

# **2<sup>nd</sup> Teaching Workshop**

**1 -5 September**

**2014, Stockholm**

**Preliminary program**

June 30, 2014

**Venue**

Royal Institute of Technology, Department of Transport Science, Division of Traffic and Logistics

**Starting date**

September 1, 2014

**Ending date**

September 5, 2014

**Schedule**

September 1: Module 2.1, 2.2, 2.3 and 2.6.....KTH  
 September 2: Modules 2.4 2.5 and 6.5 ..... NTUA  
 September 3: Modules 6.6, 6.7 and 6.8.....NTUA  
 September 4: Module 2.7, 2.8 and 2.9.....KTH  
 September 2: Modules 6.1, 6.2, 6.3, 6.4, 6.9 and 6.10.....KTH

<b>2, Introduction to transportation systems and traffic analysis, 12 ECTS credits</b>	
2.1 Transportation planning	KTH
2.2 The four step method	KTH
2.3 Discrete choice models in transportation systems analysis	KTH
2.4 Intermodal transport	UniNA
2.5 Freight and logistics	UniNA
2.6 Project evaluation and cost-benefit analysis	KTH
2.7 Traffic flow characteristics	KTH
2.8 Traffic flow models	KTH
2.9 Highway capacity and level of service	KTH

<b>6, Advanced traffic management systems, 12 ECTS credits</b>	
6.1 Introduction to Intelligent Transportation Systems	KTH
6.2 Traffic surveillance methods	KTH
6.3 Automatic vehicle identification systems	KTH
6.4 Advanced traveller information systems	KTH
6.5 Active traffic management	NTUA
6.6 Traffic flow-metering	NTUA
6.7 Incident management	NTUA
6.8 GIS technologies and applications	NTUA
6.9 Traffic flow simulation	KTH
6.10 Case studies	KTH

## Detailed program

**Monday, September 1, 2014**

**9:30 AM – 12:30 PM**

**Welcome to the participants.....Dr. Albania Nissan**

**Module 2.1 Transportation planning..... Dr. Albania Nissan**

- Transportation systems definition and characteristics
- Basic design aspects of transport systems
- Main approaches to transportation planning
- Important measures of mobility and accessibility
- Main challenges and issues in traffic

**Module 2.2 The four Steps method ..... Dr. Daniel Jonsson**

- Definition of transport demand model
- Trip emission model
- Distribution model
- Modal split model
- Path choice model
- Examples of demand models
- Applications of demand models.

**2:00 PM – 4:00 PM**

**Module 2.3 Discrete choice models in transportation systems analysis.....Dr. Daniel Jonsson**

- Categorical data: distributions
- Likelihood functions and Maximum Likelihood Estimation
- Describing contingency tables: odd ratios, inference for contingency tables
- Random utility models:
  - Logistic regression
  - Multinomial Logit model
  - Single-level Hierarchical Logit model
  - Multi-level Hierarchical Logit mode
  - Cross-Nested Logit model
  - Generalized Extreme Value (GEV) model
  - Probit model
  - Hybrid Logit-Probit model
  - Random-Parameter Multinomial Logit model
  - Ordered Logit model
  - Ordered Probit model

**4:00 PM – 5:00 PM**

**Module 2.6 Project evaluation and cost-benefit analysis ..... Dr. Joel Franklin**

**Tuesday, September 2, 2014**

**9:30 AM – 12:30 PM**

**Module 2.4 Intermodal transport.....Dr. Constantinos Antoniou**

- Understand physical (vehicles, infrastructures, nodes) and immaterial (rules, regulations, services, market characteristics) features of each freight transport mode and of all relevant multimodal/intermodal sequences of models
- Understand processes and information exchanges in intermodal nodes, with specific focus on ports, dry ports and logistics platforms
- Understand key choice factors for each mode and/or sequence of modes
- Understand the container market, from the viewpoint of both shipping companies, supply operators and demand agents
- Understand the short-sea shipping and the Ro-Ro market, with specific reference to the Euro-Mediterranean context

