CIVE 3305/4209 Highway Engineering
Department of Civil and Environmental Engineering

Teaching Team

Instructor:

Name: Yasser Hassan

email address: yasser.hassan@carleton.ca

Office hours: feel free to knock the door (ME 3434) any time or request an in-person or Teams appointment by email.

TA(s):

Information will be posted on Brightspace

Course Description and requirements

1) Course schedule

Lectures: Mon/Wed 13:05-14:25

Tutorial/lab: Mon 14:35 - 17:25 (even weeks)

Please refer to the Public Class Schedule for the most recent information

2) Course description

Calendar description: Road functional classification, human factors of road design; geometric design; traffic engineering; highway capacity and level of service; highway materials; frost action; pavement mix design; structural design of rigid and flexible pavements; maintenance and rehabilitation.

3) Precluded courses

The course is listed as CIVE 3305 and CIVE 4209. Ideally, students taking the course as a fourth-year program requirement (up to 2022 catalogue year) should register in CIVE 4209, while students taking the course as a third-year program requirement (2023 catalogue year and later) should register in CIVE 3305.

4) Prerequisites and recommended knowledge

As per the calendar: Prerequisite(s): CIVE 3304 or permission of the Department.

5) Learning Outcomes

By the end of this course, students are expected to have been introduced to the main highway engineering concepts. The specific learning goals of the course are to:
- Learn the basic concept of highway networks and classification.
- Understand the main components of the highway system and their characteristics
- Learn techniques and procedures for collecting dynamic traffic data
- Learn the main criteria and procedures for evaluating quality of traffic operation
- Learn procedures for designing main road components based on design guidelines
- Learn basic concepts of pavement condition evaluation and pavement maintenance

6) Graduate Attributes

The Canadian Engineering Accreditation Board (CEAB) requires graduates of undergraduate engineering programs to possess 12 attributes. Courses in all four years of our programs evaluate students' progress towards acquiring these attributes. Aggregate data (typically, the data collected in all sections of a course during an academic year) is used for accreditation purposes and to guide improvements to our

programs. Some of the assessments used to measure GAs may also contribute to final grades; however, the GA measurements for individual students are not used to determine the student's year-to-year progression through the program or eligibility to graduate. This following list provides the GAs that will be measured in this course, along with the Learning Outcomes that are intended to develop abilities related to these attributes.

GA - Indicator	Assessment Tool
GA 1: Discipline-specific concepts, Transportation Engineering	Specific questions in the midterm and final exams; the term project may also be used.

For information on GAs and continual curriculum improvement, visit the Accreditation section of Engineers Canada website.

7) Accreditation Units

Math	Natural Science	Complementary Studies	Engineering Science	Engineering Design
-	-	-	30%	70%

8) Text book(s)/Learning Materials and their costs
- A recommended textbook is: Garber, N.J. and Hoel, L.A. *Traffic & Highway Engineering*. Enhanced Fifth Edition, Cengage Learning, 2019.
  - The book can be acquired directly from the publisher (https://www.cengage.ca/c/traffic-and-highway-engineering-enhanced-edition-5e-garber-hoel/9781337631020/?filterBy=Student) as hardcopy for $350.95 or as one-year access to an e-book for $77.95.
  - A fifth enhanced SI edition is available in the library as e-book with access for 3 users.
  - A second-hand copy, including the fifth edition, can be used.
- Students are not required to purchase the textbook or other learning materials for this course.
- But students need access to tables and charts that are available in the recommended textbook. Some differences in the tables and figures exist in previous editions up to fourth edition.
- Students will need access to at least one software out of *RoadEng*, *OpenRoads ConceptStation*, and *OpenRoads Designer*. All listed software packages are available for free for academic use.

9) Topics and tentative plan
1. Plan of course topics:

Week	Topic	Chapter
1	*Introduction:* Importance of Transportation, Road Classification, Road Classification in Canada	1
1,2	*Driver, Vehicle, and Road Characteristics:* The Human Response Process, Older Drivers, Pedestrians and Bicyclists, Resistance to Movement, Braking Distance, Minimum Curvature of a Horizontal Curve, Sight Distance	3
3	*Traffic Engineering Studies:* Spot Speed, Volume, Travel Time and Delay, Parking	4
4,5	*Geometric Design:* Highway Location, Cross-Section Elements, Vertical Alignment, Horizontal Alignment, Design Consistency	14-15
5	*Highway Safety:* Issues Involved in Transportation Safety, Strategic Highway Safety Plans, Effectiveness of Safety Design Features	5

6,7	*Intersection Design and Control:* Types of Intersections, Design Principles for At-Grade Intersections, Sight Distance at Intersections, Conflict Points at Intersections, Signal Timing	7-8
8,9	*Highway Capacity and Level of Service:* Traffic Flow Elements, Fundamental Diagram of Flow, Two-Lane Highways, Multilane Highways, Basic Freeway Sections	6,9
10,11	*Highway Materials:* Soil Characteristics, Frost Action, Bituminous Materials, Superpave Asphalt Binder Grading, Asphalt Concrete, Asphalt Concrete Mix Design	17-18
11,12	*Structural Design:* Flexible Pavement, AASHTO Design Method, Rigid Pavement, PCA Design Method, Mechanistic-Empirical Pavement Design	19-20
12	*Pavement Maintenance and Rehabilitation:* Pavement Evaluation, Maintenance and Rehabilitation Techniques	21

2. Check Brightspace for a calendar of target classes and activities. Please note that this is a target calendar, but actual dates may vary depending on class progress.
3. Final examination will be set by Examination Services.

