CE 350-001 Transportation Engineering
Fall 2017

Brief Course Description

This course will discuss the principles and practices of transportation engineering and urban transportation planning. The major topics of this course cover 1) highway geometric design, 2) capacity analysis of highway and intersection, and 3) travel demand forecasting. The course will have a group project investigating real world example problems related to traffic impact analysis studies for transportation facilities.

Course Objectives

1. Understand the principles and practices of transportation engineering and urban transportation planning.
2. Understand the interactions between transportation planning and land use planning, economics, social planning and master plans.
3. Gain the facility of utilizing the state of the art techniques and models in the field.
4. Have the capability to identify and solve transportation problems within the context of data availability and limitations of analysis tools

Instructor Info & Office Hour

Professor Joyoung Lee, Ph.D.
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Office Hour: Wednesday 3:00-5:00PM; Friday 12:00-2:00PM

Lecture Hours and Location

Friday 2:30P PM to 5:30PM; Cullimore Hall LECT 2

Textbook

F. Mannering and S. Washburn. Principles of Highway Engineering and Traffic Analysis, **5th Edition**, John Wiley & Sons, Inc., ISBN 978-1-1181-2014-9

Grading

Mid-term Exam: 25%
Final Exam: 33%
Homework: 12% (2% @ each)
Group Project: 30%

Group Project

The class will be divided into multiple groups to conduct a virtual traffic impact analysis (TIA) studies dealing with level of service analysis for transportation facilities such as freeway, interchange, intersection, and parking lot. Each group will perform the modeling of such facilities by using a microscopic traffic simulator, VISSIM, and Highway Capacity Software (HCS).

Each group must submit the list of group members by the end of Test 1 (i.e., the 4th week of the semester) and the presentation of the group project will be held in the 15th week of the semester. The format of the final report is free but following sections must be included in the report.

a. Goal and objectives of the project;
b. Spatial and temporal scopes of the project;
c. Project site description (e.g., intersection geometry, traffic condition, signal phase sequence, etc.);
d. Data collection summary (e.g., approach volume, green time, yellow time, saturation flow rate, etc.);
e. Level of service analysis summary; and
f. Conclusions and Recommendations (if any).

Exam/Homework Policies

Exam: All exams will be in-class closed book. Students are allowed to bring their own one-page formulation sheet which must be submitted to the instructor along with the question and answer sheet at the end of each exam.

Homework: Problems will be assigned to reinforce course learning objectives. The assignments will be targeted to provide practice for methods that may be included in course exams. There will be approximately two homework assignments during the semester. Homework should be turned in at the start of the class period identified by the instructor. No late homework will be accepted.

Collaborating, sharing, and/or copying for exam/homework is **NOT** allowed. Credit will not be given to individuals who either asked or allowed such behaviors. The NJIT honor code will be upheld and any violation will be brought to the immediate attention to the Dean of Students. See http://studentsenate.njit.edu/wp-content/uploads/2010/03/University_Code_on_Academic_Integrity.pdf

Class Polices

Cell Phones and mobile devices (e.g., Laptop, IPad/Tablet PC, IPod, etc.): Cell Phone should be turned off prior to coming to class. Texting and the use of mobile devices during the class shall not be allowed. Each student will be excused to miss up to two classes with prior permission/**VALID** reason. Each subsequent class missed will cost the student up to 5% of the overall grade. Five (5) or more missed classes will result in an F grade.