**2:00 PM – 5:00 PM**

**Module 2.5 Freight and logistics.....Dr. Constantinos Antoniou**

- Implement mathematical models for the calculation of the network performances of freight multimodal/intermodal services
- Understand the Information and Communication Technology needs in the sector of intermodal/multimodal transport, with specific focus on customs regulations and Port Community Systems
- Understand main logistics and transport needs for companies
- Understand the main strategic, tactical and operational problems in supply chain management
- Implement mathematical models for freight demand: multi-regional input-output (MRIO) models, gravity models, four step models
- Apply mathematical models for planning and governance in the context of feasibility studies for new logistics platforms, analysis of catchment areas of ports, analysis of the impact of free trade zones and trade agreements

**Module 6.5 Active traffic management.....Dr. Constantinos Antoniou**

- Speed harmonization
- Variable speed limits
- Temporary shoulder use
- Queue warning
- Dynamic merge control
- Construction site management
- Truck restrictions
- Ramp metering
- Dynamic rerouting and traveller information
- Dynamic lane markings
- Automated speed enforcement
- Managed lane strategies
- Pricing

**Wednesday, September 3, 2014.....Dr. Constantinos Antoniou**

**9:30 AM – 12:30 PM**

**Module 6.6 Traffic flow-metering**

- Background
- Ramp metering
- Mainline flow metering
- Traffic flow metering algorithms
- Coordinated vs. local control
- Evaluation of traffic flow metering
- Case studies

**2:00 PM – 5:00 PM**

**Module 6.7 Incident management.....Dr. Constantinos Antoniou**

**Definitions**

- Incident types
- Incident implications
- Incident management activities
- Stakeholders, roles and responsibilities
- Developing an incident management program
- Improving an incident management program
- Infrastructure
  - Data collection
  - Control and information dissemination
- The role real-time response and planning systems
- Case studies

**Module 6.8 GIS technologies and applications.....Dr. Constantinos Antoniou**

**GIS technologies**

- GIS-T definition
- Aims
- Structure of a GIS-T
- Locational reference systems
- Modeling
- Spatial data characteristics
- Data quality
- Map systems and map matching
- Applications of positional data
- Measurement systems
- Data analysis by means of GIS-T
- Key and special issues in GIS-T

**GIS applications**

- Road inventories
- Road safety management
- Pavement management systems
- Traffic engineering analysis
- Congestion management
- Transit management
- Fleet control and management
- Emergency medical response
- Evacuation management
- Spatial factors analysis for highway design and maintenance
- Other applications

Thursday, July 4, 2014

9:30 AM – 12:30 PM

**Module 2.7 Traffic flow characteristics.....Professor Haris Koutsopolos/Dr. Albania Nissan**

- Basic Elements of Traffic Flow Theory
- Macroscopic variables
  - Density
  - Flow Rate
  - Space-Mean and Time-Mean Speed
  - Occupancy
- Microscopic and Macroscopic Flow Characteristics
- Example problems

**Module 2.8 Traffic flow models .....Professor Haris Koutsopolos/Dr. Albania Nissan**

- Objective
- Relationships: flow vs. speed and speed vs. density,
- fundamental diagram (observations, the fundamental diagrams, mathematical models for the fundamental diagrams)
- structure: single regime and multiple regime,
- Observations
- Examples
- performance measures and methods for performance analysis,
- queuing models
- deterministic queuing analysis
- Examples
- Stochastic queuing models
- Shockwaves

