

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP Master in SMARt transport and LOGistics for cities SMALOG</p>
--	---	--

**ERASMUS+ PROGRAMME**  
**Project Number: 585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP**

# **Master in SMARt transport and LOGistics for cities / SMALOG**

**Grant Agreement Number 2017-2893/001-001**

## **Master Curricula**

*development and implementation*

*at the Georgian Technical University*

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP Master in SMArt transport and LOGistics for cities SMALOG</p>
--	---	--

**Project Acronym:** SMALOG

**Duration:** 15/10/2017 - 14/10/2021

**Project Coordinator:** University of Rome Tor Vergata (Italy)

**Proposal full title:** Master in Smart transport and logistics for cities

**Project number:** 585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP

**Document Title:** Master Curricula

**Authors:** George Dobarjginidze, Temur Ugulava, Antonio Comi

**Summary:** The deliverable presents the curricula process of the 2nd level Master (120/90 ECTS) developed for the Ukraine and Georgian Universities according to the Bologna process standards within the SmaLog project. The deliverable reports curriculum for GTU partner faculties. After a short introduction, the deliverable describes the local conditions and needs and the results of the international reviews on which the curricula were built. For the developed curriculum, the deliverable provides the structure in terms of modules, the expected learning outcomes, references to publications and the materials needed to deliver the Master at GTU.

**Status:** Final draft

**Distribution:** Public

**DocumentID:** D.WP2

**Date:** 26<sup>th</sup> of July 2021

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which maybe made of the information contained therein.

## Contents

1	Introduction.....	5
2	General structure, objectives and contents of the Masters.....	8
3	SmaLog in Georgian Technical University - GTU.....	9
3.1	Master’s objectives and profile of the Master’s graduates.....	9
3.2	Master’s Curriculum.....	9
3.3	Programme structure .....	10
3.3.1	Basic concept of Smart Transport and Logistics for Cities .....	10
3.3.2	Specific objectives of the course.....	12
3.3.3	Modules.....	13
3.3.4	Employment opportunities .....	35
3.3.5	Admission procedure .....	35
3.3.6	Examination procedure for the thesis defence .....	36
3.3.7	Support for students for learning and training .....	36
3.3.8	Tutor activity.....	36
3.3.9	Fees .....	36
3.3.10	Stages .....	37
4.	Equipment and material .....	37
5.	Conclusions.....	39

## List of Tables and Figure

Table 1 - Diagram of Master’s educational programme .....	11
Table 2 - Professional modules of Master’s programme .....	13
Table 3 - City Passenger Transport.....	13
Table 4 - Transportation system modelling and simulation.....	17
Table 5 - Traffic control.....	20
Table 6 - Transportation system modelling and simulation (project).....	22
Table 7 - Environmental and Human Impacts of Transport .....	24
Table 8 - Multi-modal transport systems (Project) .....	27
Table 9 - Smart transport and logistics .....	30
Table 10 - Transport policies and regulations.....	33
Table 11 - Detailed list of equipment and materials for the Master Students Research Centre .....	38

## 1 Introduction

Within the framework of the Erasmus+ - Capacity Building in the Higher Education programme the Master in smart transport and logistics for the cities project (SmaLog below) has been selected for funding. The project started in October 2017 and will end in October 2021.

The consortium comprises four EU universities, four Ukraine and two Georgian universities, and one institute of advanced studies, namely the Department of Enterprise Engineering “Mario Lucertini” of the University of Rome Tor Vergata (the project coordinator), the Research Centre on Transport and Logistics of “Sapienza” University of Rome, Department of Transport Systems and Logistics of the O. M. Beketov National University of Urban Economy in Kharkiv, Department of Transport Technologies of the Lviv Polytechnic National University, Department of Automobiles and Transport Technologies of the Zhytomyr State Technological University, Department of Transport Systems and Road Safety of the National Transport University, Department of Logistics of the Georgian Technical University, Business and Management Faculty of the Batumi State Maritime Academy, Faculty of Transport of the Silesian University of Technology, the Department of Transport Services Market of the Institute of Market Problems and Economic & Ecological Research of the National Academy of Sciences of Ukraine, Department of Mechanical Engineering of the Hochschule Wismar, University of Applied Science: Technology, Business and Design. Two associate partners are also involved: OOO “System Service” and Batumi Auto transport Ltd. The Ukrainian and Georgian Universities are defined as “Local Universities” for the purposes of the report.

