

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

ICT2904 TRANSPORTATION SYSTEMS ENGINEERING

Credits and contact hours: 10 UC credits / 10 hours (4,5 h. Lectures; 1,5 h. Assistantship; 4 h. Independent learning experiences)

Instructor's name: Juan Carlos Muñoz / Sebastián Raveau

Course coordinator's name Felipe Delgado

Textbook: Banks, J.H. (2002) Introduction to Transportation Engineering. 2nd Ed., McGraw Hill, Nueva York.

Ortúzar, J. de D., Crovetto, G., De Cea, J. y Fernández J.E. (1991) Introducción a la Ingeniería de Transporte. Apuntes de Clase, Pontificia Universidad Católica de Chile, Santiago.

Course Catalog Description:

This course presents some fundamental techniques for the analysis of transportation systems for both passengers and cargo. Challenges regarding management, control, design and evaluation of transport systems are introduced. In the course students learn transportation demand models, traffic flow theory and programmed modes. The modeling techniques studied are: random utility theory, time-space diagram, queuing theory, network analysis, traffic equilibrium principles. Design of control strategies for simple systems. Feedback effects. Paradoxes. Modeling the impact of transport: air pollution and noise. Introduction to social evaluation of transport projects.

Prerequisite Courses: ICS1513 or EAE105A

Co-requisite Courses: MAT1630 Calculus III and MAT1640 Differential Equations

Status in the Curriculum: Required

Course Learning Outcomes:

1. Identify the basic elements of a transport system.
2. Identify the main challenges in the planning and operation of transport systems
3. Identify the main stages in the design of a transport facilities.
4. Identify the main negative impacts of transport projects and techniques to mitigate some of them.
5. Identify and use some basic analytic tools for the study of transport systems.
6. Formulate models that represent the basic behavioural

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characteristics of the different elements of a transport systems and their interaction.

7. Improve oral and written technical communication skills.

**Relation of Course to ABET
Criteria:**

- b. Design and conduct experiments: analyze and interpret data
- c. Design a system, component, or process
- e. Identify, formulate, and solve engineering problems
- g. Effective communication
- j. Knowledge of contemporary issues
- k. Techniques, skills, and modern tools for engineering practice.

Topics covered:

- I) Introduction to the analysis of Transportation Systems (TS) and basic concepts.
 - 1.1. Main Challenges of Transportation Systems.
 - 1.2. Characteristics of TS and basic concepts.
 - 1.3. Introduction to Physical Design of Transportation Facilities.
- II) Introduction to Demand Modeling
 - 2.1. General modeling
 - 2.2 Economic conceptualization of the demand for transport services.
 - 2.3. Derivation of the transport demand curve
 - 2.4. Transport Demand Models
 - 2.5. Introduction to disaggregated demand models.
- III) Introduction to the operation of TS and transport network equilibrium.
 - 3.1. Introduction to Traffic flow models and Transport network analysis.
 - 3.2. Introduction to the equilibrium in TS
 - 3.3. Introduction to the operation of Schedule transport systems
- IV) Evaluation of transport projects and mitigation of environmental impacts
 - 4.1. Mitigation elements of environmental impacts
 - 4.2. Introduction to the social evaluation of transport projects.