

Bridge Engineering

Course Code CE-414	Credit Hours 3-0
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Course Description

Text Book:

Reference Book:

Prerequisites:

CE-206 PRC-II, CE-307 Structural Analysis II, CE-411 Steel Structures, CE-412 Design of Concrete Structures (preferable).

ASSESSMENT SYSTEM FOR THEORY

	Without Project (%)	With Project/Complex Engineering Problems (%)
Quizzes	15	10-15
Assignments	10	5-10
Mid Terms	25	25
Project	-	5-10
End Semester Exam	50	45-50

ASSESSMENT SYSTEM FOR LAB

Lab Work/ Psychomotor Assessment/ Lab Reports	70%
Lab Project/ Open Ended Lab Report/ Assignment/ Quiz	10%
Final Assesment/ Viva	20%

Teaching Plan

Week	Topic Covered
1-2	Introduction <ul style="list-style-type: none"> • Types of bridges. • Historic perspective. • Bridge Terminologies. • Superstructure and Substructure components. • Failure and limits states. • Types and magnitude of loads acting on various bridge types. • AASHTO LRFD design Code and West Pakistan Highway Code of Bridges (WPHCB)

3-4	<p>Analysis Methods of Bridges, Loads & Limit states</p> <ul style="list-style-type: none"> • Computation of design Load and load combinations. • Positioning and sizing of structural members for gravity and lateral loads. • Material Properties needed for analysis and design. • Geometric Considerations, including spans, skew and vertical clearance.
5-6	<p>Analysis and Design Process: Review of applicable design codes. Introduction to AASHTO codes</p> <p>Analysis of Bridges</p> <ul style="list-style-type: none"> • Various Analysis Methods for complete bridge structure for Governing loads. • Analysis of individual super-structure members (Girder, deck, diaphragms, etc.) • Analysis of individual sub-structure members (Pile cap, piles, columns, bearing pad, abutment and back wall, transoms).
7-8	<p>Design of Super-Structure. Bridge Structural Elements Design</p> <p>Design of Bridge Systems</p> <ul style="list-style-type: none"> • Design of all structural members and connections followed by complete Design. • Detailing of Abutments, Retaining and Wing walls. • Durability, Serviceability, Hydrostatic, Geotech and temperature considerations on Design. • Bridge Structural Drawings - Assimilation and comprehension. <p>Modern Tools and Software Utilization</p> <ul style="list-style-type: none"> • Tutorial on Training utilizing Bridge Engineering software. • Semester design Project related to Bridge Engineering. <p>CEP</p>
9	MSE
10-12	<p>Pre-stressed Bridge Elements (Concrete)</p> <p>Introduction to Prestressed Concrete Bridge (Highway)</p> <ul style="list-style-type: none"> • Types and Placement of post-tensioned girder • Capacity analysis of a Girder under various load combinations. • Losses associated with Post tensioned Bridge Girders. • Flexural and Shear design of girders including reinforcement placement. • Diaphragm, and auxiliary structural members.
13-14	<p>Introduction to Plate Girder Steel Bridge (Railway / Curved)</p> <ul style="list-style-type: none"> • Structural behavior of Plate Girders • AISC Design Requirements. • Flexural and Shear strength / design of plate girders. • Design of Bearing and intermediate stiffeners • Welding design of plate girders
15-16	Design of Sub-Structure. Foundations and pile design
17	CEP Presentation
18	ESE

Practical: Nil