

Western University  
Faculty of Engineering  
*Department of Civil and Environmental Engineering*

**CEE 9695 – Special Topics: Introduction to Smart Cities**  
COURSE OUTLINE Summer 2025

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**DESCRIPTION**

This course offers a comprehensive introduction to smart mobility in smart cities. It addresses the nature and characteristics of smart cities and smart mobility, providing a focus on smart mobility services within urban areas and the opportunities and challenges associated with the application of advanced technologies. The definition of mobility adopted for the course is the ease of movement or travel within an urban area. The course places an emphasis on decarbonization possibilities and the potential for smart city mobility services to reduce emissions and fuel consumption while optimizing modal use, along with risk identification and management using a structured approach.

A focus is also placed on the need for end-to-end decision support for smart city mobility services. Overall, the course provides a framework for effective smart mobility planning, design, operations and performance management.

Additional topics covered include:

Policies and strategies associated with smart mobility in smart cities, including a description of the organizational arrangements required to support smart cities technology applications

The definition of appropriate institutional, funding, and commercial arrangements to assist interested practitioners to solve what is often their biggest challenge

Coverage of smart mobility operational management, explaining the likely impact of smart cities on transportation operations

How to attain balance between policy objectives and the avoidance of undesirable side effects such in urban areas

For public and private sector professionals in the smart cities community, the course provides an essential and easy-to-understand learning resource that will allow them to comprehend the state-of-the-art progress in the field and be prepared for future advancements in this important and rapidly developing industry.

**ENROLLMENT RESTRICTIONS**

Enrollment in this course is open to graduate students with bachelor's degree in civil and environmental engineering or similar, as well as any student who has obtained permission to enroll in this course from the course instructor and/or the Graduate Chair (or equivalent) from the student's home program.

**PREREQUISITES**

None

**CONTACT INFORMATION**

Course instructor: Bob McQueen, BSc, Civil Engineering, MSc, Highways and Transport

Email address: [bob@bobmcqueenandassociates.com](mailto:bob@bobmcqueenandassociates.com)

Lecture hours: 36 contact hours

Office hours: Weekly office hours will be held either in person or via Zoom by appointment

Administrative Support: PhD and MEng students: ceeresearchgrad@uwo.ca

MEng students: ceeprofessionalgrad@uwo.ca

**TOPICS**

Topic #	Description	Learning Activities	Tentative timeline
1	<b>Introduction To Smart Cities</b>		
	Lesson 1: Smart City Overview Lesson 2: Defining The Problems to Be Addressed by A Smart City	<ul style="list-style-type: none"> <li>• Two lectures</li> <li>• Additional reading materials</li> </ul>	Week 1
2	<b>Global Progress in Smart Mobility</b>		
	Lesson 3: A Review of Progress in Smart Mobility In Smart Cities Around The World  Lesson 4: Defining The Value and Benefits of Smart Mobility	<ul style="list-style-type: none"> <li>• Two lectures</li> <li>• Additional reading materials</li> <li>• Project-1</li> <li>• Quiz (during class hours)</li> </ul>	Week 2

<b>3</b>	<b>Planning Smart Cities</b>		
	Lesson 5: The Elements of Smart Mobility Within a Smart City  Lesson 6: Planning For Smart Cities	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Additional reading materials</li> <li>• Practice problems set</li> <li>• Help session</li> <li>• Assignment 1</li> </ul>	Week 3
<b>4</b>	<b>Smart Mobility Technology Applications</b>		
	Lesson 7 : A Review of Smart Mobility Technology Applications  Lesson 8: Opportunities And Challenges That Have Been Addressed in Smart Mobility	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Additional reading material</li> <li>• Part of the lecture will be used as a help session</li> <li>• Practice problems set</li> <li>• Quiz (during class hours)</li> </ul>	Week 3- 4
<b>5</b>	<b>The Keys to Success in Smart Cities</b>		
	Lesson 9: Smart Mobility Success Framework Lesson 10: Smart Mobility Performance Management	<ul style="list-style-type: none"> <li>• Two lectures</li> <li>• Additional reading material</li> <li>• Assignment 2</li> </ul>	Week 4-5
<b>6</b>	<b>People, Policy, And Strategy in Smart Cities</b>		
	Lesson 11: The People Aspects of Smart Mobility Lesson 12: Policy And Strategy Within Smart Mobility in Smart Cities	<ul style="list-style-type: none"> <li>• Two lectures</li> <li>• Additional reading material</li> <li>• Part of the second lecture will be used as a help session</li> </ul>	Week 5
<b>7</b>	<b>Organization And Operation of Smart Cities</b>		
	Lesson 13: Successful Organization for Smart Mobility in Smart Cities  Lesson 14: Operational Management in Smart Mobility in Smart Cities	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Additional reading material</li> <li>• Practice problems set</li> <li>• Final Project Presentations</li> </ul>	Week 6-7

