CE 307 - Geometric Design for Highways Fall 2017

Text: Garber, Nicholas, and Hoel, Lester, Traffic and Highway Engineering, 5th Edition, Cengage Learning, 2015, 2009, ISBN-13: 978-1-133-60515-7

Reference Texts: American Association of State Highway Officials A Policy on Geometric Design of Highways and Streets, 4th Edition, (AASHTO) 2001
ISBN# 1-56051-156-7
NJDOT Design Manual-Roadway,
http://www.state.nj.us/transportation/eng/documents/RDM/

Instructor: Professor Maaz Choudhry, P.E., 201-893-5644 (cell), mxc2746@njit.edu
Office Hours: by appointment (Colton 261)

Prerequisites: CE 200, CE 200A, CE 260

Date	Topic	Reading	
		Chapter	Pages
9/6	Introduction	1	All
		2	37-49
9/13	Traffic Engineering Studies, Highway Surveys and Locations	4, 14	93-106, 116-133, 729-745, 765-766
9/20	Transportation Planning, Traffic Characteristics	11, 3	All, All
9/27	Traffic Characteristics (cont), Design of the Alignment-Vertical Alignment	3, 15	All, 788-802
10/4	Design of the Alignment – Vertical Alignment (cont)	15	788-802
10/11	Horizontal Alignment	15	802-820
10/18	Horizontal Alignment (cont)	15	802-820
10/25	**Exam #1**	-	-
11/1	Intersection Design	7	All
11/8	Intersection Design, Interchange Design	7, Handout	All
11/15	Highway Safety	5	All

11/29	Pavement Management	21	All
12/6	Wrap Up, Review, Discussion on Class Project	-	-
12/13	**Exam #2**	-	-
12/20	**Project Presentations**		-

Course Objectives: To develop an understanding of the principles of geometric design in the context of transportation planning and traffic design. To understand the design criteria for geometric design of highways. To develop the capability to design highways.

Grading:

HW	20%
Attendance & Class Participation	10%
Exam #1	20%
Exam #2	20%
Class Project	30%

The final grade will be based upon the following percentages:

A = 90 to 100%
B+ = 85 to 89%
B = 80 to 84%
C+ = 75 to 79%
C = 71 to 74%
D = 68 to 70%
F = below 68%

Important Notes:

* The NJIT Honor Code will be upheld and any violations will be brought to the immediate attention of the Dean of Students.

* Students will be consulted on any substantial changes to the course syllabus. Changes will be discussed and announced in advance.

* There will be no make-up exams.

Department of Civil and Environmental Engineering

CE 307 – Geometric Design for Highways

Description:

A course in highway design based on a study of traffic distribution, volume, and speed with consideration for the predictable future. The elements of at-grade intersections and interchanges are analyzed. Studies are made of highway geometric design and intersection layout with advanced curve work including compound and transition curves.

Prerequisites: CE 200 - Surveying
CE 200A - Surveying Laboratory

Textbook(s)/Materials Required:

Nicholas J. Garber and Lester A. Hoel, Traffic and Highway Engineering,
3rd Edition, Brooks/Cole Publishing Company

Course Objectives:

1. Develop an understanding of the principles of geometric design in the context of transportation planning and traffic design.
2. Understand the design criteria for geometric design of highways.
3. Develop the capability to design highways, and utilize the state of the art tools for this process.

Topics:

Traffic Characteristics
Design of the Alignment – Vertical Alignment
Horizontal Alignment
Cross-Section Elements
Local Roads, Collectors, and Arterials
Intersection Design
Interchange Design
Highway Drainage
Special Topics: Traffic Calming/Context-Sensitive Design

Schedule: Lecture/Recitation- 3 hour class, once per week
Laboratory- none

Professional Component: Engineering Topics (Design)

Program Objectives Addressed: 1, 2

Prepared By: Prof. Daniel **Date:** 11/21/06

Course Objectives Matrix – CE 307 Geometric Design For Highways

Strategies and Actions	**Student Learning Outcomes**	**Outcomes (a-k)**	Prog. Object.	**Assessment Methods/Metrics**
Course Objective 1: Develop an understanding of the principles of geometric design in the context of **transportation planning and traffic design.**				
Illustrate the need to understand the characteristics of drivers, pedestrians, vehicles and road as a basis for geometric design.	Learn concepts and characteristic for proper design.	a, c	1, 2	Homework and quizzes.
Introduce the national standards and guidelines in highway geometric design.	Learn and apply standards to various problems.	b, c	1, 2	Homework and quizzes.
Perform work on typical projects.	Apply standards, guidelines, and practiced knowledge to perform designs.	a, b, c	1	Graded projects.
Course Objective 2: Understand the design criteria for geometric design of highways.				
Introduce standards and guidelines used in highway geometric design.	Appreciate and understand why and how standards are used.	a, e	1, 2, 3	Discussions and quizzes.
Introduce and develop principles and theories used in the design of both horizontal and vertical alignments.	Learn the mathematical and logical basis for design.	a, e, k	1	Quizzes and homework.
Course Objective 3: Develop the capability to design highways, and utilize the state of the art tools for this process.				
Utilize guidelines for geometric design.	Learn basis of design standards via mathematical background of standards.	a, e	1	Homework and quizzes
Perform design problems and projects.	Gain experience in design.	a, e, k	1	Graded projects.

CEE Mission, Program Objectives and Program Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program objectives are reflected in the achievements of our recent alumni.

1 – Engineering Practice: Recent alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Recent alumni will advance their skills through professional growth and development activities such as graduate study in engineering, professional registration, and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, civic organizations, and humanitarian endeavors.

Our program outcomes are what students are expected to know and be able to do by the time of their graduation:

(a) ability to apply knowledge of math, science, and engineering
(b) ability to design and conduct experiments, as well as interpret data
(c) ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) ability to use techniques, skills and modern engineering tools necessary for engineering practice