**Module 2.9 Highway Capacity and Level of Service.....Professor Haris Koutsopolos/Dr. Albania Nissan**

**Basic concepts**

- Basic concepts:
  - uninterrupted flow,
  - interrupted flow,
  - under saturated flow,
  - oversaturated flow,
  - queue discharge flow.
- Basic Freeway Segments
  - Base Conditions
  - Flow Characteristics Under Base Conditions
  - Capacity under Base Conditions
  - LOS for basic Freeway Segments
  - LOS Criteria
  - Required Input Data
  - Methodology
  - Limitations of Methodology
  - Examples
- Weaving Segments
  - Weaving Segment Characteristics
  - Configuration of a Weaving Segment
  - Methodology
  - Limitations of Methodology
  - Examples

- Freeway Merge and Diverge Segments .....**Dr. Albania Nissan**
  - Ramp Components
  - Classifications of Ramps
  - Ramp-Freeway Operational Conditions
  - Base Conditions
  - LOS for Base Conditions
  - Required Data
  - Methodology
  - Limitations of Methodology
  - Examples
- Two-Lane Highways .....**Dr. Albania Nissan**
  - Characteristics of Two-Lane Highways
  - Classifications of Two-Lane Highways
  - Base Conditions
  - Basic Relationships
  - Capacity and LOS
  - Required Input Data
  - Methodology
  - Limitations of Methodology
  - Examples

### 2:00 PM – 3:00 PM

- Intersections .....**Dr. Albania Nissan**
  - Unsignalised intersections:
    - types of intersections
    - control strategies
    - capacity, delay, and LOS
  - Roundabouts:
    - history
    - types of roundabouts
    - cyclist movements
    - usage and benefit and disadvantages of roundabouts
    - capacity, delay, and LOS

### 3:00 PM – 5:00 PM

- Signalised intersections: .....**Johan Whalstedt**
  - Signal control modes
  - signal terminology,
  - traffic streams and signal groups, stage and (stage) sequence
  - primary and secondary traffic patterns
  - primary and secondary conflicts
  - cycle time, optimal cycle time and optimal green times for isolated intersections
  - capacity, delay, and LOS
  - signal coordination
  - software tools for signal control and optimal coordination
  - Bus signal priority
  - Area-wide control

**Friday, September 5, 2014**

**9:30 AM – 12:30 PM**

**Module 6.1 Introduction to Intelligent Transportation Systems .....Professor Haris Koutsopolos, Dr. Xiaoliang Ma**

- Role of Models
- Basic Characteristics and Structure of Simulation Models
- Traffic Simulation Models
  - Microscopic Traffic Simulation Models
  - Mesoscopic Models
  - Macroscopic Models
- Hybrid Models
- Random Number Generators
- Input Analysis
- Output Analysis

**2:00 PM – 4:00 PM.....Professor Haris Koutsopolos**

**Module 6.2 Traffic surveillance methods**

**Module 6.3 Automatic vehicle identification systems**

**Module 6.4 Advanced traveller information systems**

**Module 6.9 Traffic flow simulation**

- Experimental Design & Analysis
- Calibration and Validation
- Validation
- Calibration
- OD Estimation

**Module 6.10 Case studies ..... Dr. Albania Nissan, Dr. Xiaoliang Ma**

**4:00 PM – 5:00 PM..... Closing remarks**

- Concluding discussion and feedback
- Lessons learned for next workshops



## **Premises**

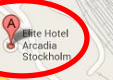
The course will be held on September 1<sup>st</sup> to 5<sup>th</sup> 2014, at KTH Royal Institute of Technology,

Department of Transport Science, Division of Traffic and Logistics Teknikringen 72, SE-100 44,  
Stockholm.

