CIVL441 Transportation Planning Analysis
CIVL583 Urban Engineering Methods and Models
PLAN548J Transportation Planning Analysis

Spring 2013
Dr. Jinhua Zhao
Department of Civil Engineering & School of Community and Regional Planning
University of British Columbia

Lecture Time and Venue
Jan 02-Apr 5, 2013
Mon 11:00-12:00; Wed 11:00-13:00 CEME 1202

Instructor
Jinhua Zhao, Email: Jinhua.Zhao@ubc.ca Office Hour: Monday 2-3:30pm CEME 2007

Teaching Assistants
Zhan Zhao zhanzhaowf@hotmail.com; Tracy Chen tracy.traart@gmail.com
Office Hour: Wed 3:00-4:00pm CEME 2004

Course Description Credits: 3
This course introduces fundamentals and latest development of transportation planning analysis in eight self-contained cases. This course examines planning tools such as pricing, land use, smart device, information, preference shaping, transit service, and policy design. The course emphasizes 1) the interaction between travel behavior and transportation policies and 2) the application of methods and models in the analysis of transportation systems.

Case 1. London’s Congestion Charging (3)
Case 2. Transport and Landuse (3)
Case 3. Positive Utility of Travel (3)
Case 4. Mind the Map (2)
Case 5. Preference Shaping (2)
Case 6. Modeling Transport (3)
Case 7. Transit Service (2)
Case 8. Policy Design (2)

Technically this course will cover modeling framework, four step models, data collection (survey design, manual and automatic data), transportation externality, behavioral impact of information, productive use of travel time, measuring perception and attitudes, service reliability and customer loyalty, and transport policy design and public acceptance.

This course uses a team-based learning approach and to be able to work in a team is one key learning objective. Students will be randomly assigned into teams: 3–5 students per team, 6–8 teams in total, and mixing students with different background: graduates and undergraduates, engineers and planners, etc. Students will work in teams on Assignment #3, term project and presentations throughout the course.
<table>
<thead>
<tr>
<th>Class</th>
<th>Date</th>
<th>Cases</th>
<th>Topics</th>
<th>Due</th>
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<tr>
<td>1</td>
<td>2-Jan</td>
<td>1. Congestion Charging</td>
<td>Course Overview / London Case</td>
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<td>2</td>
<td>7-Jan</td>
<td>1. Congestion Charging</td>
<td>Economics</td>
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<td>3</td>
<td>9-Jan</td>
<td>1. Congestion Charging</td>
<td>Politics and Practice / Tutorial 1: Linear Regression I</td>
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<td>4</td>
<td>14-Jan</td>
<td>Quiz 1</td>
<td>Quiz 1</td>
<td>Hm1/Quiz1</td>
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<tr>
<td>5</td>
<td>16-Jan</td>
<td>2. Transport and Landuse</td>
<td>Guest Lecture from Translink/Metro Vancouver</td>
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<td>6</td>
<td>21-Jan</td>
<td>2. Transport and Landuse</td>
<td>Travel Demand and 3Ds</td>
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<td>7</td>
<td>23-Jan</td>
<td>2. Transport and Landuse</td>
<td>Land Use, Transport and Pricing Tutorial 2: Linear Regression II</td>
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<td>8</td>
<td>28-Jan</td>
<td>3. Positive utility</td>
<td>Positive utility of travel</td>
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<td>9</td>
<td>30-Jan</td>
<td>3. Positive utility</td>
<td>Data, Space and Survey Design Tutorial 3: SurveyMonkey</td>
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<td>10</td>
<td>4-Feb</td>
<td>3. Positive utility</td>
<td>Smart Device and Travel Time Use</td>
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<td>11</td>
<td>6-Feb</td>
<td>4. Mind the Map</td>
<td>How to lie with a map Tutorial 4: Logit Model</td>
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<td>11-Feb</td>
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<td>Family Day, No Class</td>
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<td>12</td>
<td>13-Feb</td>
<td>4. Mind the Map</td>
<td>Real time information Experiments in transportation</td>
<td>Quiz2/HW2 (Feb15)</td>
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<td>Feb 18-22</td>
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<td>Mid-term break</td>
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<td>13</td>
<td>25-Feb</td>
<td>5. Preference Shaping</td>
<td>Behavior Change Preference Shaping</td>
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<td>14</td>
<td>27-Feb</td>
<td>5. Preference Shaping</td>
<td>Pride, Dependence and Happiness Tutorial 5: MPlus</td>
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<td>16</td>
<td>6-Mar</td>
<td>6. Modeling Transport</td>
<td>Proposal Presentations</td>
<td>G3,6,1,5</td>
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<td>19</td>
<td>18-Mar</td>
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<td>Proposal presentations</td>
<td>G7, G4</td>
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<td>20</td>
<td>20-Mar</td>
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<td>Project Workshop / iron ring</td>
<td>HM3 (Mar 22)</td>
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<td>21</td>
<td>25-Mar</td>
<td>7. Transit Reliability</td>
<td>Proposal presentations</td>
<td>G8, G2</td>
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<td>22</td>
<td>27-Mar</td>
<td>7. Transit Reliability</td>
<td>Measure, Improve and Inform</td>
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<td>1-Apr</td>
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<td>Easter Monday, No Class</td>
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<td>23</td>
<td>3-Apr</td>
<td>8. Policy Design</td>
<td>Bidding to Drive / Course Summary</td>
<td>Quiz 3</td>
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<td>8-Apr</td>
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<td>Draft Report</td>
<td>Draft report</td>
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<td>17-Apr</td>
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<td>Final Presentation 4-8pm</td>
<td>Presentation</td>
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<td>22-Apr</td>
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<td>Final Report</td>
<td>Final report</td>
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Assignment & Grading