During the proposal stage the analysis carried out in cooperation with Ukrainian and Georgian Universities and stakeholders highlighted that there is a need to strengthen the role of research to start managing transport and logistics, exploiting the opportunities offered by telematics on an evidence-base in Ukraine and Georgia. For this reason, the SmaLog project aims to transfer to Ukraine and Georgia the most recent knowledge and good practices developed in the European Union in the field of smart transport and logistics for cities, and Local Universities are the key actors to start this process. Starting from these concepts and knowledge developed within the European partners, the project aims to:

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

- develop and test in Ukraine and Georgia a 2-year University Master's programme according to the Bologna process standards;
- “Train the Trainer” supporting Local academics in defining and delivering the Masters;
- provide each Ukrainian and Georgian University with a laboratory dedicated to smart transport and logistics for cities;
- disseminate through newsletters, events, workshops and seminars the importance of research in the field of smart transport and logistics for cities;
- set up a national coordinated network of Universities, public bodies, private companies and NGOs on smart transport and logistics for cities involving Local Universities in the wider European network of research centres.

With reference to the definition of effective and useful Master curricula on smart transport and logistics, two preconditions are required to reach these aims. On the one hand, there is a need to clearly understand local conditions and needs both in terms of research and teaching on the topic in question. On the other, the need is to review and analyse the most relevant and recent experiences and tools in the field of smart transport and logistics for cities available at international level. The analysis carried out highlights several important aspects. First, the Local University system guarantees a suitable level for designing, managing and analysing smart transport and logistics. On the other hand, there are some gaps. First of all, there is a problem of isolation from the international research world that leads to:

- a need to update contents and methods of courses for students;
- a need to update research topics in the field of smart transport and logistics for cities;
- a need of adequate technical equipment in current laboratories, useful to achieve the aims of a SmaLog Master.

According to the previously recalled derivable results, the new Masters programmes were defined accordingly as a 2/1.5 years and 120/90 ECTS credit Masters with transparent quality assured content in accordance with the Bologna process that will allow the course to be recognised within the Lisbon Convention and on a par with the European Area of Higher Education.

User Needs Analysis carried out at the local level highlighted some interesting aspects. First of all, while Masters on Transport topics are already available in Ukraine and Georgia there is no specific

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMART transport and LOGistics for cities SMALOG</b></p>
--	---	---

Master's programme in smart transport and logistics for cities, and all the local partners agreed that research on such a topic is not fully implemented at the local level.

Finally, according to local partners, there is a lack of practical or laboratory-based activities in the Master courses. In some Masters, there are no practical or lab activities whatsoever, whilst in others they are not extensive and need to be improved.

At the beginning, SmaLog program was initiated at the Georgian Technical University as an updated/extended existing Logistics Master's programme and in 2021 earned 7 years accreditation status.

In order to improve employment opportunities at local level of Masters' graduates, the academics from local technical universities suggest focusing first of all on technical and practical skills, on the use of innovative software programmes and on the international overview of the courses.

A last aspect underlined by the international review is the importance of taking into account the newest approaches on transport system management and control.

These results were used as inputs in the present Deliverable whose main objective is to define the Master's Curricula both for Technical and Economic Universities in Ukraine and Georgia.

