



CE 421 – Transportation Facility Design

Code and Name: CE 421 – Transportation Facility Design

Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:

- Traffic and Highway Engineering, N.J. Garber and L.A. Hoel, Cengage Learning, 5th Edition, 2015

Other References:

- *Transportation Engineering: Planning and Design* by Paul H. Wright, Norman J. Ashford, Robert J. Stammer. Wiley Fourth Edition (1998).

- *Principles of Highway and Traffic Analysis* by Mannering, F. L., Kilareski, W. P., and Washburn, S. S., John Wiley & Sons Inc. New Jersey, Fifth Edition (2013).

- *Course handouts: distributed on a regular basis to provide more information on the topic.*

Course Description:

Study of transportation facilities, with emphasis on highway engineering covering pavement material properties, asphalt mix design, geometric analysis and design, flexible and rigid pavements structural design. Pavement maintenance, rehabilitation and management. Railway elements and design requirements of horizontal and vertical alignments.

Pre-requisites: CE321 Transportation Engineering, CE322 Transportation Engineering Lab, CE351 Geotechnical Engineering

Co-requisites: None

Course Learning Outcomes:

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

1. Recognize the impacts of highway location process (4).
2. Analyze and design horizontal and vertical alignment of highways(2)
3. Classify and evaluate the properties of highway soil and bituminous materials (6)
4. Analyze and design asphalt mixtures (2)
5. Analyze and design flexible and rigid pavement (2)
6. Comprehend common approaches for pavement maintenance, rehabilitation and management (4)
7. Understand railway elements and comprehend design requirements of horizontal and vertical alignment (4)

Topics to be covered:

- Principles of highway location, survey methods, earthwork and final plans.
- Factors influencing highway design and design of parking facilities.
- Characteristics, engineering properties, classification, compaction and tests of soil for pavement design
- Description and uses of bituminous binders, properties and tests of asphalt materials and asphalt mixtures.
- Structural components of a flexible pavement, flexible pavement design method.
- Rigid pavement (materials, joints, types, stresses), thickness design method.
- Pavement management, maintenance and rehabilitation.
- Introduction to railways elements and design requirements

Grading Policy:

The grading for the course is: 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, and homework for the remaining 20% that is modified by the course instructor.