<table>
<thead>
<tr>
<th>Assignments</th>
<th>%</th>
<th>Note</th>
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<tbody>
<tr>
<td>3 Home-works</td>
<td>30%</td>
<td>6% + 12% + 12%</td>
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<tr>
<td>3 Quizzes</td>
<td>30%</td>
<td>6% + 12% + 12%</td>
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<tr>
<td>Term Project</td>
<td>40%</td>
<td>10% Proposal + 10% Draft + 20% Final</td>
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- There are additional questions for grad students in each homework and quiz.
- Late policy: A deduction of 10% (of the assignment in question) per day; will not accepted one week after due date.
- Assignment #3 and Term Project will be evaluated as a group. Assignments 1 and 2, and all quizzes are evaluated individually.

Home-works:
- HW1: A Two-mode Congestion Model
- HW2: Value of Idling: Questionnaire Design and Pilot
- HW3: Travel Time Use and Experiment Design

Quizzes:
- Quiz 1: covering cases 1;
- Quiz 2: covering cases 2, 3 and 4;
- Quiz 3: covering cases 5, 6 and 7

Closed book quizzes but one single-page aid sheet allowed.

Testable Material:
- All material presented in lecture slides
- Key concepts in the required readings
- Calculation based on equations discussed in class

Non-Testable Material:
- Case details from readings (exact dates, times, amounts, locations, etc.)

Tutorials:
1. Linear Regression Part 1 (Zhan)
2. Linear Regression Part 2 (Dr. Zhao)
3. SurveyMonkey (Tracy)
4. Mplus (Tracy)
5. Logit Model (Zhan)
6. TransCAD (Cindy)

Prerequisite for SCARP students

PLAN 580: Introduction to Transportation Planning
If you have not taken the course but believe you are ready to take this course, please come to the first class and discuss with the instructor.
Course Materials in Dropbox
All class materials will be shared in Dropbox, including syllabus, lecture notes, assignments, readings, etc. An email list of students will be collected in the first class and an invitation to join the shared folder in Dropbox will be sent to students.