**SPECIFIC LEARNING OUTCOMES**

<b>Degree Level Expectation</b>	<b>Weight</b>	<b>Assessment Tools</b>	<b>Outcomes</b>
<b>Depth and breadth of knowledge</b>	30%	<ul style="list-style-type: none"> <li>• Assignments</li> <li>• Examinations</li> </ul>	<p>Discuss important concepts and theories related to Smart Mobility in Smart Cities</p> <ul style="list-style-type: none"> <li>• Awareness of important current challenges and opportunities in Smart Mobility in Smart Cities</li> </ul> <p>Discuss computational and/or empirical methodologies for planning, designing, and operating Smart Mobility in Smart Cities</p>
<b>Application of knowledge</b>	35%	<ul style="list-style-type: none"> <li>• Assignments</li> <li>• Examinations</li> </ul>	<ul style="list-style-type: none"> <li>• Ability to apply knowledge in a rational way to analyze the effects of smart city mobility technology applications</li> <li>• Ability to use a coherent approach to evaluate the effectiveness of smart city mobility systems.</li> </ul>
<b>Communication skills</b>	15%	<ul style="list-style-type: none"> <li>• Projects</li> </ul>	<ul style="list-style-type: none"> <li>• Ability to communicate (oral and/or written) ideas, issues, results and conclusions clearly and effectively, related to smart cities and smart mobility</li> </ul>
<b>Awareness of limits of knowledge</b>	20%	<ul style="list-style-type: none"> <li>• Projects</li> <li>• Discussion/Debate</li> <li>• Class activities</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness of lessons learned from around the globe by prior practitioners and implementations</li> <li>• Understanding of the difference between theoretical and empirical approaches</li> <li>• Ability to acknowledge analytical limitations due to complexity of the urban environment</li> </ul>

**ASSESSMENTS**

Assessment Type	Material Covered	Tentative Due Date	Weight
Assignments (two)	Topics 1-3, 4 and 5	Week 4 &6	15%
Quiz (two)	Topics 1 and 4	Week 2 & 4	10%
Participation in class activities and discussion/debate “forums section of WL”	All the topics	Week 1- 6	10%
Projects (two)	Topics 1-2 and 5-7	Week 3 & 7	25%
Final exam	All the topics	Week 6	40%

**Activities in which collaboration is permitted:**

- Projects (Discussion is allowed)

**Activities in which students must work alone (collaboration is not permitted):**

- Assignments and Quizzes
- Final Exam

**Contact policy:**

- Contact instructor via email (above) or through messages in OWL
- Weekly Office hours are held via Zoom or briefly after the class
- A general FAQ section on the ‘forums’ section of OWL will be used for students to pose course-related questions so that all have the same information

**REQUIRED TEXTBOOK**

**No Textbook** is required, but it highly recommended to read from the following Textbooks:

- 1- McQueen, Shafi, Alkhyeli, Smart Mobility: Using Technology to Improve Transportation in Smart Cities”, Wiley-IEEE Press; 1st edition (August 13, 2024)
- 2- Comité technique 16 Exploitation des réseaux / Technical Committee 16 Network Operations, ITS Manual, Second edition, PIARC
- 3- McQueen, Bob, Big Data Analytics for Connected Vehicles and Smart Cities, Artech House (August 31, 2017)
- 4-

**OPTIONAL COURSE READINGS**

1. <https://blogs.cisco.com/industrial-iot/vision-zero-guaranteed>, Is Vision Zero Guaranteed? October 12, 2022
2. <https://blogs.cisco.com/industrial-iot/managing-the-environmental-impacts-of-european-roadways-and-intersections>, Managing the environmental impacts of European roadways and intersections, September 14, 2022
3. <https://blogs.cisco.com/industrial-iot/is-it-time-to-prod-your-roadways-with-a-stick> , Is it time to prod your roadways with a stick? August 24, 2022

**COURSE CONTENT**

The lecture notes are copyrighted to the instructor and legally protected. Do not post these lecture notes on any other website or online forums. The recording of the lectures of the course without permission from the instructor is prohibited. The illegal posting and sharing of the copyrighted course content could be subjected to legal actions.

