**“ITS and management of logistic systems”**

**Syllabus SCR.01/2**

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October, 20th, 2018

Version 1

# Name of the course

 **ITS and management of logistic systems**

# ECTS credits

6 Credits, **(45H Theory; 30H Exe + Lab), 3rd semester**

This lecture provides students with basic knowledge in the field ITS and management of logistic systems. The lectures should acquaint students with base modelling and simulation system using in management of logistics and transport system, teach to use the common simulation software and prepare students for manage of logistics chains and processes in practice and in management of private companies or state administration.

# Objectives

The main objectives of this lecture are following:

* ~~basic terminology and basic concepts in the field of ITS,~~
* basic terminology and basic concepts in the field of logistics,
* main concepts in the field of transport and logistics modelling,
* decision making support software,
* theory of modelling transport and logistics system,
* creating the transport and logistics models,
* simulation of transport and logistics systems.

# Learning outcomes

The general expectation regarding the knowledge to be provided/acquired is as follows:

* analytical work in the field of ITS;
* understanding relationships in transport and logistics system,
* solving more complicated transport and logistics problems in practice;
* using decision making support software to solve specific problems of application character;
* creation and use of processes models of transport and logistics;
* usage simulation software in logistics systems.

# Contents

1. Basic terms of ITS with focusing on logistics problems
2. Methodology of transport and logistics system theory
	1. Verbal models, mathematic models,
	2. heuristics solution, solution process of transport problems,
	3. errors in the transmission of information,
	4. Pareto optimum solution
3. Transport systems
	1. systematic characteristics of passengers
	2. and freight transport
4. Description and design of the transport networks
	1. characteristics the structure and types of transport networks,
	2. definition of section permeability,
	3. capacity of section and hub,
	4. section transport performance,
	5. network skeleton,
	6. service coverage areas
5. Transport sets
	1. application of Clark-Wright algorithm
	2. other algorithms
6. Changes of equipment in logistics chains
	1. application of algorithm of determining the equipment between connections
7. Design of transport routes in logistics
	1. application of special algorithm of design optimum count of public transport lines
8. Coordination of rhythmic processes in transport and logistics
	1. application of algorithm for calculation the optimum organization of parallel logistics lines
9. Interaction in transport flows
	1. definition the crossing,
	2. collision, collision point, non-collision graph,
	3. phases groups,
	4. matrix of succession
10. Processes simulation models
	1. problem definition,
	2. project planning,
	3. system definition and model formulation,
	4. input data collection and data analysis,
	5. model translation, verification and validation,
	6. experimentation and analysis,
	7. application simulation method on queuing theory problems and agent based simulation in different software

# Teaching method

Lectures, case studies, exercises, practical solution of problems

# Assessment method

Mid-term and final written examination (theoretical test), exercises from case studies (practical examination).

# Textbooks - Publications - Software

**Textbooks**

* Guido Gentile (Editor), Klaus Nökel 2016 Modelling Public Transport Passenger Flows in the Era of Intelligent Transport Systems: COST Action TU1004 (TransITS) (Springer Tracts on Transportation and Traffic), Springer
* Jaume Barceló (Editor) 2010 Fundamentals of Traffic Simulation (International Series in Operations Research & Management Science) Springer New York
* Gaetano Fusco 2017 Intelligent Transport Systems (ITS): Past, Present and Future Directions (Transportation Issues, Policies and R&d), Nova Science Pub Inc
* Edward Chung, Andre-Gilles Dumont 2009 Transport Simulation: Beyond Traditional Approaches (Engineering Sciences), EPFL Press 1st Edition
* Andreas Fink, Franz Rothlauf 2009 Advances in Computational Intelligence in Transport, Logistics, and Supply Chain Management (Studies in Computational Intelligence), Springer
* Martin Treiber, Arne Kesting, Christian Thiemann 2013 Traffic Flow Dynamics: Data, Models and Simulation, Springer Heidelberg
* Lily Elefteriadou 2014 An Introduction to Traffic Flow Theory (Springer Optimization and Its Applications), Springer New York
* Michael Patriksson 2015 The Traffic Assignment Problem: Models and Methods (Dover Books on Mathematics), Dover Publications
* John Liu 2011 Supply Chain Management and Transport Logistics (Routledge Advanced Texts in Economics and Finance), Routledge

**Software**

* MS Office Excel
* AnyLogic
* Arena Input and Output Analyser