- Do not delete/changes files from the folder.
- Anything you add to the folder will be accessible to all students.
- All materials in the Dropbox are for educational purpose and for this course only. Please don’t share outside this class.

Term Project
Each team will deliver a term project on one of the following topics. If you like to propose a different topic, which is equally encouraged, please talk to Dr. Zhao for advice. Each team will submit their top three favourite topics and Dr. Zhao will coordinate and assign the topics according to your preferences to the best extent. Informal interviews with Dr. Zhao and TAs are offered upon request near milestones to brainstorm ideas, clarify questions, gauge group progress and assess individual contributions. The deliverables include

- Project proposal (3000 words) and presentation (15 minutes including Q&A)
- Project draft report (7500 words) and presentation (30 minutes including Q&A)
- Project final report (7500 words)

<table>
<thead>
<tr>
<th>Project Proposal</th>
<th>Project Report (Draft and Final)</th>
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<tr>
<td><strong>Project Title</strong></td>
<td><strong>Project Title</strong></td>
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<tr>
<td><strong>Highlights</strong></td>
<td>Highlights</td>
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<tr>
<td><strong>Abstract (250 words)</strong></td>
<td><strong>Abstract (250 words)</strong></td>
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<td><strong>Key words</strong></td>
<td><strong>Key words</strong></td>
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<tr>
<td><strong>1. Introduction</strong></td>
<td><strong>1. Introduction</strong></td>
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<tr>
<td>b. Objectives / Research questions</td>
<td>b. Objectives / Research questions</td>
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<td><strong>2. Literature Review</strong></td>
<td><strong>2. Literature Review</strong></td>
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<td><strong>3. Methodology</strong></td>
<td><strong>3. Methodology</strong></td>
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<tr>
<td>a. Data</td>
<td>a. Data</td>
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<td><strong>4. Expected results</strong></td>
<td><strong>4. Analysis results and interpretation</strong></td>
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<td><strong>5. Expected impact and policy implications</strong></td>
<td><strong>5. Discussion</strong></td>
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<tr>
<td><strong>6. References</strong></td>
<td><strong>6. References</strong></td>
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Please use mendeley for reference formatting. Please follow the reference format of the example paper “Costa 2012 Urban public transport in Europe”.

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1 Dropbox is a file hosting service that uses cloud storage to store and share files and folders with others through the Internet. The files and folders are stored both on the user’s hard drive and online. Dropbox works with Windows, Mac, Linux, iPad, iPhone, Android and BlackBerry. All students, who do not have dropbox, will receive an email with a link to register and install dropbox. A second email will have a link to join the shared folder. If you have any question, email manvirssohi@hotmail.com.
Candidate project topics

- A Typology of Travel Time Use
- Pricing as a policy signal: VAR Model
- Parking as a solution: Parking Questionnaire and Survey
- Vehicle Type Choice Model w and w/o auction policy
- Transit Customer Loyalty in Metrolinx
- Nudging Behavior: An Experimental Study
- Value of Idling
- Car Ownership Management Policies: World Wide Survey
- Measuring Car Pride and Dependence in the North America
- Active Travel and Happiness
- Travel aspiration of the youth (driver license, car ownership, …)
- Gauging Policy Attitude with Microblogs
- …any other topics proposed by the students

Past Examples

2012
- The Quality of Productive Activities While Commuting
- Real-time Information Displays for Parking at UBC Campus: Effects on Drivers Way-Finding
- Productive Use of Commuting Time: Vancouver
- Happiness and Commuting in UBC
- Vancouver Road Pricing: Public Acceptance of Congestion Pricing
- When and Where: Passengers’ Information Need for Transit Service
- Transit Service Reliability: Measurement and Evaluation Using AVL
- Social Networks: Does it affect one’s travel behaviour?