## **How to get there**

Please see the description and maps in the next pages

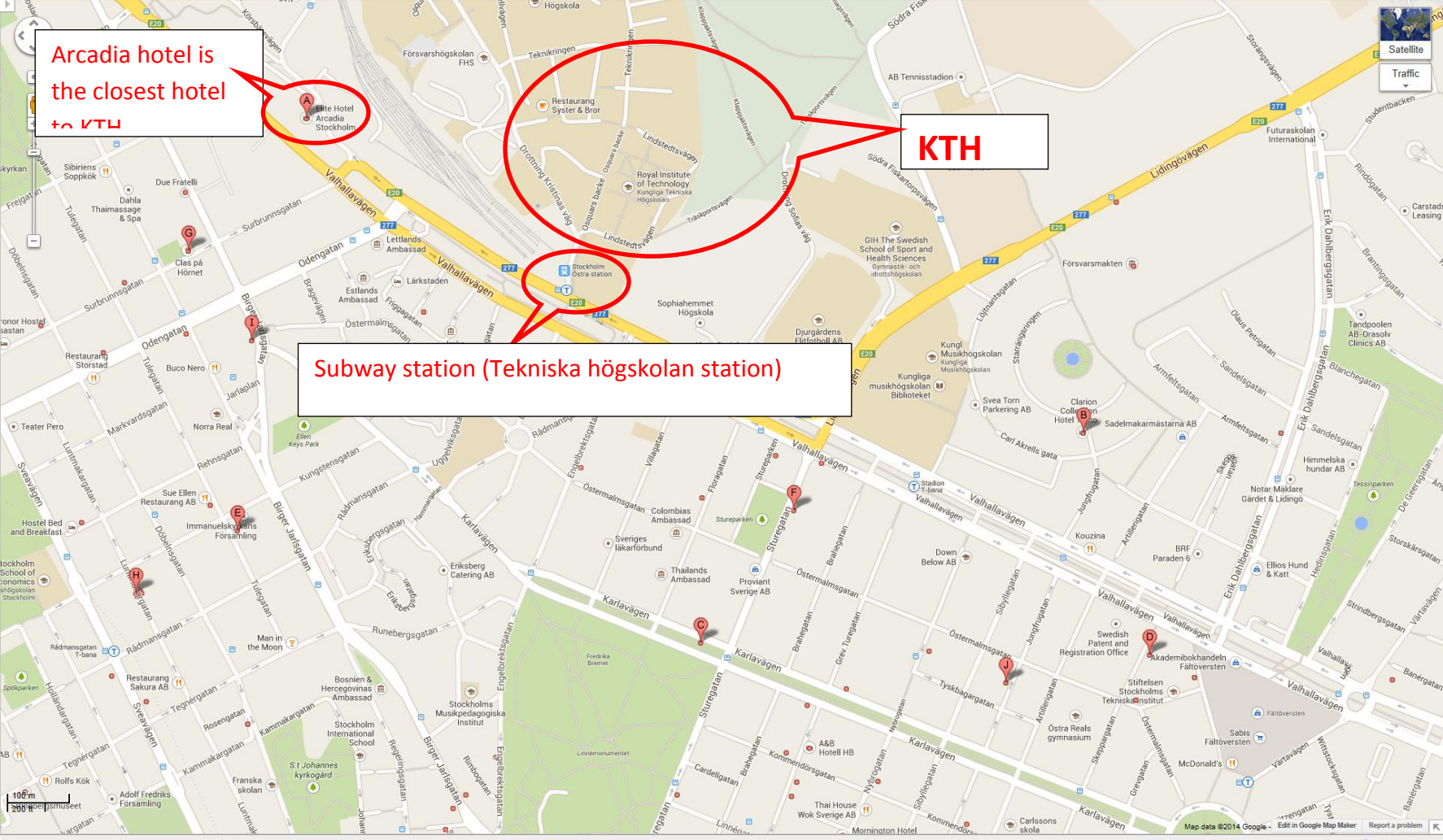
Arcadia hotel is the closest hotel to KTH