10) Evaluation and marking scheme

Assignments	20%
Midterm Examination	20%
Project	10%
Final Examination	50%
Total	**100%**

a) **Midterm examination**
- The midterm exam is proctored in-person.
- Tentative date for the midterm exam is **March 2** during the tutorial session.
- Students who miss the midterm exam for a valid reason will have the weight of the exam transferred to the final exam. Students who miss the midterm for a valid reason need to check the section "Deferred term work and self declaration" for timeline and details to request academic consideration.

b) **Final examination**
- Final exams are for evaluation purpose and will not be returned to students.
- Exam Conditions: exams are proctored, in-person; closed book; simple, non-programable calculators are allowed; formula sheet may be allowed.
- **Minimum 30% grade in the final exam (15/50)** is required to pass the course.
- Deferred Final Examinations: Students who are unable to write the final examination because of extenuating circumstances, as defined in the Academic Consideration Policy, may apply for accommodation by contacting the Registrar's office. Consult the Section 4.3 of the University Calendar.

c) **Term work late submission policy**
- All term work is submitted in Brightspace. A single as pdf file is required for each submission unless otherwise is stated.
- Only pdf files created using a word-processor, handwriting on a tablet, or very clean scan from handwriting on paper will be accepted.

- Submissions that are difficult to read may be given zero grade. Parts of submission that are difficult to read will be treated as no submission.
- All due dates are strictly enforced.
- Submission of term work after, but within 24 hours of, the due date will have the grade reduced by 20% of the total grade.
- No submission is accepted after 24 hours of the due date.
- As per Section 3.3.4 of the undergraduate calendar regulations, all appeals of term work grades need to be initiated by the student within <u>seven (7) working days</u> of the day on which the official grade in question was made available.

d) **Deferred term work and self declaration**
- Students who claim extenuating circumstances defined in the [Academic Consideration Policy](), as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases. This must occur <u>no later than three (3) days</u> after the term work was due.
- The self-declaration form is always required for short-term academic considerations as defined in the Academic Consideration Policy.
- Documentation is always required for long-term academic considerations as defined in the Academic Consideration Policy (<u>do not send documentation to the instructor or TAs</u>).
- Except for the term project, academic consideration for missing the midterm exam or any assignment will involve transferring the weight to the final exam.
- All academic considerations must be made before the last day of classes in the term as published in the academic schedule.

11) Academic dates
Students should be aware of the academic dates (e.g. last day for academic withdrawal) posted on the Registrar's office web site https://students.carleton.ca/academic-dates/

Academic Integrity and Plagiarism

4. Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: https://carleton.ca/engineering-design/current-students/fed-academic-integrity/
5. Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension, or expulsion.
6. One of the main objectives of the Academic Integrity Policy is to ensure that **the work you submit is your own.** As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions.
7. The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source.
8. Examples of violations of the policy include, but are not limited to:
- Any submission prepared in whole or in part, by someone else.
- Using another's data or research findings without appropriate acknowledgement.
- Submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own.

- Failing to acknowledge sources of information through the use of proper citations when using another's work and/or failing to use quotations marks.

AI Policy:

1. AI use in this course:
   - None in tests and exams: the midterm and final examinations are proctored, in-person. No access to AI tool is allowed.
   - Limited use in assignments: Students may use AI tools for ideas, clarifying challenging concepts or getting started. You may for example use AI to explain or visualize a difficult concept or to find relevant information. You are still expected to work out assignment questions yourself without generating a solution using AI.
   - Enhanced use in term project: Students are allowed to use AI tools in this course for support in completing the term project. Some acceptable uses include assistance with use of software and generating submitted report (e.g. suggesting standard text, proof-reading for grammar and spelling, generating schematics, …).
2. Documenting use of AI: It is necessary to document your use of AI in this course, using the following guidelines:
   - Clearly identify and cite AI-generated text (e.g. "The following paragraph was generated by ChatGPT/Microsoft Word's Researcher tool/Copilot").
   - Review, edit and ensure accuracy and originality of final submissions.
   - AI-generated content should not exceed 30% of the total report length.
3. Why have I adopted this policy? This policy supports the use of AI as a supplementary tool, helping students develop ideas and structure their work while emphasizing the importance of transparency and personal engagement with the content. With the potential of AI in increasing industry productivity, use of AI in generating a report is acceptable. However, students should refrain from using AI to solve questions in assignments to practice questions to help prepare for the midterm and final examinations.

