TRAIL

Research School for Transport, Infrastructure and Logistics

Beta

Research School for Operations Management and Logistics

Course
Freight Transport Management

Date:	**15 & 22 May, 5 & 12 June 2019**
Time:	**10.00 – 16.00 h.**
Location:	**Utrecht, room t.b.a.**
Course leaders:	**Prof. dr. Iris Vis and Dr. Leandro Coelho**
ECTS:	**1 (attendance) / 4 (with assignment)**
Days:	**4**
Course fee:	**Free for TRAIL/Beta/OML members, others please contact the TRAIL office**
Registration:	**www.rstrail.nl**

Objectives
You will learn to:

- describe transportation networks, logistics operations and distinguish between related synchronization issues in the network;
- design and apply models and solution approaches for port logistics and transportation;
- design and apply mathematical models and solution approaches to solve specific decision problems such as vehicle routing, scheduling and inventory control;
- indicate the challenges and solve specific decision problems in synchromodal transportation networks.

Course description
The aim of this course is to learn how to plan and control transport operations in supply chain networks. We study how to design and apply solution approaches to deal with typical decision problems that arise in transportation networks to make sure that the presented objectives will be met. In this course, we show you both qualitative and quantitative approaches to reach this goal for freight transportation. We study several types of facilities in more detail such as ports and cross-docking facilities. We treat various decision problems at the tactical and operational levels and examine supply chain synchronization issues in more detail. Examples include port logistics, vehicle routing in hinterland transportation networks and inventory-routing. Several modelling and simulation techniques are addressed to show how to tackle each of these decision problems and how to deal with uncertainty in the network. We discuss several important trends such as synchromodal transportation networks and new mathematical formulations.

Research project
Each student will develop a research project throughout the course. It will include describing all the problem assumptions, developing a formulation and the design of the experiments during the first half of the course. In the second half each student will test and validate the formulation and develop a solution algorithm for the problem. Small presentations in class will guide the development of the project, and a final report and implementation files is to be handed in to the professors.

Program

	Date	Lecturer	*Topics*	*Assignment*
Lecture 1	15 May	Vis	*Freight transportation and supply chain synchronization*	*Research project*
Lecture 2	22 May	Vis	*Port Logistics*	
Lecture 3	5 June	Coelho	*Vehicle routing - heuristics and exact methods*	
Lecture 4	12 June	Coelho	*Variants of the vehicle routing and Inventory-routing problems*	

Course material
A set of academic papers including:

- Lecture 1:
  - Buijs, P., Carlo, H., Vis, I.F.A., Synchronizing local and network-wide cross-docking operations – a framework and classification, European Journal of Operational Research.
- Lecture 2:
  - Carlo, H.J., Vis, I.F.A., Roodbergen, K.J. Seaside Operations in Container Terminals: Literature Overview, Trends, and Research Directions, Flexible Services and Manufacturing Journal.
  - Carlo, H.J., Vis, I.F.A., Roodbergen, K.J. Transport Operations in Container Terminals: Literature Overview, Trends, and Research Directions, European Journal of Operational Research 236, 1-13.
  - Carlo, H.J., Vis, I.F.A., Roodbergen, K.J. (2014), Stacking Operations in Container Terminals: Literature Overview, Trends, and Research Directions, European Journal of Operational Research 235, 412-430.
- Lecture 3:
  - F. Semet, P. Toth, D. Vigo (2014). Classical exact algorithms for the capacitated vehicle routing problem. In Vehicle routing: problems, methods, and applications. Toth, P. and Vigo, D. (editors). Society for Industrial and Applied Mathematics, Society for Industrial and Applied Mathematics, Philadelphia, pages 37—57.
  - G. Laporte, S. Ropke, T. Vidal (2014). Heuristics for the vehicle routing problem. In Vehicle routing: problems, methods, and applications. Toth, P. and Vigo, D. (editors). Society for Industrial and Applied Mathematics, Society for Industrial and Applied Mathematics, Philadelphia, pages 87--116.
- Lecture 4:
  - S. Irnich, M. Schneider, D. Vigo (2014). Four variants of the vehicle routing problem. In Vehicle routing: problems, methods, and applications. Toth, P. and Vigo, D. (editors). Society for Industrial and Applied Mathematics, Society for Industrial and Applied Mathematics, Philadelphia, pages 241--271.
  - L. C. Coelho, G. Laporte, J.-F. Cordeau (2014). Thirty years of inventory-routing. Transportation Science, 48(1):1—19.

Prerequisite
Master courses on Operations Research and Logistics. Students should have MSc level knowledge of modeling, mathematical programming, heuristics and computer implementation. Note that programming an optimization method for a distribution problem will be required for the assignment.