

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

**ICT2223 TRAFFIC FLOW THEORY**

**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:** Juan Carlos Herrera

**Course coordinator's name:** Juan Carlos Herrera

**Textbook:** Daganzo, C (1997) Fundamentals of Transportation and Traffic Operations. Elsevier Science, Nueva York.

**Course Catalog Description:** The course introduces the students in the vehicular traffic flow theory on transportation networks, and delivers the necessary tools to understand the stochastic and deterministic models that explain traffic behavior and traffic states. The course also trains students to model traffic phenomena at intersections.

**Prerequisite Courses:** None

**Co-requisite Courses:** ICT2904 Transportation Systems Engineering

**Status in the Curriculum:** Required

**Course Learning Outcomes:**

1. To use basic analysis tools in traffic flow problems.
2. To understand the relationship among traffic variables used in traffic models, and how changes in some of them affect the others.
3. To analyze the effect of static and moving bottleneck on traffic states and the capacity of the system.
4. To optimize the operation of isolated signalized intersection subject to operational constraints, determining phase design, green allocation and cycle length.
5. To estimate the performance (delays, stops, queue length, etc.) on both signalized and priority junctions.
6. To design operational mechanisms in traffic engineering according to a certain confidence level on its performance.
7. To design traffic data collection methods.

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**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
- e. Identify, formulate, and solve engineering problems
- h. Broad education necessary for global, economic, environmental and societal context
- k. Techniques, skills, and modern tools for engineering practice.

**Topics covered:**

- 1. Introduction
  - 1.1. Basic concepts: flow, density, velocity.
  - 1.2. Analysis tools: x-t and N-t diagrams.
- 2. Traffic flow theory
  - 2.1. The fundamental relationship
  - 2.2. Examples of v-k relationships
  - 2.3. Generalized definitions
  - 2.4. Traffic models: macroscopic models (LWR or KWT) and microscopic models (car-following models)
- 3. Traffic Control
  - 3.1. Signalized intersection modeling
  - 3.2 Priority intersection modeling
- 4. Statistical distribution applied to traffic variables: flow, headway, velocity.
- 5. Traffic data collection: flow, density, velocity, vehicular occupancy rate, public transport parameters, queue length.