Introduction to Transportation Engineering
CIV ENG 3K03
Fall 2018

Course Instructor
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1- Course information
Course Name: Introduction to Transportation Engineering
Course ID: CIV ENG 3K03
Term: Fall Term 2018
Class Times & location: Wednesdays, 19:00-21:00 at ITB-137
Tutorial Times & location: Wednesdays, 13:30-14:20 at BSB-106
Thursdays, 08:30-09:20 at BSB-106
Term 1 Dates: September 4 – December 5, 2018

2- Course Overview
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 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.

3- Learning Outcome
Upon successful completion of this course, you will be able to:
- Identify all four stages of the Urban Transportation Modelling System (UTMS) for the purpose of traffic demand forecasting in the event of new development [CEAB Indicator 1.4],
- Perform all the necessary calculations for each stage of the UTMS to estimate; trip generation, trip distribution, modal split, and route assignment [CEAB Indicators 2.1],
- 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],
- 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 4.5],
- Understand legal requirements governing transportation engineering practice, and the role and responsibilities of transportation engineer in the society [CEAB Indicator 8.2]

4- CEAB* Graduate Attributes and Indicators
Through this course, you will develop the following graduate attributes and indicators:
1- Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
1.4. Competence in Specialized Engineering Knowledge
2- An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.

2.1. Ability to identify reasonable assumptions (including identification of uncertainties and imprecise information) that could or should be made before a solution path is proposed.

3- An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.

3.2. Capable of selecting appropriate model and methods and identify assumptions and constraints.

4- An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural and societal considerations.

4.5. Able to determine and include appropriate health and safety considerations

8- An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.

8.2. Understands legal requirements governing engineering activities (including but not limited to personnel, health, safety, and risk issues).

*Canadian Engineering Accreditation Board

5- Course Outlines

Theme 1 Introduction
Week 1 Introduction to Transportation Engineering  
Banks Ch.1
Week 1 Transportation System; Issues & Challenges  
Banks Ch.2

Theme 2 Transportation Demand Modelling
Week 2 Travel Behaviour, Data Collection, and Trip Generation  
Banks Ch.13(1-3)
Week 3 Trip Distribution & Mode Choice  
Banks Ch.13(4-6)
Week 4 Trip Assignment & Transportation Demand Project  
Lecture notes

Theme 3 Transportation System Operation
Week 6 Traffic Flow Theory and Level of Service (LoS)  
Banks Ch.9
Week 7 Queuing Theory & Signalized Intersections  
Banks Ch.9
Week 8 Signalized Intersection Design I  
Banks Ch.11
Week 9 Signalized Intersection Design II  
Banks Ch.11
Week 10 Signalized Intersection Design III  
Banks Ch.11

Theme 4 Transport System Design
Week 11 Geometric Cross-Section, Vertical and Horizontal Alignment  
Banks Ch.4(1-3)

Theme 5 Transportation Project Evaluation & Conclusion
Week 12 Economic Evaluation and Environmental Impact Assessment  
Banks Ch.15(1,2)
Week 13 Conclusion, remarks, and discussions  
Lecture notes

6- Course Materials

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

Text Book  Required
Optional

Supplementary reading

7- Assignments, Projects, and Exercises
Exercise 1-10 Exercises will be assigned weekly
Assignment 1 Presentation-based, Big Ideas in Transportation systems; challenges & opportunities (Due on Week 3)
Assignment 2 Project-based, Transportation system design (Due on Week 12)
Mid-Term Theoretical Concepts & Working exercise (Week 5 – BSB B135)

Detailed guidelines for each assignment/exercise will be available on Avenue to Learn.

8- Evaluation
The final mark for this course will be determined as follows:

<table>
<thead>
<tr>
<th>Exercises (1-10)</th>
<th>10 * 2.0% each 20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>10%</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>15%</td>
</tr>
<tr>
<td>Mid-term</td>
<td>15%</td>
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<tr>
<td>Final Exam</td>
<td>40%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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Please note that students **MUST** score a passing grade in the final exam to pass the course and failing in the final exam would result in failing the course.

9- Deadlines and Late Penalties
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” (MSAF). Please note these regulations have changed beginning Fall 2015. When using the MSAF, report your absence to mmohame@mcmaster.ca and directly to your supervisor. Absences lasting more than three days must be reported to the Associate Dean’s Office (KTH-129 for Social Science students, BSB-129 for Science students, and JHE-A214 for Engineering Students) and appropriate documentation must be provided.

For medical absences, the University reserves the right to require students to obtain medical documentation from the Campus Health Centre. Please note that this form is simply a request for relief, the nature of the relief is left to the instructor’s/supervisor’s discretion. Once the form is filled out, the student must contact their supervisor and the course instructor (mmohame@mcmaster.ca) as soon as possible in order to make necessary arrangements for making up work.

Generally, the accommodation will be to grant an extension which matches the length of the absence, at the discretion of the supervisor and in consultation with the course coordinator.

Please review the University’s policy on missed term work that is available at:
http://academiccalendars.romcmaster.ca/content.php?catoid=7&navoid=559

Late submissions that are not subject to the aforementioned criteria will lose 5% of the assignment/exercise grade for every late business day.
10- Communication, Discussion, and Feedback
All formal communications regarding this course will be through McMaster email accounts and/or Avenue to Learn. Please be sure to check your McMaster account regularly. If you have not received emails regarding 3K03, it is your responsibility to contact the course coordinator with your McMaster email address and ensure your name is on the distribution list. Similar information will be posted on Avenue to Learn.

Email subject line must start with the course number 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. Emails 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 a written explanation. This process should be no later than one week of the day that the assignment was returned.

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.

11- Accessibility
Students with diverse learning styles and needs are welcome in this course. If you have a disability or health consideration that may require accommodations, please contact Student Accessibility Services (SAS, http://sas.mcmaster.ca) as soon as possible. We are happy to work with SAS to provide the necessary accommodations for you to achieve your intended learning outcomes (ILOs) for this course.

12- Academic Integrity
You are expected to exhibit honesty and use ethical behavior in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

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 behavior 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.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at: http://www.mcmaster.ca/academicintegrity

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained,
2. Improper collaboration in group work,
3. Copying or using unauthorized aids in tests and examinations.

In this course, we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, 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 this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the Course Administrators.

13- 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,
- Please arrive on time, and minimize disruption if you are late,
- You are encouraged to ask questions related to the content of this course,
- Please avoid eating during class if possible, breaks will be provided,
- Please make sure all your electronic devices (e.g. cell phones and mp4 players) are on silent mode,
- If you urgently need to leave the class, please do it quietly to minimize disruption,
- Additional aspects will be discussed in Week 1.

Please Note that
The instructor and the University reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.