UNIVERSITY OF ALBERTA
Department of Civil and Environmental Engineering

Civ E 612 - TRANPORTATION PLANNING: METHOD & TECHNIQUE

Winter 2026

Course Instructor: Tae J. Kwon, Ph.D., P.Eng.
Office: D ICE 6-281
Email: tjkwon@ualberta.ca

Office Hours: Mondays 1:00PM to 2:00PM, or **by appointment**

Class Time: Thursdays 2:00PM – 4:50PM @ NRE 2-122

Course Website: Canvas

Course Description:

The objective of this course is to provide students an in-depth discussion on the fundamental concepts and methodologies applied in the urban transportation planning process. The primary focus of the course is on the development of various models applied in the urban demand forecasting process, including traditional four-step models and activity-based models (ABM). Important methodologies that will be covered in this course include linear (logistic) regression, categorical analysis, random utility maximization (RUM) theory, maximum likelihood (ML) estimation, shortest path algorithm, equilibrium assignment methods.

Course Organization:

- Midterm
- Final Exam
- Assignments
- Student presentations

References*:

1. Ortuzar, J. D. and L. G. Willumsen, *Modelling Transport*, 4th Edition, Jon Wiley&Sons, Inc. 2011
2. Ahuja, R. K., T. L. Magnanti, and J. B. Orlin, (1993) *Network Flow: Theory, Algorithms, and Applications,* Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632.

***All references are available as an e-book via UAlberta Library**

Course Outline:

Week	[1]Lecture Topic	[2]Remarks
1 JAN. 8th	**INTRODUCTION** • Course overview • Transportation engineering and system modeling • Urban transportation planning process • Demand modeling	
2 JAN. 15th	• **Class Canceled –** *Instructor away at TRB* • Reading materials and a survey are provided in Canvas. A make-up class scheduled for April 9th	
3 JAN. 22nd	**DATA COLLECTION** • Urban transportation spatial system • Data sources and trip purpose (land use, population, transportation) • Survey methods and validation	
3-4 JAN. 22nd JAN. 29th	**4-STEP MODEL: TRIP GENERATION ANALYSIS** • Definition of analysis unit (zone, household, employment unit) • Purpose of trip production and attraction models • Aggregate vs disaggregate approaches • Nonparametric modelling techniques	• Assignment 1
5-6 FEB. 5th FEB. 12th	**4-STEP MODEL: TRIP DISTRIBUTION ANALYSIS** • Purpose of TD models (trip interchange definitions) • Estimating inter-zonal skims • Calibration/validation framework and data • Gravity models • Growth factor methods • Nonparametric modelling techniques	• Assignment 1 DUE • Student Group Presentation on A1 • Assignment 2
7 FEB. 19th	**READING WEEK (NO CLASS)**	

8 FEB. 26th	**4-STEP MODEL: MODE SPLIT** • Purpose of MS analysis • Factors affecting choice (Captive and choice ridership) • Aggregate approach: Diversion curves models • Aggregate: Logit multi-variate regression models **MIDTERM REVIEW**	• Assignment 2 DUE • Student Group Presentation on A2
9 MAR. 5th	**MIDTERM** REFER TO CLASS ANNOUNCEMENTS	
10 MAR. 12th	**4-STEP MODEL: MODE SPLIT** **BY DR. MINGJIAN WU VIA ZOOM** • Disaggregate: Multi-nomial Logit (MNL) models • Model calibrations and validations • Multinomial logit via SPSS • Nonparametric modelling techniques REFER TO CLASS ANNOUNCEMENTS https://ualberta-ca.zoom.us/j/96664058595?pwd=89WopWbLjBZKRg3IoGLRfY7S2AOa79.1	
11 MAR. 19th	**GUEST LECTURE FROM THE CITY OF EDMONTON** • City of Edmonton's Transportation Model Development and Applications	• Assignment 3
12 MAR. 26th	**4-STEP MODEL: TRAFFIC ASSIGNMENT** • Purpose of traffic assignment • Tree builder outward search procedure • Route choice behaviour (Wardrop's assumptions) • All-or-Nothing route assignment	

13 APR. 2nd	**4-STEP MODEL: TRAFFIC ASSIGNMENT** • Node splitting method • Review of shortest path algorithm and non-linear programming capacitated assignments • Volume-delay relationships **ACTIVITY-BASED MODELS**	• Assignment 3 DUE • Student Group Presentation on A3
14 APR. 9th	**CLASS WRAP-UP & EXAM REVIEW** REFER TO CLASS ANNOUNCEMENTS	• Assignment 4 • Assignment 4 DUE on Apr. 24th

[1]Lectures may be modified/replaced/supplemented with guest lectures, etc.
[2]Assignment due dates may be subject to change; always refer to due dates listed on each assignment, and announcements in class, email, and Canvas.

Mark Distribution:

4 Assignments	20 %
Midterm	20 %
Student Presentation	5 %
Class Participation	5 %
Final Exam	50%
Total	100 %

Assignments:

Assignment 1: TRIP GENERATION (4%)

Assignment 2: TRIP DISTRIBUTION (4%)

Assignment 3: MODE SPLIT (4%)

Assignment 4: TRAFFIC ASSIGNMENT (8%)

Note: Exact titles of each assignment will be provided at the time of distribution. Each student is required to submit his/her own assignment using a technical memorandum. Instructions on how to use a technical memo will be provided later in the class. There will be penalty for late submission (25% deduction of total marks per day).

Student Presentation:

Students will form a group of 2 to prepare and deliver a 15-min presentation during lecture hours. Each student is required to actively collaborate in preparing a presentation, and will be marked by the audience (the rest of students) and the instructor. Each presentation should, at least, cover the following items:

- Introduction / Background
- Objectives
- Procedure / Methods
- Results
- Conclusions / Recommendations

Midterm / Final Exams:

The midterm and final exams will be closed-book. Further instructions will be provided through class announcements in Canvas and/or during class sessions.

Class Participation:

Class participation will be evaluated holistically, based on class attendance and participation.

Contingency Plan:

Should the instructor be indisposed or otherwise unable to attend, a set of pre-recorded lectures (from 2020) and/or new recordings will be made available via eClass. Please be sure to stay on top of announcements made via email, in class, and in the eClass.

Academic Integrity:

Make sure to read the "*Code of Student Behaviors*" by Dr. T.G. Joseph & Mr. C. Harper (updated June 2019), which is also available in your eClass.