



CIV E 618

Advanced Pavement Material and Design

Winter 2027

Objectives:

The objective of the course is to introduce graduate students to the main concepts of the design and construction of asphalt pavement systems.

The first part of the course refreshes students' knowledge of pavement structures, materials and testing. Also, introducing Superpave classification for asphalt binders.

The second part of the course addresses the advanced analysis/design of flexible pavement structures, including Empirical and Mechanistic-Empirical methods considering climate and environmental impacts.

The third part of the course deals with identifying typical flexible pavement failures and maintenance methods. Also, the application of non-destructive techniques such as falling weight deflectometer (FWD) testing to evaluate pavement load-bearing capacity and layers stiffness will be discussed.

The students will have the opportunity to interact with professionals in the pavement industry who will serve as guest speakers during the course.

Learning outcome:

- Describe pavement material specifications (soil and asphalt binder) and design factors of flexible pavements.
- Define materials requirements and characteristics for pavement construction and rehabilitation.
- Analyze stresses and strains in flexible pavement layers using computer software.
- Design of flexible pavement using Empirical and Mechanistic-Empirical Methods.
- Identify pavement failures and maintenance methods
- Evaluate pavement load-bearing capacity and layers stiffness using non-destructive testing methods.

Instructor

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Office hours

By appointment

Lectures

Dates	Jan. 05 – April. 06	Tuesdays	2:00-04:50 pm
Location	NRE 2-122		

Important Dates

Deadline for selection of references for the presentation 1	Jan. 19, 2027
Deadline for selection of references for the presentation 2	Feb. 09, 2027
Deadline for selection of term paper topic and abstract submission	Mar. 23, 2027

Reference textbooks

Pavement Engineering - Principles and Practice (3rd Edition).

Superpave Fundamentals, Reference Manual

Shell Bitumen Handbook (6th Edition)

Reading material (for the term papers)

Publications, Journals and Conference Proceedings of the following organizations:

Transportation Research Board (TRB), Canadian Technical Asphalt Association (CTAA), American Association of Paving Technologists (AAPT), International Society of Asphalt pavement (ISAP), Superpave (SHRP), Transportation Association of Canada (TAC), ASCE, CSCE, CJCE, IJPE, IJPRT, JTE 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>Tuesday-05</i>	<i>Tuesday-12</i>	<i>Tuesday-19</i>	<i>Tuesday-26</i>
Introduction to the pavement system, flexible and rigid pavements	Pavement system, flexible and rigid pavements (2) Asphalt binders	Asphalt binder Classifications	Class presentations (topic: asphalt binder-each presentation: 10 min/5 min Q&A)
February 2027			
<i>Tuesday-02</i>	<i>Tuesday-09</i>	<i>Tuesday-16</i>	<i>Tuesday-23</i>
Pavement Workshop	Aggregates	Reading week-no class	Class presentations (topics: aggregates/asphalt mix-each presentation: 10 min/5 min Q&A)
March 2027			
<i>Tuesday-02</i>	<i>Tuesday-09</i>	<i>Tuesday-16</i>	<i>Tuesday-23</i>
Pavement design 1 (empirical)	Guest speaker presentation	Pavement design 2 (mechanistic/empirical)	Guest speaker presentation
March 2027		April 2027	
<i>Tuesday-30</i>	<i>Tuesday-06</i>		
Final presentations	Final exam (take home)		