University of Engineering and Technology, Taxila
Department of Civil Engineering

Course Title: Transportation Engineering-II (CE-404)

Pre-requisite(s): Transportation Engineering-I

Credit Hours: 2 + 1

Contact Hours: 2 + 3

Text Book(s): **1.** Principles of Highway Engineering and Traffic Analysis
by Fred L. Mannering

2. Pavement Analysis and Design
by Yang H. Huang

3. Airport Planning and Management
by Alexander T. Wells

Reference Book(s): **1.** Fundamentals of Transportation Engineering: A Multimodal Systems Approach
by Jon D. Fricker, Robert K. Whitford

2. Planning and Design of Airports
by Robert Horonjeff , Francis McKelvey, William Sproule, Seth Young

Catalog Data:

Introduction to Pavement Engineering; Highway Engineering; Pavement Design; Runway Engineering; Introduction to relevant tools.

Course Objectives:

The objective of this course is to introduce students to Pavement Engineering fundamentals for roads. Emphasis is on the safe and efficient operation of roadway by adopting suitable pavement design. By the end of this course students will be able to evaluate, analyze, and design safer roads.

Course Learning Outcomes:

At the end of this course, the student will:

CLO 1: Obtain an understanding of the fundamentals of Pavement Engineering.

CLO 2: Learn both quantitative and computerized technique for solving problems related to Highway and Runway Engineering.

CLO 3: Apply principles of Pavement Engineering to evaluate, analyze and design asphalt mix and asphalt pavement.

CLO 4: Demonstrate the capability to write a technical report and communicate the results to other Engineering professionals

Course Contents:

Highway Engineering

- The pavement
- Types of pavement
- The principal of pavement design
- Two approaches to pavement design
- Pavement design standards
- Axle loads, equivalent single axle load
- Classification of commercial vehicles
- Axle loading of commercial vehicles
- The influence of axle configuration and loading on the damaging effect
- Contact area between the tyre and the road
- Repetition and impact factors
- Load distribution characteristics
- Methods of pavement design
- AASHTO pavement design method
- Group index method
- CBR Method
- Westergaurd method
- Resilient behavior of unbound granular materials
- Pavement failures, construction and maintenance
- Pavement evaluation and rehabilitation
- Introduction to non-destructive testing

Runway Engineering

- Airport planning
- Type and elements of airport planning, factors affecting airport site selection
- Runway lighting
- Airport drainage systems
- Air-characteristics.
- Characteristics of transport category aircraft.
- The effect of aircraft performance on runway length.
- Various runway configurations.
- Comparison of highway and airport pavements.

Grading Policy:

Sr. No.	Grading	% of Total Marks
1	Assignments	10
2	Quizzes	10
3	Lab. Work	20
4	Midterm Exam	20
5	Final Exam	40
	Total	**100**

Student Learning Outcomes:

Upon successful completion of this course students should know about pavement and runway engineering and will be able to perform pavement design manually and using specified tools.

Course Professional Outcome/Industrial Usage:

Students will be able to understand pavements, their types and behavior under traffic loading and will be able to design pavements. Students will be able to work in the transportation engineering industry.

CLO's / PLO's	CLO 1	CLO 2	CLO 3	CLO 4
PLO 1 (Engineering Knowledge)	✓	✓		✓
PLO 2 (Problem Analysis)			✓	
PLO 3 (Design/Development of Solutions)			✓	
PLO 4 (Investigation)			✓	
PLO 5 (Modern Tool Usage)		✓		✓
PLO 6 (The Engineer and Society)			✓	
PLO 7 (Environment and Sustainability)	✓			
PLO 8 (Ethics)				✓
PLO 9 (Individual and Team work)				✓
PLO 10 (Communication)				✓
PLO 11 (Project Management)				
PLO 12 (Lifelong Learning)				

CLOs / Assessment Modules	CLO 1	CLO 2	CLO 3	CLO 4
Assignments	✓	✓	✓	✓
Quizzes	✓	✓	✓	
Midterm Exam	✓	✓	✓	
Final Exam	✓	✓	✓	