**UNITS**

SI units will be used in lectures and examinations

**CHEATING, PLAGIARISM/ACADEMIC OFFENCES**

Academic integrity is an essential component of learning activities. Students must have a clear understanding of the course activities in which they are expected to work alone (and what working alone implies) and the activities in which they can collaborate or seek help; see information above and ask instructor for clarification if needed. Any unauthorized forms of help-seeking or collaboration will be considered an academic offense. University policy states that cheating is an academic offence. If you are caught cheating, there will be no second warning. Students must write their essays and assignments in their own words. Whenever students take an idea or a passage of text from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence. Academic offences are taken seriously and attended by academic penalties which may include expulsion from the program. Students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence at the following website: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_grad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)

**CONDUCT**

Students are expected to follow proper etiquette to maintain an appropriate and respectful academic environment. Any student who, in the opinion of the instructor, is not appropriately participating in course activities and/or is not following the rules and responsibilities associated with the course activities, will be reported to the Associate Dean (Graduate) (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Associate Dean (Graduate), the student could be debarred from completing the assessment activities in the course as appropriate.

**STATEMENT ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE (AI)**

The use of AI in the preparation of the project and assignments must be acknowledged in the submission. Please refer to the published [Provisional Guidance for the Use of Generative AI in Graduate Studies](#) at Western University.

**HEALTH/WELLNESS SERVICES**

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several health and wellness related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca/>.

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate chair), or other relevant administrators in their unit. Faculty of Engineering has a Student Wellness Counsellor. Information on how to schedule an appointment with the counsellor is available at: <https://www.eng.uwo.ca/undergraduate/academic-support-and-accommodations/Student-Wellness-Counselling.html>

Students who are in emotional/mental distress should refer to Mental Health@Western: <http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.

**SICKNESS**

Students should immediately consult with the instructor (for a particular course) or Associate Chair (Graduate) (for a range of courses) if they have problems that could affect their performance. The student should seek advice from the Instructor or Associate Chair (Graduate) regarding how best to deal with the problem. Failure to notify the Instructor or the Associate Chair (Graduate) immediately (or as soon as possible thereafter) will have a negative effect on any appeal. Obtaining appropriate documentation (e.g., a note from the doctor) is valuable when asking for accommodation due to illness.

Students who are not able to meet certain academic responsibilities due to medical, compassionate, or other legitimate reason(s), could request for academic consideration. The Graduate Academic Accommodation Policy and Procedure details are available at:

<https://www.eng.uwo.ca/graduate/current-students/academic-support-and-accommodations/index.html>

**STATEMENT ON GENDER-BASED AND SEXUAL VIOLENCE**

Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who is going through or has gone through these traumatic events. If you are experiencing or have experienced GBSV (either recently or in the past), you will find information about support services for survivors, including emergency contacts at the following website: [https://www.uwo.ca/health/student\\_support/survivor\\_support/get-help.html](https://www.uwo.ca/health/student_support/survivor_support/get-help.html)

To connect with a case manager or set up an appointment, please contact [support@uwo.ca](mailto:support@uwo.ca)

**ACCESSIBLE EDUCATION WESTERN (AEW)**

Western is committed to achieving barrier-free accessibility for all its members, including graduate students. As part of this commitment, Western provides a variety of services devoted to promoting, advocating, and accommodating persons with disabilities in their respective graduate program.

Graduate students with disabilities (for example, chronic illnesses, mental health conditions, mobility impairments) are strongly encouraged to register with Accessible Education Western (AEW):

[http://academicsupport.uwo.ca/accessible\\_education/index.html](http://academicsupport.uwo.ca/accessible_education/index.html)

AEW is a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both AEW and their graduate programs (normally their Graduate Chair and/or Course instructor) to ensure that appropriate academic accommodations to program requirements are arranged. These accommodations include individual counselling, alternative formatted literature, accessible campus transportation, learning strategy instruction, writing exams and assistive technology instruction.