consideration to limitations, assumptions, constraints and other relevant factors.

A07 – Communication Skills

7.1 Demonstrates comprehension of technical and non-technical instructions and questions.

7.3 Composes and delivers an effective oral presentation for the intended audience.

2. COURSE SPECIFIC POLICIES

2.1. In-person Lectures

This course will be offered in person. Please note that:

- Lecture notes will be available on A2L.
- Lectures will not be recorded.
- You are expected to take notes during class.
- Only few items will be pre-recorded to save lecture time.

2.2. Course Materials

Lecture Notes Lecture notes, assignments, and exercises will be made available through Avenue to Learn.

Text Book

- Required (available on A2L)

Teply, S., Allingham, D.I., Richardson, D.B., Stephenson B.W., (2008) ***Canadian Capacity Guide for Signalized Intersections*****,** third edition, Ite
Available at: http://www.tac-atc.ca/sites/tac-atc.ca/files/site/doc/resources/report-capacityguide.pdf

- Optional

Banks, J. (2004) ***Introduction to Transportation Engineering***, Second Edition, McGraw Hill, New York.

Supplementary reading

Meyers, M.D., and Miller, E.J. (2001) ***Urban Transportation Planning,*** Second Edition, McGraw Hill, New York.

McShane, W.R., Prassas, E., and Roess, R.P. (2010) ***Traffic Engineering***, Fourth Edition, Prentice-Hall, New Jersey.

2.3. Communication, Discussion, and Feedback

All formal communications regarding this course will be through **McMaster's e-mail account** and/or **Avenue to Learn**. Please be sure to check your McMaster account regularly. If you have not received e-mails regarding **3K03**, it is your responsibility to contact the course coordinator with your McMaster e-mail address and ensure your name is on the distribution list. Similar information will be posted on Avenue to Learn.

E-mail subject line **must start with the course number** (otherwise, your e-mail will be filtered out) followed by a colon and includes a relevant description of the content in the e-mail (e.g. ***3K03: Assignment 1 question***).

Following this policy, students may expect a response from the TAs within two business days, or from the instructor in three business days. E-mails that do not follow this policy may not receive a response.

You are encouraged to discuss the feedback that you receive on your assignments with the course TA and the course instructor. If you believe that you have received incorrect grades, you must contact the teaching team immediately with an **e-mail explanation**. This process should be no later than one week of the day that the assignment was returned. The following schedule identifies the roles and responsibilities of the teaching team.

Task	Contact Person	e-mail
Lectures	Moataz Mohamed	mmohame@mcmaster.ca
Tutorials	Ahmed Foda	fodaa@mcmaster.ca
Assignment 1 grading	Jing Li	li1413@mcmaster.ca
Term Project grading	Jing Li	li1413@mcmaster.ca
Exercises 1-10 grading	Abdul Siddiqui	sidda9@mcmaster.ca
Midterm grading	Jing Li	li1413@mcmaster.ca
Practical Reflections	Jing Li	li1413@mcmaster.ca

Periodically, you will be asked to **provide feedback on your own** experience during this course, including your opinion on the effectiveness of the lectures, tutorials, and assignments in contributing to your learning. This feedback will be solicited to help improve your experience, so it is in your best interest to make this feedback as informative, constructive, and respectful as possible.

2.4. Professional Class Conduct

Attending lectures and tutorials is mandatory.

Our goal is to provide an environment that is free of discrimination and harassment, as well as that supports you to become competent in transportation engineering. Therefore, we have the following expectations;

- Lectures should be treated as discussion sessions. Please be prepared to work, and participate actively in every meeting
- Log in to Zoom on time
- You are encouraged to ask questions related to the content of this course (via the chat function)

- Additional aspects will be discussed in Week 1.

2.5. MSAF & Late Submission

In accordance with the MSAF policy in Section 7, the MSAF accommodation for this course will be **to reallocate the weight of missed items** at the discretion of the supervisor and in consultation with the course coordinator. Late submissions that are not subject to the aforementioned criteria will lose 5% of the assignment/exercise grade for every late business day.

2.6. Extracurricular Activities

Several extracurricular activities will be offered throughout the course. This will be in collaboration with the Institute for Transportation Engineering (ITE) - McMaster Student Chapter. In Fall 2018 & 2019, the course offered a soccer night and three guest presentations from industrial experts.

