CE 414 – Bridge Engineering

Code and Name: CE 414 – Bridge engineering
Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:
- Bridge Engineering: Jim Zhao, Demetrios Tonias, 3rd Edition, McGraw Hill, 2012

Other References:
- *AASHTO LRFD Highway Bridge Design Code, 2010*
- *STAAD V8i software*

Course Description:

Historical overview of bridge building and bridge types; bridge aesthetics and materials; bridge geometry; review of applicable design codes; loads (truck and lane, impact, braking, thermal, wind, seismic, hydraulic etc.) on bridges and force distribution; influence lines; grillage analysis for super-structure elements; design of concrete and steel girder bridges; design of sub-structure components (foundations, pier, abutment, wing walls, approach slab); bridge bearings and expansion joints; bridge maintenance and rehabilitation.

Pre-requisites: CE412 Indeterminate structural analysis
Co-requisites: None

Course Learning Outcomes:

With relation to ABET Student Outcomes (From Fall 2019-SOs: 1-7)

1. Recognize arrangement of structural members in commonly used bridge types (1)
2. Apply knowledge of structural mechanics in analyzing forces in bridge components (1)
3. Use numerical modelling procedures for analysis and design (2)
4. Compare and contrast bridge design with already learned methods for building component design (2)

Topics to be covered:

- History of bridge engineering, types of bridges, components of modern highway bridges
- Bridge layout, site selection, aesthetic consideration, design and construction practice
- Design Loads and design methods on highway bridges, introduction to AASHTO LRFD bridge design code
- Analysis and design of bridge super-structure components (deck, girder, diaphragm, railing)
- Analysis and design of bridge sub-structure components (pier, abutment, wing walls, foundations, bearings etc.)
- Introduction to seismic design of bridges
- Bridge maintenance and rehabilitation

Grading Policy:

The grading for the course are 60% coursework and 40% Final Exam.
The course work consists of two quizzes, home works and term project.