This Deliverable is organized as follows. Chapter 1 is the current chapter (Introduction). Chapter 2 describes the general structure, objectives and contents of the Master-s programme in smart transport and logistics for cities according to the original application, and normative/legal constraints in partner countries (PCs) for EU recognition. Chapter 3 (Technical Universities) and Chapter 4 (Economic Universities) detail the SmaLog Masters describing: master objectives, profile of the Master's graduates, Master's curricula, programme structure and equipment and material. The last section, Chapter 5, presents conclusions.

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP Master in SMArt transport and LOGistics for cities SMALOG</p>
--	---	--

## 2 General structure, objectives and contents of the Masters

In order to define the general structure, objectives and contents of the Masters it is important to look at the conclusions and recommendations received during ad-hoc meetings carried out during application design and in the first months after the project started. These recommendations will be used to draft the structure, objectives and contents of the Masters.

With regard to the structure of the Masters, according to the Bologna process the new Masters Programme defined accordingly as a two-year 120 credit Masters with transparent quality assured content that will allow the course to be recognised within the Lisbon Convention and on a par with the European Area of Higher Education (EAHE).

Concerning the contents of the Master the recommendations give many important inputs. First of all there is a problem of isolation of Local Universities. To overcome this isolation there is a requirement to:

- Update contents and methods of courses for students with the most recent international experiences;
- Update research topics in the field of smart transport and logistics for cities with the most recent international experiences;
- Involve the Local Universities in the international research networks;
- To meet these needs, the Masters curricula will be based on the most recent and more effective training courses on smart transport and logistics existing worldwide or on research projects carried out worldwide in recent years.

Recommendations highlight a problem related to the low level of technical equipment and reference material in the current laboratories in terms of hardware, software and publications and it is important to set up SmaLog laboratories with appropriate updated equipment to this effect.

These laboratories will have a twofold use since they will be used, on the one hand, to improve the quality of education and, on the other, to support research.

To improve the employment opportunities at local level of the Masters' graduates it is very important to hold laboratory, practical and field activities in the Masters and to include in the curricula the use of the most advanced software related to transport and logistics systems. For this reason, the Masters curricula includes practical activities, laboratory activities and field activities. Moreover, the final



 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP Master in SMARt transport and LOGistics for cities SMALOG</p>
--	---	--

thesis envisaged for each Master student will be geared to research and practical activities rather than desk analysis.

### *Georgian Technical University - GTU*

Existing GTU curricula of Master's Programmes were based on the existing situation in transport systems in Georgian cities, especially in Tbilisi. GEO educational and scientific programmes consider city transport systematically: city transport systems concern many different stakeholders, who are considered while developing sustainable transport systems. Unlike existing curricula, GTU has not yet presented such an approach. Educational modules based on smart technology, which focus on the environment and other factors, have not yet been presented in the curricula of master's programmes at GTU. There are shortcomings in the application of systematic modelling tools and decision making in transport systems that are widely used in the EU and worldwide. At the same time, the current curricula of master's programmes in EU partner-universities include modules addressing the demands of users, particularly operators, with a view to building competences for future city needs.

## **3 SmaLog in Georgian Technical University - GTU**

### 3.1 Master's objectives and profile of the Master's graduates

The aim of the educational programme is to obtain skills that can be used to solve complex problems in the field of urban transport systems based on best practices and technologies developed in European countries in the field of intelligent urban transport and logistics.

### 3.2 Master's Curriculum

Based on the results of the need assessment and on discussions with Georgian local experts and stakeholders, a set of "core competencies" for technical SmaLog professionals was identified. These competencies aim to provide a broad framework for educating SmaLog professionals. They represent a fundamental set of knowledge, skills and abilities needed to effectively be an expert in smart transport and logistics for cities. Graduates will have the following competencies:

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

- To increase the efficiency of city logistics, traffic and passenger transportation within the city based on systematically using and exploiting the opportunities of intelligent transport systems (ITS);
- To analyse city transport systems, especially using smart transport systems and information communication technologies;
- Research, assessment and management of the operation of integrated transport systems in cities;
- To manage freight, passenger transportation and control traffic within the city;
- To implement Information Communication Technologies and Intelligent Transport Systems in city contexts.

