CARLETON UNIVERSITY
Department of Civil and Environmental Engineering

Geometric Design CIVE5308F **Fall 2017**

Course Objectives

In this course, civil engineers and graduate students will have a deep insight into the basic principles of highway geometric design. Students will examine the components of the highway system, their interrelationships, their abilities and limitations, and their interrelation with the design elements. Safety and human factors and their interaction with the highway elements will be investigated. Coverage of new and evolving concepts and the latest research findings are among the course's major objectives.

Course Outline:

Week	Topic
1	***Introduction and Review:*** Highway Networks; Driver, Vehicle, and Road Characteristics; Cross-Section Elements; Vertical Alignment; Horizontal Alignment
2	***A look at Geometric Design Guides:*** AASHTO Green Book; TAC Design Guide
3,4	***Speeds and Sight Distance:*** Relevant Speeds; Determining Operating Speed; Stopping Sight Distance; Passing Sight Distance; Decision Sight Distance; Preview Sight Distance
5,6	***Alignment and Three-Dimensional Coordination:*** Alignment Elements; Sight Distance; Vehicle Dynamics; Aesthetics and Perception; Drainage
7,8	***Design Consistency:*** Background; Consistency Criteria; Operating Speed; Vehicle Stability; Driver Workload; Alignment Indices
9	***Probabilistic Highway Design:*** Deterministic vs. probabilistic highway design; Methods of Reliability Analysis; Reliability Analysis in Highway Engineering
10	***Road Safety:*** Black Spot Programs; Analysis of Crash Prone Locations; Highway Safety Manual; Road Safety Audits
11	***Human Factors:*** The Driving Task; The Information System; Driver Adaptation; Driver Error; New Vehicle Technologies
12	***Catching up and Review***

Marking Scheme (might change subject to course enrolment):

Class Participation	10%
Term paper/ Project	30%
Online Quizzes	30%
CuPortfolio Entries	20%
Term Presentation	10%

Total	100%

Course Instructor:

Dr. Y. Hassan
Room 3442 ME
Phone: 8625
E-mail: yasser_hassan@carleton.ca

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. These materials may not be reproduced or redistributed without prior written consent of the author(s).
- The evaluation of class 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 note) in all classes will have their participation grade transferred to the quizzes.
- In this course, the instructor will be using PollEverywhere, 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 or respond via Twitter. 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.
- Considerable percentage of the mark will be deducted for messy term work.
- In this course, students are expected to use cuPortfolio to document their learning on a weekly basis and make a formal in-class presentation related to their cuPortfolio. Together, the entries and presentation account for 30% of the course grade. This is contingent on having a group created for the course in cuPortfolio. If this cannot be done in a timely manner, the grading scheme will be adjusted.
- University of Ottawa students can get access to cuLearn by filling the form available at https://gradstudents.carleton.ca/wp-content/uploads/Access-to-CULearn.pdf
- 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/
  - **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/
  - **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/

References:

- Lamm, R., Psarianos, B., Mailaender, T. *Highway Design and Traffic Safety Engineering Handbook.* McGraw-Hill Companies, Inc., New York, NY. 1999.
- Transportation Association of Canada, TAC. *Geometric Design Guide for Canadian Roads*. Ottawa, ON, 2017.
- Transportation Association of Canada, TAC. *Geometric Design Guide for Canadian Roads*. Ottawa, ON, 1999.
- American Association of State Highway and Transportation Officials, AASHTO. *A Policy on Geometric Design of Highways and Streets*. Washington, D.C., 2011.
- Other technical publications.