Course Description:
This is an introductory course to key analytical techniques and design methods of Transportation Engineering and Transportation Planning. The course covers the following general topics: transportation and the socio-economic environment, components of transportation systems, fundamentals of vehicle motion, vehicle stability on horizontal curves, different modes of transportation, design controls, vehicle motion on horizontal curves and on, design of key highway geometric elements, fundamental of traffic flow theory, capacity analysis, fundamentals of transportation planning methodologies, introduction to traffic safety analysis, and introduction to transportation impact studies and evaluation techniques of transportation projects.

Learning Materials:
Lectures Notes and selected handouts will also be posted on Brightspace.

Recommended Textbook:

Course Goals and Learning Objectives:
This course is designed to provide foundational technical, analytical knowledge, skills required in major practice areas of Transportation Engineering and Planning. Following is an outline of the course goals and learning objectives:

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<th>Course Goal</th>
<th>Related Learning Objectives</th>
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<th>Related Chapters</th>
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| **Goal 1:** Introducing the transportation system | - Identify component of the transportation system.  
- List different modes of transportation.  
- Discuss the Functions of each mode in the transportation system. | ➢ Midterm  
➢ Final | Ch. 1  
Ch. 5 |
| **Goal 2:** Fundamentals of highway geometric design | - Recognize key geometric elements of highways from a designer’s perspective.  
- Identify main geometric design requirements for key geometric elements and the influence of human factors on geometric design.  
- Apply models of vehicle motion and stability on horizontal curves.  
- Differentiate analytical treatments of geometric elements and distinguish contextual variables.  
- Choose appropriate design models and apply them to solve fundamental problems of horizontal and vertical alignment of highways.  
- Recognize the importance of alignment coordination as a task in highway design.  
- Recognize the significance of design consistency on highway design. | ➢ Assignment 1  
➢ Midterm  
➢ Final | Ch. 2 |
### Course Goal | Related Learning Objectives | Testing Methods | Related Chapters
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**Goal 3:** Fundamentals of Traffic Flow Theory | - Recognize and discuss main traffic flow patterns and relationships that govern speeds of moving road users versus their density.
- Choose and apply main traffic flow models to predict traffic conditions in some traffic engineering problems; in this course shockwaves and queues formation. | ➢ Assignment 2 ➢ Final | Ch. 3

**Goal 4:** Fundamentals of Transportation planning and travel demand forecast | - Identify the purpose and goals of the Transportation Planning process.
- List and explain the main steps and classic models used in the traditional four-step model for Travel Demand Forecast.
- Apply the classic models for demand forecast.
- Recognize limitations of this model, devise, and estimate potential improvements. | ➢ Assignment 3 ➢ Final | Ch. 7 Ch. 8

**Goal 5:** Learning analytical techniques of common road safety analysis problems | - Discuss the purpose of network screening.
- Recognize the practical challenges of network screening for road safety treatments.
- Apply classic and some specific statistical techniques for network screening.
- Evaluate on logical grounds the effectiveness of each method, recognize their limitations, and estimate potential improvements. | ➢ Assignment 4 ➢ Final | Lecture Notes

**Goal 6:** Providing an overview of traffic impact analysis | - Identify and discuss main impacts of transportation projects on the environment.
- Recognize typical approaches to evaluate transportation project alternatives. | ➢ Final | Ch. 10 Ch. 11

### Lectures:
Online Lectures: Two times a week as per the University schedule.

Online Problem Sessions: Problem sessions will be held from every two weeks on Fridays. Check your course registration to identify whether you are in an Odd (A2O) or Even (A1E) section and attend accordingly.

### Student Performance Evaluation:
Assignments: 15%
Quizzes: 10%
Mid Term: 25%
Final: 50%

### Communications:
Knowledge of Brightspace is very important to receive timely announcements and course materials. All correspondences will be conducted through Brightspace Email Service.
Course-related University Rules and Services:

[1] Accommodations:

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy obligation**: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)

**Religious obligation**: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)

**Academic Accommodations for Students with Disabilities**: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable) at [http://www.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/](http://www.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/)

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)

[2] Plagiarism: Student Affairs website: [http://www2.carleton.ca/studentaffairs/academic-integrity/](http://www2.carleton.ca/studentaffairs/academic-integrity/)

Course-specific Rules:

[1] Lectures and course materials, including presentations, outlines, and similar materials, are protected by copyright. You may not and may not allow others to reproduce or distribute lecture notes and course materials publicly without the Instructor’s express written consent.

[2] Assignments work submitted late will be accepted, but with an automatic penalty:

- 15% off for every day late.
- Work will not be accepted after the 2nd day.

[3] Assignments detected by the Teaching Assistants to be of similar form will be referred to the Instructor. The Instructor will review these assignments against university policy on plagiarism (refer to university policy [2]).