Course Schedule

Week	Topic		Chapter in Text	Assignment
1 (9/8)	Course Overview & Introduction to Transportation Engineering Road Vehicle Performance: Principles of Braking, Braking Forces, Stopping Sight Distance		*Ch.1*	
2 (9/15)	Geometric Design of Highway: Vertical Curve		*Ch. 2 pp. 9-41* *Ch.3 pp. 47-92*	Homework #1
3 (9/22)	Geometric Design of Highway: Vertical Curve & Horizontal Curve			
4 (9/29)	Geometric Design of Highway: Horizontal Curve			Homework #2
5 (10/6)	Fundamentals of Traffic Flow		*Ch. 5 pp. 135-168*	
6 (10/13)	Fundamentals of Traffic Flow and Queuing Model			Homework #3
7 (10/20)	**Mid-Term Exam**			
8 (10/27)	Highway Capacity and Level of Service Analysis : Basic Freeway Segment	Lab: HCS	*Ch. 6 pp. 169-192*	
9 (11/3)	Highway Capacity and Level of Service Analysis : Multi-Lane Highway & Two-lane Highway			Homework #4
10 (11/10)	Traffic Control and Analysis at Signalized Intersections	Lab: VISSIM	*Ch.7 pp. 253-279*	Homework #5
11 (11/17)	Traffic Control and Analysis at Signalized Intersections			Homework #6
12 (11/24)	No Class : Thanksgiving Recess			
13 (12/1)	Travel Demand and Traffic Forecasting	Lab: VISSIM	*Ch.7 pp. 285-325*	
14 (12/8)	Group Project Presentation (4/28)			
15 (TBD)	**Final Exam**			

CEE Mission, Program 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 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 toward sustainable solutions 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, educational institutions, civic organizations, and humanitarian endeavors.

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

(a) an ability to apply knowledge of math, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an 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 on 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) an ability to use techniques, skills and modern engineering tools necessary for engineering practice

Revised 8/28/13

Course Objectives Matrix – CE 350 Transportation Engineering

Strategies and Actions	Student Learning Outcomes	Outcomes (a-k)	Prog. Object.	Assessment Methods/Metrics
Course Objective 1: Understand the principles and practices of transportation engineering and urban transportation planning.				
Discuss public transportation facilities.	Gain insight into problems and potential solutions.	e, k	1, 2	Discussions, quizzes and homework.
Develop tools Transportation facilities.	Learn methodology and models to solve real micro and macro transportation problems.	a, b, e, k	1	Homework and quizzes.
Implement design of transportation facilities.	Gain professional knowledge of standards and practice safe design.	e, k	1, 2	Graded projects.
Course Objective 2: Understand the interactions between transportation planning and land use planning, economics, social planning and master plans.				
Link transportation to land use, economics, social planning, and master plans.	Appreciate that transportation influences many critical areas.	h, j	2, 3	Homework and quizzes
Develop interactions between each of the above factors	Gain an understanding of the link of transportation and other factors	a, c	2, 3	Home
Give examples of growth due to improvement in transportation.	Learn that transportation produces major impacts in cities.	h, j	2, 3	Discussions, homework and quizzes.
Course Objective 3: Gain a facility of utilizing the state of the art techniques and models in the field.				
Introduce need for forecasting models.	Learn the basis for utilizing mathematical based equation/models for forecasts	a, b	1, 2	Homework and quizzes.
Discuss application of models.	Learn how to structure, apply and evaluate techniques and models.	a, b, e	1, 2	Homework and quizzes.
Discuss application of models.	Learn how to structure, apply and evaluate techniques and models.	a, b, e	1, 2	Homework and quizzes.
Assign large scale problems.	Ability to run techniques and models on data sets.	a, b, e, h	1	Quizzes and gradedassignments.
Course Objective 4: Have the capability to identify and solve transportation problems within the context of data availability and limitations of analysis tools.				
Discuss how to obtain data necessary for transportation studies.	Learn how to find potential sources of data for transportation studies.	b, c	1, 2	Homework.
Match up analysis tools, data sets, and problems to solve.	Learn the need to match up analysis tools and availability of data to solve problems.	b, c, e	1, 2	Quizzes and homework.
Introduce problems to be solved using analysis tools.	Ability to set up and solve real life transportation problems with limited data sets.	b, c, e, k	1, 2	Quizzes and homework.