### 3.3 Programme structure

#### 3.3.1 Basic concept of Smart Transport and Logistics for Cities

The Master's degree in Smart Transport and Logistics for Cities / SmaLog was developed in the framework of the Capacity-building Projects, transnational cooperation projects based on multilateral partnerships, primarily between higher education institutions (HEIs) from Programme and eligible Partner Countries (KA2 - Cooperation for innovation and the exchange of good practices Capacity Building in Higher Education, Joint project).

The Master's course lasts two years for a total of 120ECTs, 75 ECTs for the elective / non-elective subjects and 45 ECTs – for the research component.

The study components are presented in the following way:

- General technical training courses - 15 credits;
- Technical training to speciality - 20 credits;
- The courses of elective master courses, comprising four topics, are grouped with training courses - each with a total of 40 credits.

The research component (which is obligatory for all GTU Master's Programmes) consists of:

	Co-funded by the Erasmus+ Programme of the European Union		<a href="http://www.smalog.uniroma2.it">www.smalog.uniroma2.it</a>	585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMART transport and LOGistics for cities SMALOG</b>
---	---	---	--	---

- Master's Research Project / Prospectus -5 ECTs;
- Theoretical / experimental research / colloquium - 10 ECTs;
- Completion and protection of master thesis - 30 ECTs.

To obtain the master's degree in SmaLog, students have to obtain 120 ECTs with at least certification of English language.

Table 1 - Diagram of Master's educational programme

N°	Subject	Prerequisite for admission	ECTS Credits				
			I year		II year		
			Semester				
			I	II	III	IV	
1.	Business communication (English)	N/A	5				
	Business communication (French)						
	Business communication (German)						
	Business communication (Russian)						
2.	Theory and practice in technical translation (English)	N/A		5			
	Theory and practice in technical translation (French)						
	Theory and practice in technical translation (German)						
	Theory and practice in technical translation (Russian)						
3.	Urban public transport	N/A	7				
4.	Supply Chain Management	N/A	6				
5.	Telematics systems	N/A	6				
6.	Smart transport and logistics for cities	N/A	6				
7.	Transport logistics	Urban public transport		7			
8.	Distribution and warehouse management	Supply Chain Management		6			
9.	Transport policy and regulations	Urban public transport		6			
10.	Multimodal transportation centres	Supply Chain Management		6			
11.	Modelling and simulation of traffic flows	Transport logistics			7		
12.	Traffic control	N/A			6		
13.	Impact of transport on the environment and society	N/A			5		
14.	<b>Master Practice</b> - Modelling and Simulation of Traffic Flows	Modelling and simulation of traffic flows			7		
<b>In Semester</b>			30	30	25	35	
<b>Research component</b>							
15.	Completion and defence of the master's thesis	All training and research components covered by this programme					35
Total in semester						35	
Total in year:							60

The Master's Degree in Smart Transport and Logistics for Cities is divided into distinct curricula,

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMARt transport and LOGistics for cities SMALOG</b></p>
--	---	---

which allow specific training modules to be defined. Such modules are characterized by the presence of lessons that deal with: traffic modelling and simulation, transport policy and regulations, multimodal transport systems, smart transport and logistics, transport and environment, public transport, transport control.

### 3.3.2 *Specific objectives of the course*

SmaLog aims to transfer to GE&UA the most recent knowledge and good practices developed within European countries in the field of smart urban transport and logistics, using new technologies. Curriculum introduced by GTU fulfils this objective fully.

The educational objectives of the Master's Degree Programme in Smart Transport and Logistics for Cities at GTU – which can be accessed with a Bachelor's degree or equivalent academic degree for those who are enrolled on the Master's degree on the basis of the results of the Master's Examinations (Exams / Tests defined by Graduate Examination and GTU). Examination issues / tests will be posted at the GTU Teaching Department website <http://gtu.ge/Study-Dep/> at least one month before the start of exams.