2.7. Masks are strongly encouraged on campus

Wearing a mask in our shared classroom space is a good way to keep yourself and others healthy throughout the term in the face of COVID-19, but also other airborne illnesses. Staying healthy, so that you can attend classes in-person, study, complete course work, and collaborate with your peers, is an important part of your academic success this year. Wearing a mask in the classroom also provides increased protection to other students and TAs who may have elevated needs in their own health or that of their families. I encourage you to bring and wear a mask in class, labs, studios, seminars, and any crowded spaces. I have chosen to wear a mask in the classroom and encourage others to do the same. Free surgical-level masks are available at several locations, including the Campus Store.

2.8. Additional items

Additional items will be communicated during teaching Week 1.

3. SCHEDULE

WEEK 1	Transportation System; Issues & Challenges	Assignment 1
WEEK 2	Travel Behaviour, Data Collection, and Trip Generation	Exercise 1
WEEK 3	Trip Distribution & Mode Choice	Exercise 2, 3
WEEK 4	Trip Assignment	Exercise 4
WEEK 5	Transportation Demand Project	Midterm
WEEK 6	Reading Week	
WEEK 7	Queuing Theory & Signalized Intersections	Exercise 5, 6 + Term Project
WEEK 8	Signalized Intersection Design I	Exercise 7 + Term Project
WEEK 9	Signalized Intersection Design II	Exercise 8 + Term Project
WEEK 10	Signalized Intersection Design III	Term Project
WEEK 11	Geometric Cross-Section, Vertical and Horizontal Alignment	Exercise 9, 10
WEEK 12	Economic Evaluation and Environmental Impact Assessment	

FINAL EXAMINATION	Scheduled during the regular University Final Examination period established by the Registrar's Office

4. ASSESSMENT OF LEARNING	WEIGHT %
Exercises (1-10) 10 * 2.0% each	20%
Assignment 1	10%
Self-reflection written assignments 3 * 2% each	06%
Mid-term	10%
Term Project	20%
Final Exam	35%
Please note that students **MUST** score a passing grade (more than 50%) in the final exam to pass the course, and failing in the final exam would result in failing the course.	

5. LEARNING OUTCOMES

- Identify all four stages of the Urban Transportation Modelling System (UTMS) for traffic demand forecasting in the event of new development [CEAB Indicator 7.3].
- Perform all the necessary calculations for each stage of the UTMS to estimate; trip generation, trip distribution, modal split, and route assignment [CEAB Indicators 4.4].
- Assess the level of service of signalized intersections and determine optimal traffic signal timing plans through calculations [CEAB Indicator 3.2].
- Apply the fundamental principles of traffic flow theory and associated traffic engineering knowledge to solve unfamiliar problems, as well as the implementation of different traffic control strategies in transportation projects [CEAB Indicator 3.2 and 4.4].
- Perform all the necessary calculations for geometric design of transportation facilities taking into consideration design, health and safety standards, and economic and environmental impacts [CEAB Indicator 4.4].
- Understand legal requirements governing transportation engineering practice, and the role and responsibilities of transportation engineer in the society [CEAB Indicator 7.1].

6. COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their "@mcmaster.ca" alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue e-mail and course websites on a regular basis during the term.

7. POLICIES

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.**

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the *Academic Integrity Policy*, located at https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/.

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.

copying or using unauthorized aids in tests and examinations.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are

described in the *Code of Student Rights & Responsibilities* (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's *Academic Accommodation of Students with Disabilities* policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

The McMaster Student Absence Form is a self-reporting tool for **Undergraduate Students** to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period. You may submit a maximum of 1 Academic Work Missed requests per term. It is **your** responsibility to follow up with your Instructor immediately regarding the nature of the accommodation. If you are absent more than 5 days or exceed 1 request per term you **must** visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation. This form should be filled out immediately when you are about to return to class after your absence.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office ***normally within 10 working days*** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

PROTECTION OF PRIVACY ACT (FIPPA)

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades, and all other personal information at all times. For example, the submission and return of assignments and the posting of grades must be done in a manner that ensures confidentiality – see http://www.mcmaster.ca/univsec/fippa/fippa.cfm.

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer, or the Human Rights Consultant, as soon as possible.
https://www.mcmaster.ca/policy/General/HR/Discrimination_and_Harassment.pdf

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster e-mail.

8. MCMASTER GRADING SCALE

Grade	Equivalent Grade Point	Equivalent Percentages
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49