PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF TRANSPORT ENGINEERING AND LOGISTICS
ABET COURSE SYLLABI

ICT3283 TRANSPORTATION NETWORKS EQUILIBRIUM

Credits and contact hours:	10 UC credits / 10 hours (3 h. Lectures; 1,5 h. Assistantship; 5,5 h. Independent learning experiences)
Instructor's name:	Joaquín De Cea
Course coordinator's name	Joaquín De Cea
Textbook:	Sheffi, Y. (1985) Urban Transportation Networks: Equilibrium Analysis with Mathematical Programming Methods. MIT Press.
Course Catalog Description:	This course provides the knowledge to predict flows in static transportation systems (public and private) with fixed and variable demand, with separable or not separable arc cost functions. This objective is broken down into: a) Develop transport network models that allow the representation of the flow and service levels equilibrium problem in different modes considered; b) Use operationally methods and solution algorithms to determine these equilibrium states in transport networks.
Prerequisite Courses:	ICT2213 Travel Demand Modelling and ICT2233 Network Flows
Co-requisite Courses:	None
Status in the Curriculum:	Required Crr2009 and Selected Elective Crr2013.
Course Learning Outcomes:	1. Predict the behavior of transportation systems with fixed demand and symmetric (diagonal and no-diagonal) and asymmetric cost functions. 2. Predict the behavior of transportation systems with variable demand and symmetric (diagonal and no-diagonal) and asymmetric cost functions. 3. Formulate combined supply-demand equilibrium problems. 4. Use operationally methods and solution algorithms to determine equilibrium states in transport networks.
Relation of Course to ABET Criteria:	a. Knowledge of mathematics, science and engineering b. Design and conduct experiments: analyze and interpret data c. Design a system, component, or process d. Multidisciplinary teams e. Identify, formulate, and solve engineering problems f. Professional and ethical responsibility

g. Effective communication
h. Broad education necessary for global, economic, environmental and societal context
j. Knowledge of contemporary issues
k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

1. Introduction
2. Principles of Deterministic Equilibrium in Transportation Networks: Traffic Equilibrium
3. The General Traffic Equilibrium Problem in Networks with Congestion.
4. Traffic Equilibrium in networks with Diagonal Cost Functions.
5. Traffic Equilibrium in networks with Symmetric Flow Interactions.
6. Traffic Equilibrium in networks with Asymmetric Flow Interactions.
7. Optimal System Assignment
8. The Equilibrium Problem in Networks with variable demand.
9. Demand models and entropy.
10. Combined distribution and assignment models.
11. Combined modal split and assignment models.
12. Combined distribution, modal split and assignment models.
13. Description of an implementation of the studied models: Estraus model.