2011
- Quantifying the Value of Comfort of a Bus Seat
- Cost/Benefit Analysis of Trolley Bus in Route 41 Corridor
- Off Campus Parking at UBC
- Weather’s Impact on Bicycle Traffic in Vancouver: A Time Series Analysis
- “Over-forecasting” of Canada Line?
- More at ChinaMobility.org

Available database

- North America Active Travel and Happiness Survey
- North America Travel Time Use Survey
- Shanghai Transportation Survey Data 2012
- London LTDS 2006-2010
- Toronto Metrolinx Transit Customer Satisfaction Survey
- Vancouver Road Pricing Public Acceptance Survey
- Beijing and Shanghai Car Pride and Dependence Data
- Guangzhou Microblog Data
Reading and Discussion

- It is essential that students complete the assigned readings before each class so as to participate actively in class discussions.
- Class discussion: summary of the key insights, your thoughts inspired by the papers, connections to local or national transportation issues, and potential areas for term project.

Cases

Case 1. Congestion Charging: Economics, Politics, and Practice

Class 1: London’s Congestion Charging and Course Overview

Required reading:
- Santos, G. 2008 London Congestion Charging

Optional Reading:
- New York City’s congestion pricing experience and implications for road pricing acceptance in the United States http://www.youtube.com/watch?v=v2CaHwRiaR4

Case 2. Economics: the Tragedy of the Commons

Class 2: Economics: the Tragedy of the Commons

Required reading:
- Essays in Transportation Economics and Policy: Ch. 6 Congestion by Herbert Mohring, pp 181-193
  http://webcat1.library.ubc.ca/vwebv/holdingsInfo?searchId=622618&recCount=10&recPointer=0&bibId=4557628

Optional Reading:

Case 3: Politics and Practice

Class 3: Politics and Practice

Required reading:

Optional Reading:
- Jakobsson and Garling 2000, Determinants of private car users' acceptance of road pricing, Transport Policy 7 (2)
- Small 2005 “Unnoticed Lessons from London: Road Pricing and Public Transit.” Access, No. 26,

Case 4: Quiz 1

Case 2. Transport 2045

Class 5: Vancouver’s Transport 2045

Guest Lecture by Lyle Walker, Translink and Raymond Kan, Metro Vancouver
Optional Reading:
- Vuchic, W. Transportation for Liveable Cities Ch. 2 City-Transportation Relationship

Class 6: Travel Demand and 3Ds

Required reading:
- Cervero and Kockelman 1997 Travel demand and the 3Ds: Density, Diversity, and Design. Transportation Research D

Optional Reading:
- Essays in Transportation, Ch. 12 Transportation and Land Use

Class 7: Land use, transportation and pricing

Required reading:

Case 3. Positive Utility of Travel

Class 8: Multi-Tasking and Travel as a Desired End

Required reading:
- Mokhtarian and Salomon 2001, How derived is the demand for travel? Some conceptual and measurement considerations, Transportation Research Part A: 35 (8)

Optional Reading:
- Diana 2008, Making the “primary utility of travel” concept operational: A measurement model for the assessment of the intrinsic utility of reported trips, Transportation Research Part A 42(3)

Class 9: Transportation Data, Space and Survey Design

Required reading:
- Modelling Transport, Ch. 3 Data and Space
- Travel Survey Manual Chapter 1: Introduction http://www.travelsurveymanual.org/Chapter-1-1.html

Optional Reading:
- Hensher and Button, Handbook of transport modelling, Ch. 14 Survey and Sampling Strategies by Peter Stopher http://books.google.ca/books?id=tbbAS0GxcNUC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Class 10: Smart Device and Travel Time Use

Required reading:

Optional Reading:
- Zhao, J., A. Lung and Z. Guo (2012) Quantity and Quality of Commuting Time Use: a Heckman Model, working paper
Transportation Planning Analysis | Zhao

