Spring 2024

CE 350 - 106: TRANSPORTATION ENGR

Branislav Veeregowda

NJIT New Jersey's Science & Technology University

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CE 350 Transportation Engineering Spring 2024

Course Description:

The purpose of this course is to provide students with a solid introduction to the principles of transportation engineering with a focus on highway design and traffic analysis. The material learned will provide the basic skill set that will allow students to solve transportation problems that are likely to appear in professional practice and on the Fundamentals of Engineering exam (FE) and the Principles and Practice of Engineering exam (PE). The material also serves as foundation for future coursework in transportation should students wish to pursue further coursework in the field. This course will also introduce several of the industry's best-practice resources such as the *Manual on Uniform Traffic Control Devices (MUTCD)*, the *Highway Capacity Manual (HCM)*, and *A Policy on Geometric Design of Highways and Streets (AASHTO Green Book)*.

Canvas:
All course materials including class lectures, assignments, assignments, and relevant files will be posted on to the Canvas. Also, I may have to teach few classes online (virtual), if I am travelling on work. I will discuss and notify the students well in advance.

Instructor: Babu Veeregowda, Ph.D, PE, PTOE

Office: Please contact by email

Office Hours: Dr. Veeregowda will be available online Thursdays from 5:00 to 6:00 PM by appointment only. If you need a 1 on 1 at the university, please make an appointment. I can also make myself available on campus for 1 on 1 consultation on the campus or teleconference by appointment only.

Email: bkv4@njit.edu

Required Text: John Wiley & Sons, Inc.,
F. Mannering and S. Washburn. Principles of Highway Engineering and Traffic Analysis, 7th Edition, John Wiley & Sons, Inc.

Prerequisites: CE 200, CE 200A.

Course Schedule:

Meeting	Topic/*Assignment*
1	Class 1: Course Introduction • Professor Introductions • Class Schedule • Class Expectations • Text Overview • Transportation and the Economy, Environment, and Climate Change
2	Class 2: Introduction to Transportation Engineering • Transportation modes • Traffic congestion • Operations and safety • Emerging technologies
3	Class 3: Tractive Effort and Resistance • Acceleration and Breaking • Sight Distances • Perception/Reaction Time
4	Class 4: In-Class Problem/Solution Discussions
5	Class 5: Vertical Alignment • Curve Design • Sight Distances • **Chapter 2 Solutions Due**
6	Class 6: Vertical Alignment Example Problems/Solution Discussion
7	Class 7: Horizontal Alignment • Curve Design • Sight Distances • Superelevation
8	Class 8: Horizontal Alignment Example Problems • Combined horizontal and vertical curves
9	Class 9: In-Class Design Problem/Solution Discussions • **Chapter 3 Solutions Due**
10	Class 10: Pavement Design • Flexible Pave0ent • Rigid Pavement • Pavement Performance
11	Class 11: In-Class Design Problem/Solution Discussions
12	Class 12: Midterm Exam #1 Review • **Chapter 4 Solutions Due**
13	**Class 13: Midterm Exam #1 (Chapters 2-3-4)**

14	Class 14: Traffic Operations • Speed, Flow, and Density • Traffic Flow Models
15	Class 15: Queuing • Queuing Theory • Queuing Models
16	Class 16: In-Class Design Problem/Solution Discussions • **Chapter 5 Solutions Due**
17	Class 17: Uninterrupted Flow Analysis • What is Level of Service? • Basic Freeway Analysis • Weaving, Merge, and Diverge Segments
18	Class 18: Uninterrupted Flow Analysis • Multilane Highway Segments • Two-Lane Highway Segments
19	Class 19: In-Class Design Problem/Solution Discussions • **Chapter 6 Solutions Due**
20	Class 20: Midterm Exam #2 Review
21	**Class 21: Midterm Exam #2 (Chapters 5-6)**
22	Class 22: Signalized Intersection Fundamentals • Pretimed and Actuated Signals • Signal Timing and Phasing • Signal Progression and Bandwidth • Change and Clearance Intervals
23	Class 23: Analysis of Signalized Intersections • Capacity • Delay • Queuing and Spillback • Level of Service
24	Class 24: In-Class Design Problem/Solution Discussions • **Chapter 7 Solutions Due**
25	Class 25: Travel Demand Forecasting Theory • Trip Generation • Trip Distribution • Mode Choice • Route Choice
26	Class 26: Travel Demand Forecasting in Practice • Emerging Technologies
27	Class 27: In-Class Design Problem/Solution Discussions • **Chapter 8 Solutions Due**
28	Class 28: Optional Final Exam Review Session
29	**Class 29: Final Exam (50% cumulative, 50% emphasis on Chapters 7 and 8)**

Grading Policy:

- Each exam will be worth 20% of your overall grade (3 exams – total 60%).
- Each homework assignment will be worth 5% of your overall grade (7 assignments – total 35%).
- Class participation and attendance will be worth 5% of your overall grade.

Grading Scale:

A:	**100-90**
B+:	**89-85**
B:	**84-80**
C+:	**79-75**
C:	**74-70**
D:	**69-60**
F:	**Below 60**

Attendance Policy:

Attendance is mandatory for all classes.

Withdrawals:

In order to insure consistency and fairness in application of the NJIT policy on withdrawals, student requests for withdrawals after the deadline will not be permitted unless extenuating circumstances (e.g., major family emergency or substantial medical difficulty) are documented. The course Professors and the Dean of Students are the principal points of contact for students considering withdrawals.

NJIT Honor Code:

The NJIT Honor Code will be upheld; any violations will be brought to the immediate attention of the Dean of Students. The Honor Code can be found at (http://www5.njit.edu/doss/policies/honorcode/index.php).

Assignment Policy:

- Assignments must be submitted by 11:59 PM on the date of the class specified.
- Late assignments will be accepted but an automatic 10% reduction in points will be applied for unexcused lateness. If you will not be able to submit an assignment on time due to emergencies (COVID-19, death in the family, religious observances, etc.), please email or ask the professor for assistance.

Syllabus Information:

The dates and topics of the syllabus are subject to change; however, students will be consulted with and must agree to any modifications or deviations from the syllabus throughout the course of the semester.

Email Policy:

Please contact Dr. Veeregowda at bkv4@njit.edu with any questions you may have.

Items Required for this Course:

N/A

Dress Policy:

N/A

Outcomes Course Matrix –

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1:			
Student Learning Outcome 2:			
Student Learning Outcome 3:			

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 safe, practical, resilient, 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 technical and interpersonal skills through professional growth and development activities such a 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
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies