Course Specification
(Bachelor)

Course Title:	Pavement Materials
Course Code:	CE4304
Program:	Bachelor of Science in Civil Engineering
Department:	Civil Engineering Department
College:	College of Engineering and Architecture
Institution:	Umm Al-Qura University
Version:	1
Last Revision Date:	31 January 2025

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A. General information about the course:

1. Course Identification

1. Credit hours: (3 hours)					
2. Course type					
A.	☐University	☐College	☐Department	☐Track	Others
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: (Level 9 or 10 / 5th Year)					
4. Course General Description:					
The course covers highway design control and criteria. It covers mix design of flexible and rigid pavements. It also includes characterization of subbase, base and surface course materials. The properties of asphalt concrete as a binder in flexible pavements and asphalt mix design by Marshal and SuperPave Method are also included.					
5. Pre-requirements for this course (if any)**:**					
CE 4303					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The course main objectives are to develop the: • **Ability to understand pavement materials as coarse aggregate, fine aggregate, asphalt binder and additives.** • **Ability to select the proper materials for pavement layers and mix design for each layer.** • **Ability to demonstrate pavement distresses for flexible and ridge pavement.** • **Ability to understand pavement design methods such as Marshal and SuberPave.**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	42	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	42
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		42

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	To demonstrate fundamental knowledge of paving materials such as aggregate, asphalt binder and additives.	K1	Lectures	Home work Written examinations
1.2	To outline mix design methods: Marshall, and Superpave.	K2	Lectures	Home work Written examinations
1.3	To demonstrate knowledge of engineering properties of pavement materials using relevant laboratory procedures and various asphalt mix design methods	K3	Lectures	Team project
2.0	Skills			

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.1	To select the proper flexible and rigid pavement materials.	S4	Lectures Project and report	Team prject
2.2	To formulate relevant analysis, compare options and develop the solutions.	S5	Home work Lecture	Team project
2.3	To undertake characterization of highway materials and asphalt mix design by various methods.	S6	Lecture	Homework
3.0	**Values, autonomy, and responsibility**			
3.1	To integrate professionally and ethically with multi-disciplinary teams in highway engineering projects, material characterization and laboratory testing.	V1	Lecture	Homework Exam
3.2	To use professional codes for evaluating structural highway design problems and demonstrate ability of life-long learning.	V2	Lecture	Homework Exam
3.3	To use expertise in highway design projects for serving society and providing solutions for Hajj and Umrah.	V3	Lecture	Homework Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Coarse Aggregate properties	3
2.	Fine Aggregate Properties	3
3.	Mining and Processing of Aggregate	3
4.	Asphalt binder properties	3
5.	Asphalt Binders (Penetration Grading)	3

6.	Asphalt Binders (Viscosity Grading)	3
7.	Asphalt Binders (PG Grading)	3
8.	Earthwork Computation and Mass Diagram (Volumetric phase diagrams)	3
9.	Mix Types and Properties	3
10.	Pavement distress	3
11.	Marshal mix design	3
12.	SuperPave mix design	3
13.	Plant Operations	3
14.	Materials Selction and construction for pavement projects	3
Total		**42**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework	Bi-weekly	10%
2.	Mid-Term exam	7	25%
3.	Project	7 to 12	15%
4	Final Exam	15/16	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	A.T. Papagiannakis and E.A. Masad, "Pavement Design and Materials" Ist Edition, John Wiley & Sons, Inc., 2008.
Supportive References	• Y. H. Huang, “Pavement Analysis and Design”, Pearsons, 2012. Nicholas J. Garber and Lester A. Hoel, “Traffic and Highway Engineering”, 4th Edition, Cengage Learning, USA, 2010
Electronic Materials	• http://www.sciencedirect.com. • http://www.trb.org/Main/Home.aspx • http://www.ite.org/ • https://bookstore.transportation.org/ • http://www.trl.co.uk/reports-publications/
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom**
Technology equipment (projector, smart board, software)	**Datashow**
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct
Effectiveness of Students assessment	Program Lead Students	Direct
Quality of learning resources	Peer Reviewer	Direct
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**CIVIL ENGINEERING COUNCIL**
REFERENCE NO.	**THE FIFTEENTH SESSION OF THE ACADEMIC YEAR 1446**
DATE	**30 APRIL 2025**