Case 4. Mind the Map: How can the Transit Map Distort Travel Behavior
Class 11: Mind the Map
Required reading:
- Guo 2011 Mind the Map! Impact of Transit Maps on Travel Decisions in Public Transit Systems, Transportation Research Part A 45(7)

Class 12: Real Time Information and Experiments in Transportation
Required reading:
- Dziekan and Kottenhoff 2007 Dynamic at-stop real-time information displays for public transport: effects on customers, Transportation Research Part A 41
- Gaker, Zheng, and Walker 2010, Experimental Economics in Transportation: Focus on Social Influences and Provision of Information, Transportation Research Record: Journal of the Transportation Research Board, No. 2156
Optional Reading:

Case 5. Behavioral Change and Preference Shaping
Class 13: Preference Accommodating and Preference Shaping
Required reading:
Optional Reading:

Class 14: Pride, Dependence, Happiness and Social Network of Travel
Required reading:
- Zhao, J. and J. Lee (2012) Experience or Memory: Happiness of Commuters, working paper
Optional Reading:
- Zhao 2011 A Subjective Measure of Car Dependence, Transportation Research Record: Journal of the Transportation Research Board, No. 2231
- Campbell, R. and J. Zhao (2013) Prestige on Wheels: Life Aspirations and Implications for Transportation Planning in Beijing, working paper

Case 6. Modelling Transport
Class 15: Transportation Modeling Framework
Required reading:
- Ortuzar and Willumsen Modelling Transport, Ch. 1 Introduction
Class 16: Proposal Presentation

Class 17: Four Step Models
Required reading:
- Hensher and Button, Handbook of transport modelling, Ch. 2 History of Demand Modelling by John Bates
  http://books.google.ca/books?id=tbbAS0GxcNUC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Class 18: Guest Lecture: Four-Step Modeling Application
Guest Lecture: Eric Peterson, Translink

Case 7. Transit Reliability, Service Quality and Customer Loyalty
Class 19: Transit Service Reliability and Automatic Data Collection System
Required reading:
- Uniman, Attanucci, Mishalani, and Wilson 2010, Service Reliability Measurement Using Automated Fare Card Data Application to the London Underground, Transportation Research Record: Journal of the Transportation Research Board, No. 2143

Optional Reading:
- US DOT Travel Time Reliability Measures
  http://www.ops.fhwa.dot.gov/perf_measurement/reliability_measures/index.htm

Class 20: Service quality and Customer loyalty
Required reading:

Optional Reading:

Case 8. Transport Policy Design and Leakage
Class 21: Bidding to Drive
Required reading:

Optional Reading:

Class 22: Transportation Policy Leakage
Required reading:
- Zhao, J., D. Block-Schachter and T. Chen (2013) Purposeful Policy Leakage: Legitimacy
and Intentionality of Non Local Vehicles in Shanghai, working paper

Additional readings for further studies

- Duarte et al 2010, New approaches in transportation planning: happiness and transport economics, Netnomics 11(5)
- Abou-Zeid et al 2012 Happiness and travel mode switching: Findings from a Swiss public transportation experiment, Transport Policy 19 (1)
- Sunitiyoso, Avineri, and Chatterjee 2011 The effect of social interactions on travel behaviour: An exploratory study using a laboratory experiment, Transportation Research Part A 45 (4)
- Dugundji et al 2011 Transportation and social interactions, Editorial, Transportation Research Part A 45 (4)
- Translinks, Transport 2040: A Transportation Strategy for Metro Vancouver, Now and in the Future
- Translink, Moving Forward: Improving Metro Vancouver’s Transportation Network, 2012 Supplemental Plan and Outlook
- Pelletier, Trépanier, and Morency, 2011 Smart card data use in public transit: A literature review, Transportation Research Part C: Emerging Technologies, 19 (4)
- Zhao, J., M. Frumin, N. Wilson and Z. Zhao (2012) Unified estimator for excess journey time under heterogeneous passenger incidence behavior using smartcard data, Transportation Research Part C (conditionally accepted)