



CIV E 719

Advanced Pavement Management Systems

Winter 2027

Objectives:

The objective of this course is to provide graduate students with an advanced and in-depth understanding of modern pavement management systems (PMS), with emphasis on the management, maintenance, rehabilitation, and construction of asphalt pavement infrastructure.

The course focuses on the application of data analytics, lifecycle optimization, and sustainable decision-making in pavement management. Students will learn how to assess pavement condition, analyze field and laboratory data, predict pavement performance, and develop cost-effective maintenance and rehabilitation strategies using real-world datasets, tools, and practical case studies. Particular attention is given to the interaction between office-based analysis and field-based activities across different phases of pavement design, construction, monitoring, maintenance, and rehabilitation.

Upon completion of the course, students will gain advanced technical knowledge and practical skills related to the sustainable and cost-effective management of pavement infrastructure, one of the most important components of civil engineering systems. A major component of the course is a term presentation, in which each student will identify a topic related to advanced pavement management systems and develop a detailed technical presentation addressing a specific problem or research question. This assignment is intended to strengthen students' research, analytical thinking, and technical writing skills by demonstrating how the knowledge and methods gained in the course can be applied to evaluate, analyze, and propose solutions to real-world pavement management challenges.

Learning outcome:

- Explain the fundamental and advanced principles of modern pavement management systems, with emphasis on asphalt pavement infrastructure, maintenance, rehabilitation, and construction management.
- Assess pavement condition using field observations, performance indicators, laboratory results, and real-world pavement condition datasets.
- Analyze pavement-related data using appropriate analytical methods and tools to support evidence-based pavement management decisions.
- Predict pavement performance and deterioration trends to support maintenance planning, rehabilitation selection, and long-term infrastructure management.
- Develop cost-effective and sustainable maintenance and rehabilitation strategies using lifecycle analysis, optimization concepts, and practical engineering considerations.
- Integrate office-based analysis with field-based practices to evaluate real-world pavement management problems and communicate technical solutions through a research-based term presentation.

Instructor

Dr. Leila Hashemian
Associate Professor
Department of Civil and Environmental Engineering
ICE-7-255
hashemia@ualberta.ca

Office hours

By appointment

Lectures

Dates	Jan. 07 – April. 08	Thursdays	2:00-04:50 pm
Location	NRE 2-122		

Important Dates

Deadline for selection of references for the presentation 1	Jan. 21, 2027
Deadline for selection of references for the presentation 2	Feb. 11, 2027
Deadline for selection of term paper topic and abstract submission	Mar. 25, 2027

Reference textbooks

- Nicholas Garber and Lester Hoel, Traffic and Highway Engineering, 5th Edition, Ch. 19 Flexible Pavement Design, Ch. 21 Pavement Management, Ch. 18 Pavement Materials (Ch. 18 for homework assignment)
- CIS from InfraGudie of National Research Council of Canada (NRC)
- Pavement Network Analysis from Ch. 5 from TAC Pavement Design and Mgmt. Guide
- LCA Methodologies from Ch. 10 from Bradley Striebig Book on Eng. & Sustainable Development
- LCAA Procedures from EUPave and FHWA Guide on LCCA

Reading material (for the term papers)

Publications, Journals and Conference Proceedings of the following organizations:
Transportation Research Board (TRB), International Society of Asphalt pavement (ISAP),

Superpave (SHRP), Transportation Association of Canada (TAC), ASCE, CSCE, and any other recognized publications relevant to the subject.

Evaluation

Class participation	10%
Presentation 1	15%
Presentation 2	15%
Term paper presentation	25%
	(10% topic and abstract, 15% presentation)
Final exam	35%
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<i>Total</i>	<i>100%</i>



Course Schedule

January 2027			
<i>Thursday-07</i>	<i>Thursday-14</i>	<i>Thursday-21</i>	<i>Thursday-28</i>
Overview of Civil Infrastructure System (CIS) and Pavement Network Analysis	Life Cycle Assessment (LCA) Methodologies, Life Cycle Cost Analysis (LCCA) Procedures-part 1	Life Cycle Assessment (LCA) Methodologies, Life Cycle Cost Analysis (LCCA) Procedures-part 2	Presentation 1- CIS-LCA-LCCA
February 2027			
<i>Thursday-04</i>	<i>Thursday-11</i>	<i>Thursday-18</i>	<i>Thursday-25</i>
Pavement Management System Overviews, Basic Component of PMS, Pavement Conditions Data, Pavement Conditions Surveys, ASTM Method -1	Pavement Management System Overviews, Basic Component of PMS, Pavement Conditions Data, Pavement Conditions Surveys, ASTM Method -2	Reading week-no class	Class presentations PMS
March 2027			
<i>Thursday-04</i>	<i>Thursday-11</i>	<i>Thursday-18</i>	<i>Thursday-25</i>
Pavement Maintenance Prioritization and Optimization-1	Guest speaker presentation	Pavement Maintenance Prioritization and Optimization-2	Guest speaker presentation
April 2027			
<i>Thursday-01</i>	<i>Thursday-08</i>		
Final presentations	Final exam		