Graduates in Smart Transport and Logistics for Cities acquire the following knowledge/skills:

- modern modelling and software implementation of transport modelling and simulation. Create and analyse the simulation models of transport and logistics using software;
- knowledge of logistic systems, processes and operational planning and management methods;
- knowledge and understanding of modern smart technologies in planning and management of urban infrastructure as well as transportation infrastructure;
- ability to use knowledge in practice: - Search for new, efficient ways of solving complex problems in urban transport and logistics including independent research and process analysis using the latest methods and approaches;
- ability to use modern software as well as smart modelling of simulations (PTV Vissim/Visum);
- ability to establish data interpretation, goals and criteria. Ability to optimize logistical processes in urban transport, logistical system planning and basic principles and methods

for making decisions regarding configuration of transport infrastructure and integration of ITS;

- ability to effectively utilize intelligent transport systems (ITS) in urban transport planning;
- ability to conclude: - evaluate logistics systems and transport networks, transport infrastructure functionality and efficiency of ITS;
- ability to reveal conclusions based on the participation, initiative and critical analysis of team decisions.
- communication skills - ability to demonstrate their conclusions, argumentative judgments, research methods and results in a comprehensive and understandable manner in academic and professional societies in Georgian and foreign languages;

### 3.3.3 Modules

The detailed planning of the Master's Degree in Smart Transport and Logistics for Cities can be found at <http://smalog-2017.uniroma2.it/>

The Master's programme includes the modules reported in Table 2 and detailed below.

Table 2 - Professional modules of the Master's programme

Module	Table
City passenger transport	Table 3
Transportation system modelling and simulation	Table 4
Transport polices and regulations	Table 5
Multimodal transport systems	Table 6
Smart transport and logistics	Table 7
Environmental and social impact of transport	Table 8
Traffic control	Table 9
Transportation system modelling and simulation (project)	Table 10

Table 3 - City passenger transport

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

Title	City Passenger Transport
Number of ECTs	6
Year and Semester	1 <sup>st</sup> year, 1 <sup>st</sup> semester
Lecturer	Associate Professor Temur Gorshkov
Teaching Method	Innovative, verbal, visual, practical, active and control methods with the use of the best European practices of learning
Prerequisites	First (Bachelor) Degree or educational qualifying level of specialists
Examination procedure	Theoretical part – questions (written and oral), practical part – exercises
Project envisaged	Individual course project
Aim	<p>The goal of the course is to introduce the students to: urban public transport planning and management systems; evaluate the possibilities of development and use of logistic and transport systems in urban public transport enterprises: study the city's public transport network planning and routing / dispatching principles; study production capacity and optimal distribution, selection and management of human resources, resource controlling and reimbursement systems.</p> <p>Knowledge and understanding - knowledge of the basis of the urban public transport processes, ability to improve the organization and management processes of transportation based on appropriate instructions.</p> <p>Use of knowledge in practice - Determining the mode of urban public transport systems under the supervision of the instructor.</p> <p>The ability to conclude the analysis of complex and incomplete information which is a characteristic of transport and logistics, using standard and some distinctive methods.</p> <p>Values - evaluate the attitudes of business characteristics and share it with others</p>
Contents	<ol style="list-style-type: none"> <li>1. Public transport in urban areas - Economic and social role of passenger transportation, users of passenger transportation in urban agglomeration, types of passenger transport, classification of passenger traffic in cities.</li> <li>2. Operation of public transportation in cities - Classification of the passenger transport; road network parameters; importance of passenger transport operation characteristics for the organization of urban transportation.</li> <li>3. Efficiency of public transport in urban conditions – Public transport</li> </ol>



Co-funded by the  
Erasmus+ Programme  
of the European Union



[www.smalog.uniroma2.it](http://www.smalog.uniroma2.it)

585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP  
**Master in SMArt transport and LOGistics  
for cities  
SMALOG**

efficiency indicators; passenger transport safety indicators; classification of road traffic accidents.

