

Spring 2019

# CE 307-102: Geometric Design for Highways

Maaz Choudhry

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## Recommended Citation

Choudhry, Maaz, "CE 307-102: Geometric Design for Highways" (2019). *Civil and Environmental Engineering Syllabi*. 77.  
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**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](mailto:mxc2746@njit.edu)  
Office Hours: by appointment (Colton 261)

**Prerequisites:** CE 200, CE 200A, CE 260

Date	Topic	Chapter	Reading	Pages
1/28	Introduction	1		All
		2		37-49
2/4	Traffic Engineering Studies, Highway Surveys and Locations	4, 14	93-106, 116-133, 729-745, 765-766	
2/11	Transportation Planning, Traffic Characteristics	11, 3		All, All
2/18	Traffic Characteristics (cont), Design of the Alignment-Vertical Alignment	3, 15		All, 788-802
2/25	Design of the Alignment – Vertical Alignment (cont)	15		788-802
3/4	Horizontal Alignment	15		802-820
3/11	Horizontal Alignment (cont)	15		802-820
<b>3/25</b>	<b>Exam #1</b>	-		-
4/1	Intersection Design	7		All
4/8	Intersection Design, Interchange Design	7, Handout		All

4/15	Highway Safety	5	All
4/22	Pavement Management	21	All
4/29	Wrap Up, Review, Discussion on Class Project	-	-
5/6	<b>Exam #2</b>	-	-
5/13	<b>Project Presentations</b>	-	-

**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.

**Outcomes Course Matrix – CE 307 Geometric Design for Highways**

<b>Strategies, Actions and Assignments</b>	<b>ABET Student Outcomes (1-7)</b>	<b>Program Educational Objectives</b>	<b>Assessment Measures</b>
<b>Student Learning Outcome 1: Develop an understanding of the basic principles of surveying including the traditional measurements and representations as well as such modern techniques as global positioning.</b>			
Introduce the theory of measurements and related errors.	1	1, 2	Homework, quizzes and exams
Examine aspects of Geographic Information System (GIS) and Global Positioning System (GPS).	7	1, 2	Homework, quizzes and exams
Discuss surveying theory as applied to engineering projects.	1, 2	1, 2	Homework, quizzes and exams
<b>Student Learning Outcome 2: Integrate CAD techniques and tools into the application of basic surveying principles.</b>			
Introduce the theory of mapping and CAD.	1, 7	1, 2	Homework, labs, quizzes and exams
Demonstrate surveying equipment and its proper use.	7	1	Homework, labs, quizzes and exams
Use Geographic Information System (GIS) as a mapping tool.	1, 2, 7	2	Homework, quizzes and exams
<b>Student Learning Outcome 3: Apply the survey database to phases of project control.</b>			
Introduce the control network as a basis for mapping.	1	1	Homework, labs, quizzes and exams.
Practice computations associated with route and construction surveys.	1	1	Homework, labs, quizzes and exams.
Combine mapping with CAD.	7	1, 2	Mapping project, quizzes and exams.

**CEE Mission, Program Educational Objectives and Student 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 educational objectives are reflected in the achievements of our recent alumni:

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

2 – Professional Growth: Alumni will advance their skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and

continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

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

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions an ability to acquire and apply new knowledge as needed, using appropriate learning strategies
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Revised: 2/13/18