Copyright

- The materials (including the course outline, slides, posted notes, videos, labs, projects, assignments, quizzes, exams, and solutions) created for this course are intended for personal use only. They may not be reproduced, redistributed, or transmitted in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise—without written permission from the author(s), both during and after the semester.
- No audio or video recording of lectures or tutorials is allowed unless a prior written permission is obtained from the instructor.

Learning and Working Environment

The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at equity@carleton.ca
We will strive to create an environment of mutual respect for all through equity, diversity, and inclusion within this course. The space which we work in will be safe for everyone. Please be considerate of everyone's personal beliefs, choices, and opinions.

Academic Accommodations

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

- **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 .
  You should request your academic accommodations in the Ventus Student Portal, for each course at the beginning of every term. For in-term tests or midterms, please request accommodations at least two (2) weeks before the first test or midterm. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

- **Accommodation for Student Activities**: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor 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, see the Senate Policy on Accommodation for Student Activities.

- **Pregnancy Obligation**: Please contact your instructor 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, please review the Student Guide to Academic Accommodation (PDF).

- **Religious Obligation**: Please contact your instructor 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, please review the Student Guide to Academic Accommodation (PDF).

- **Survivors of Sexual Violence**: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the Sexual Violence Prevention & Survivor Support.

Engineering Academic Advising

The Engineering Academic Support Service assists undergraduate engineering students with course selection, registration, and learning support from first-year through to graduation.
Academic Advisors Contact can be found here: https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/.

Student Mental Health and Wellness

As a university student you may experience a range of mental health challenges that can significantly impact your academic success and overall well-being. Carleton's **Wellness Services Navigator** is designed to help students connect with mental health and wellness resources.
If you need to talk to someone from the department for more information and support with connecting to resources, you can contact the following faculty members, depending on your program. Or contact the department at or CEEUGChair@cunet.carleton.ca.

ACSE: Prof. Elie Azar
Email: Elie.Azar@carleton.ca, Office: 3432 Mackenzie
CIVE: Prof. Christian Viau
Email: Christian.Viau@carleton.ca , Office: 4535 Mackenzie
ENVE: Prof. Cole Van De Ven
Email: cole.vandeven@carleton.ca , Office: 6210 Canal Building

Here is a list of on-campus and off-campus recourses:

1. **Carleton's Wellness Desk**: Located at 204A MacOdrum Library, is a space for students to learn about resources, connect with our Wellness Coordinator, and decompress during stressful times of the year. You can pop into the Wellness Desk any time during its hours of operation – no appointments necessary! https://wellness.carleton.ca/mental-health/wellness-desk/
2. **Carleton's Health and Counselling Services:** To book an appointment contact the main clinic by calling (613) 520-6674. If urgent, let the Patient Care Coordinator know or go in person to the main clinic (2500 Carleton Technology and Training Centre Building) and indicate that they are in crisis and need to speak to someone right away. https://carleton.ca/health/
3. **Residence Counselling and Wellness Service:** Counselling services specifically for students in residence. https://carleton.ca/health/residence-counselling/
4. **Therapy Dogs:** Carleton's therapy dogs are around campus with their owners (who are Carleton University staff and faculty) to comfort and provide support to help you thrive as a university student. https://wellness.carleton.ca/mental-health/therapy-dogs/
5. Emergencies and Crisis and Emergency Numbers
6. **Good2Talk (1-866-925-5454):** Good2Talk is a free, confidential helpline providing professional counselling and information and referrals for mental health, addictions and well-being to post-secondary students in Ontario, 24/7/36 https://good2talk.ca/
7. **The Walk-In Counselling Clinic (off-campus community resource):** The Walk-in Counselling Clinic has offices in various locations across Ottawa and the greater Champlain region that are open 7 days a week. Individuals will be assisted, with no appointment, on a first-come, first-serve basis during the Walk-in Counselling Clinic hours. The Walk-in Counselling Clinic **offers services in many languages** and is free and confidential. More information can be found at: https://walkincounselling.com/
8. **Distress Centre of Ottawa and Region**: Available 10am-11pm, 7 days/week, 365 days/year. **Distress Line:** 613-238-3311, **Crisis Line:** 613-722-6914 or 1-866-996-0991, **Text:** 343-306-5550. https://www.dcottawa.on.ca/
9. **Distress and Crisis Ontario**, Available for chat 2 pm – 2 am EST. https://www.dcontario.org/
10. **BounceBack Ontario (Toll-Free: 1-866-345-0224)** is a free skill-building program managed by the Canadian Mental Health Association (CMHA). It is designed to help adults and youth 15+ manage low mood, mild to moderate depression and anxiety, stress or worry. Delivered over the phone with a coach and through online videos, you will get access to tools that will support you on your path to mental wellness. https://bouncebackontario.ca/.