4. Urban Public Transportation Organization - Passenger Transportation Organization; normalization of speed on routes; determining traffic needs and allocation of transport on the routes; drivers and network staff models; scheduling.

5. Public transport analysis - Travel purposes; passenger correspondence matrix; basic indicators of the passenger flows.

6. Managing the city passenger minibus system - Minibus technologies; technical and operational indicators of routes; organize, change and close routes; stops and technical points on routes; route optimization.

7. Public transport working processes - Elements of public transport working process; classification and quantification of quantitative and qualitative elements.

8. Production of urban passenger transport - Cycle of the passenger transport production process; production logistics for the public transport.

9. Organization of the public services with the private vehicle - Passenger car transportation technology; passenger transportation by taxi; taxi work schedule and driver schedule; car rental organization, taxi customer service.

10. Quality of passenger service - basics of quality management of passengers; quality indicators and standards of passenger transport; certification of transport services.

11. Public transport dispatching - Basics of Traffic Control; characteristics of traffic disorders; dispatching on inner-city and suburban areas; long-distance and international route dispatching; taxi dispatching.

12. Travel and luggage transfer - Travel and luggage transfer system; benefits; tariffs for passenger transport; tickets and receipts.

13. Accounting and control of urban public transport - Registration and control mechanisms; control of carrier activities; responding to passenger remarks and complaints.

14. Coordination between road passenger transport and other types of passenger transport - Underground passenger transport and its operation; coordination of road passenger traffic with main transport hubs (railway

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

	<p>stations, airports, ports, shopping malls).</p> <p>15. City Logistics - City transport arteries; coordinating systems for the operation of city passenger transport; city development and structure; logistic approaches to the rehabilitation / improvement of urban passenger systems.</p>
Textbooks	<ol style="list-style-type: none"> <li>1. Kummer S, Einfuehrung in die Verkehrswirtschaft Boehlau- Verlag, 2014. S.418.</li> <li>2. G. Tkeshelashvili, Basis of Logistics, Tbilisi, Georgia 2004- 156 pages 338.224(02) 8.</li> <li>3. Aberle: Transportwirtschaft, München, Wien (Oldenbourg), 2003</li> <li>4. Arnold u.a.: Handbuch der Logistik, Berlin Heidelberg New York, 2004</li> <li>5. Handbuch Microbus Betriebseinsatzplanung IVU AG 2004</li> <li>6. Schubert: Verkehrslogistik, Dresden, 2001</li> </ol>
Support tools	MS Office (Excel, Word, Power Point, Visio); PTV VISUM



 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP Master in SMArt transport and LOGistics for cities SMALOG</p>
--	---	--

Table 4 - Transportation system modelling and simulation

Title	Transportation system modelling and simulation
Number of ECTs	7
Year and Semester	2 <sup>nd</sup> year, 2 <sup>nd</sup> semester
Lecturer	Rezo Tedoradze
Teaching Method	Innovative, verbal, visual, practical, active and control methods with the use of the best European practices of learning
Prerequisites	First (Bachelor) Degree or educational qualifying level of specialists
Examination procedure	Theoretical part – questions (written and oral), practical part – exercises
Project envisaged	Individual course project
Aim	<p>Students study the planning of the transportation network and differentiate them according to demand, infrastructure, transportation types and routes. Collect and enter data in the selected standard software. Forecasting of expected changes through analysis and planning and calculate main KPIs.</p> <p>After completing the course students are able to use knowledge in practice, evaluate the transport systems, perform traffic counts, collect geometric data and simulate the flow in standard software. Using the software calculate indicators and make comparative analysis through practical group work, using appropriate methodologies.</p> <p>Calculation of data and comparative analysis using theoretical knowledge and stimulation software. Determine and upgrade the weak areas using theoretical knowledge and best practices.</p>
Contents	<ol style="list-style-type: none"> <li>1. