Geometric Design of Highways

Course Code	Credit Hours
CE- 449	3-0

Course Description

The geometric design of highways deals with the dimensions and layout of visible features of the highway. The emphasis of the geometric design is to address the requirement of the driver and the vehicle such as safety, comfort, efficiency, etc. The features normally considered are the cross section elements, sight distance consideration, horizontal curvature, gradients, and intersection. The design of these features is to a great extend influenced by driver behavior and psychology, vehicle characteristics, traffic characteristics such as speed and volume. Proper geometric design will help in the reduction of accidents and their severity. Therefore, the objective of geometric design is to provide optimum efficiency in traffic operation and maximum safety at reasonable cost.

Text Book:

1. A Policy on Geometric Design of Highways and Streets, 2011, 5th ed. American Association of State Highway and Transportation Officials, Washington, D.C.

Reference Book:

1. Principles of Highway Engineering and Traffic Analysis by Fred L. Mannering, Walter P. Kilareski, Scott S. Washburn, 3rd Edition.
2. Traffic and Highway Engineering by Nicholas J. Garber, Lester A. Hoel, 4th Edition, Cengage Learning
3. Highway Capacity Manual (HCM 2000).

Prerequisites :

CE 242 Transportation Engineering–II

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	Introduction to Geometric Design and Factors Affecting Geometric Design
2	Principles of High Location and Design
3	Highway Geometric Design and Road Functional Classes
4	Design Control and Criteria - Design vehicle, Driver performance and Human Factors
5	Design Control and Criteria - Design speed, Traffic Characteristics and Design Hourly Volume
6-7	Sight Distance – Stopping, Decision and Passing Sight Distance
8	Horizontal Alignment – Types of Curves and Properties of Circular Curves, Super Elevation, Side Friction Factor and Stopping Sight Distance on Horizontal Curves and use of software for designing of horizontal alignment Use of Civil 3D to Perform Horizontal Alignment
9	**MID SEMESTER EXAM**
10-11	Vertical Alignment – Vertical Curve Fundamentals and Crest and Sag Vertical Curves, Grades, Climbing Lanes and Emergency Escape Ramps and use of software for designing of vertical alignment Use of Civil 3D to Perform Vertical Alignment
11-13	Cross-section elements – Travel way, Lane Width, Shoulders and Rumble Strip, Cross Slope, Side Slope, Right of Way and use of software for presenting highway cross-section. Use of Civil 3D to extract cross-sections
14-16	Intersection Design, Introduction to Highway Capacity Manual
17-18	End Semester Exam

Practical: Nil.