Summary
The objectives of this course are to present the major elements of traffic operations and to develop basic skills in applying the fundamentals of traffic analysis and control. Students should be able to start applying these skills to model different aspects of congestion in urban systems.

Content
Introduction to fundamentals of urban traffic engineering, including data collection, analysis, and operations. Traffic engineering studies, traffic control devices, capacity and level of service analysis of freeways and urban streets for multimodal systems. Performance models and modeling techniques: queuing theory, network analysis and simulation. Different levels of traffic modeling, micro- (car following), meso- (link level) and macro- (network level). Design of control strategies for simple systems. Application of traffic operations to the design of isolated intersection and coordinated traffic signal control systems. Emission models, Public Transportation Operations.

Keywords
traffic engineering, traffic flow theory, traffic management, ramp metering, public transportation, operations

Learning Prerequisites
Required courses
Transportation Systems Engineering (GC-351) or Consent of the Instructor

Important concepts to start the course
A good level of knowledge in mathematics and programming as taught in the first 2 years of Civil Engineering program.

Learning Outcomes
By the end of the course, the student must be able to:
- Assess / Evaluate the performance of transport systems
- Optimize the level of mobility in a city
- Analyze the different types of congestion
- Apply control strategies in congested networks
- Illustrate with simple examples the complexity of transport systems
- Establish methodologies to model congestion
Transversal skills

- Evaluate one’s own performance in the team, receive and respond appropriately to feedback.
- Resolve conflicts in ways that are productive for the task and the people concerned.
- Respect relevant legal guidelines and ethical codes for the profession.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Continue to work through difficulties or initial failure to find optimal solutions.
- Access and evaluate appropriate sources of information.
- Collect data.

Teaching methods
Lectures with slides and/or board description, exercises, group projects, seminars by invited professor

Assessment methods
Mid-term exam, final exam, homeworks, laboratories (in groups)

Resources
Bibliography
Lecture notes, book chapters and handouts will be distributed throughout the semester, or posted on web.

Moodle Link