Bridge Engineering

Course Code	Credit Hours
CE-414	3-0

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 No	Topics/Learning Outcomes
1-2	Introduction to Bridge Engineering. Types of bridges. **(Topic Deleted)** **Introduction** • 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

	• 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. **(Topics Added)**
3-4	Analysis and Design Process: Review of applicable design codes. Introduction to AASHTO codes **(Topic Deleted)** **Analysis of Bridges** • 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). **(Topics Added)**
5-6	Analysis Methods of Bridges **(Topic Deleted)**
7	OHT-1
8-9	Design of Super-Structure. Bridge Structural Elements Design **(Topic Deleted)** **Design of Bridge Systems** • 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. **Modern Tools and Software Utilization** • Tutorial on Training utilizing Bridge Engineering software's. • Semester design Project related to Bridge Engineering. **(Topics Added)** Pre-stressed Bridge Elements (Concrete) **(Topic Deleted)**

	Introduction to Prestressed Concrete Bridge (Highway) • 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. **(Topics Added)**
10-11	Design of Super-Structure. Bridge Structural Elements Design Plate girder Element (Steel) **Introduction to Plate Girder Steel Bridge (Railway / Curved)** • 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 **(Topics Added)**
12-13	Design of Sub-Structure. Foundations and pile design
14	OHT-2
15-16	Group Semester Project **(Topics Added)**
17-18	**End Semester Exam**

Practical: Nil