KTH

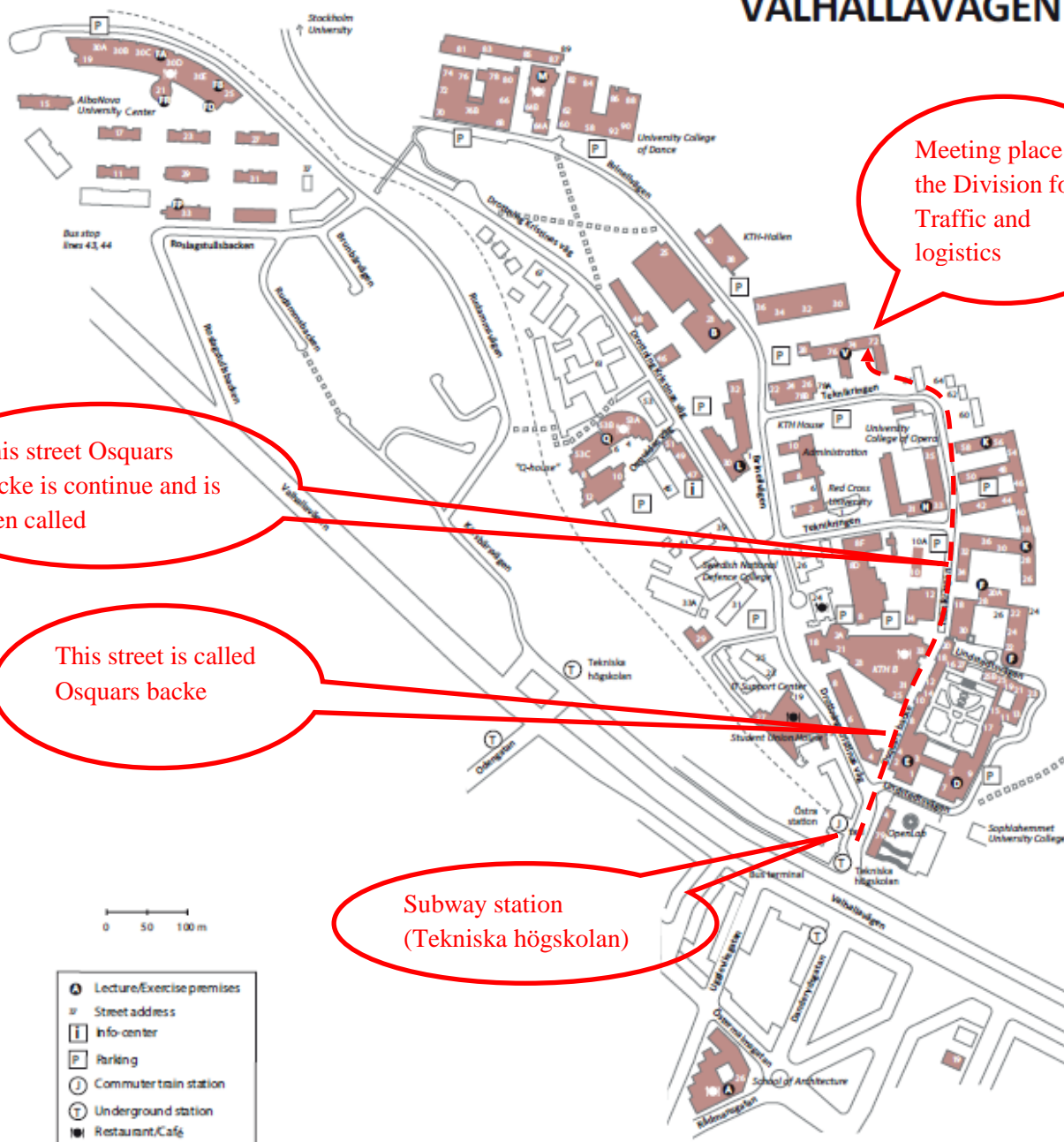


Subway station (Tekniska högskolan station)





# KTH MAIN CAMPUS VALHALLAVÄGEN



This street Osquars backe is continue and is then called

This street is called Osquars backe

Subway station (Tekniska högskolan)

Meeting place in the Division for Traffic and logistics

