Course Objectives
The main objective of this course is to introduce Civil Engineering students to the basic concepts and techniques of Highway and Transportation Engineering. Emphasis is placed on the components of the highway system, i.e., road user, vehicle, and the road itself in addition to the interaction among these components as related to the design, construction, operation and maintenance of the highway system.

By the end of this course, students are expected to have been introduced to the following concepts (the learning goals of the course):
- Highway networks and classification.
- Main components of the highway system and their characteristics.
- Techniques and procedures for collecting dynamic traffic data.
- Procedures and guidelines for evaluating quality of traffic operation.
- Procedures and guidelines for designing main road components.
- Evaluation of pavement condition and importance of pavement maintenance.

Course Outline:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapter</th>
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<tbody>
<tr>
<td>1</td>
<td><em>Introduction:</em> Importance of Transportation, Road Classification, Road Classification in Canada</td>
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<td>1,2</td>
<td><em>Driver, Vehicle, and Road Characteristics:</em> The Human Response Process, Older Drivers, Pedestrians and Bicyclists, Resistance to Movement, Braking Distance, Minimum Curvature of a Horizontal Curve, Sight Distance</td>
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<td>3</td>
<td><em>Traffic Engineering Studies:</em> Spot Speed, Volume, Travel Time and Delay, Parking</td>
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<td>4</td>
<td><em>Highway Safety:</em> Issues Involved in Transportation Safety, Strategic Highway Safety Plans, Effectiveness of Safety Design Features</td>
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<td>5,6</td>
<td><em>Intersection Design and Control:</em> Types of Intersections, Design Principles for At-Grade Intersections, Sight Distance at Intersections, Conflict Points at Intersections, Signal Timing</td>
<td>7-8</td>
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<td>7,8</td>
<td><em>Highway Capacity and Level of Service:</em> Traffic Flow Elements, Fundamental Diagram of Flow, Two-Lane Highways, Multilane Highways, Basic Freeway Sections</td>
<td>6,9</td>
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<td>9</td>
<td><em>Geometric Design:</em> Highway Location, Cross-Section Elements, Vertical Alignment, Horizontal Alignment, Design Consistency</td>
<td>14-15</td>
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<td>10</td>
<td><em>Highway Materials:</em> Soil Characteristics, Frost Action, Bituminous Materials, Superpave Asphalt Binder Grading, Asphalt Concrete, Asphalt Concrete Mix Design</td>
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<td>11,12</td>
<td><em>Structural Design:</em> Flexible Pavement, AASHTO Design Method, Rigid Pavement, PCA Design Method, Mechanistic-Empirical Pavement Design</td>
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<td>12</td>
<td><em>Pavement Maintenance and Rehabilitation:</em> Pavement Evaluation, Maintenance and Rehabilitation Techniques</td>
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Marking Scheme:

- Assignments 20%
- Participation/Quizzes 5%
- Midterm 25%
- Final Examination 50%

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Total 100%

Course Instructor:

Dr. Y. Hassan  
Room 3434 ME  
Phone: 8625 or 3393  
E-mail: yasser.hassan@carleton.ca

Text:


Notes:

- The instructor may alter the course outline and/or the marking scheme depending on the class performance.
- Use of any device to record audio, video, or still images in the classroom is strictly prohibited unless it is explicitly authorized by the instructor.
- All materials posted on cuLearn are for the exclusive educational purpose by registered students in this course in the designated term and cannot be used for any other purpose.
- **Class participation**:
  - The evaluation of course participation will be based on student’s answering questions and responding to surveys in the lectures. Students who cannot use any of the class participation tools (see the following two notes) in all classes will have all their Participation/Quizzes grade assessed based on the quizzes only.
  - In this course, the instructor will be using Poll Everywhere, an audience response system, to ask questions during class. Students will be able to respond to the questions through the use of a web browser on a computer or by SMS text messaging on a cell phone. Students can also download the Poll Everywhere app. The website and phone number to text to will be displayed in class. Please note that your phone will be charged regular SMS text fee if you choose to respond by SMS.
  - The instructor will track Poll Everywhere responses only from accounts registered using the students’ email addresses as they are displayed in cuLearn (the alias email: firstname.lastname@carleton.ca). Responses from accounts registered under any other email address or email address that was not entered correctly will not be tracked.
- **Assignments**:
  - Considerable percentage of the mark will be deducted for messy assignments or exams.
  - Assignments are to be submitted as hardcopies with proper cover page in the designated drop-box before the due date and time. Assignments that are submitted after (but within 24 hrs of) the due date will have the grade discounted by 20%. No assignments will be accepted after 24 hrs of the due date. Students who miss an assignment for a legitimate reason must report their reasons as soon as possible.
  - Students are encouraged to upload a clean and legible softcopy of the assignment on cuLearn as a backup. The softcopy will not be graded or checked. The softcopy cannot be used to establish submission prior to the due date. Exceptions can be granted in cases of extreme difficulty with an arrangement with the course instructor at least 24 hrs before the due date.
- **Midterm:** Tentative date for midterm examination is March 7.
- The final examination is for evaluation purposes only and will not be returned to the student.
- A minimum of 30% (15 out of 50) in the final is required to pass the course.
- **Special Accommodation:** 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.
  - 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/)