Course guide
250ST013 - 250ST013 - Transport Systems Operations and Logistics

Last modified: 16/04/2024

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: MASTER'S DEGREE IN SUPPLY CHAIN, TRANSPORT AND MOBILITY MANAGEMENT (Syllabus 2014). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 5.0 **Languages:** English

LECTURER

Coordinating lecturer:

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CESCTM4. Know and apply the modeling techniques and simulation optimization to solve the problems of design, operation and management of transportation systems.
CESC4. Know and apply the techniques of modeling, simulation and optimization to solve the problems involved the design and management of supply chains.
CETM1. Knowledge of the design, planning of transport infrastructure and modal terminals, such as highways, railways, ports, airports, railway stations and transport logistics centers exchange.
CETM3. Knowledge for planning, management and operation of transportation systems and mobility, ability to analyze service levels to users, operating costs and environmental and social such as mass transit, and private vehicle traffic impacts, air transport, sea transport, intermodal transport and urban mobility.
CESC1. Analyze and optimize the operations associated with the supply chains of companies and organizations in general, both globally and in each of its parts: supply, distribution, production, transportation, storage and retrieval.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	12.00
Hours large group	30,0	24.00
Self study	80,0	64.00

Total learning time: 125 h

CONTENTS

1-Basic Assessment Tools

Description:
We will present the tools, predominantly graphical, useful for understanding details of transport operations. We will briefly discuss optimization techniques.

Related activities:
Homework 1

Full-or-part-time: 43h 45m
Practical classes: 10h 30m
Laboratory classes: 5h 15m
Self study : 28h

2-Traffic flow theory

Description:
Common properties of traffic streams (including flow, density and speed), relations between these properties and models describing how these properties change over time and space.

Related activities:
Homework 2

Full-or-part-time: 37h 30m
Practical classes: 9h
Laboratory classes: 4h 30m
Self study : 24h

3-Flow Control

Description:
Schemes to affect traffic stream properties in some desirable way(s); e.g. coordinating green times at neighboring highway traffic signals to reduce driver delay or implementing take-off and landing rules at an airport runway to maintain safe spacings between aircraft. Preliminary discussion of transport networks (e.g. paradoxes) is provided here with an eye toward preparing students for more detailed study in other courses and to highlight the complications that can arise network-wide when deploying control schemes.

Related activities:
Homework 2

Full-or-part-time: 18h 45m
Practical classes: 4h 30m
Laboratory classes: 2h 15m
Self study : 12h

4-Observation and Measurement

Description:
Collection and interpretation of transportation data in order to estimate relevant properties of traffic streams (e.g. capacity, average speed, O/D matrix?) accounting for the inherent uncertainty in transport systems.

Related activities:
Mini-Project

Full-or-part-time: 6h 15m
Theory classes: 1h 30m
Practical classes: 0h 45m
Self study : 4h

5-Scheduled Transportation

Description:
Basic principles in operating fleets with schedules. This includes dispatching of vehicles, schedule adherence and control, passenger delays and transfer coordination.

Related activities:
Homework 3

Full-or-part-time: 18h 45m
Practical classes: 4h 30m
Laboratory classes: 2h 15m
Self study : 12h

GRADING SYSTEM

BIBLIOGRAPHY

Basic:
- Daganzo, C.. Fundamentals of Transportation and Traffic Operations. New york: Elsevier, 1997. ISBN 0080427855.

Complementary:
- Homburger, W.S. et al. Fundamentals of traffic engineering. 16th ed. Berkeley, CA: Institute of Transportation Studies, 2007.
- TRB. Highway capacity manual. Washington D.C: Transportation Research Board, 2010. ISBN 9780309160773.
- Vuchic, Vukan. R. Urban public transportation: systems & technology. Englewood Cliffs, N.J: Prentice Hall, 1981. ISBN 0139394966.
- Edie, Leslie C. "Discussion of traffic stream measurements and definitions". Proceedings The 2nd International Symposium. Paris: OECD, 1965. pp 139-154.
- Greenshields, B.D.; Bibbins, J.R.; Channing, W.S.; Miller, H.H. "A study of traffic capacity". Highway Research Board Proceedings [on line]. Washington: National Research Council (U.S.A.), Highway Research Board, 1935. Vol. 14, pp. 448-477 [Consultation: 03/04/2023]. Available on: https://onlinepubs.trb.org/Onlinepubs/hrbproceedings/14/14P1-023.pdf.- Makigami, Y. ; G.F. Newell ; R. Rothery.. "Three-dimensional representation of traffic flow". Transportation Science [on line]. Vol 5 (1971) num. 3 pp 302-313 [Consultation: 23/09/2022]. Available on: http://search.proquest.com/publication/37963.

RESOURCES

Hyperlink:
- Atenea - Digital Campus. https://atenea.upc.edu/moodle/login/index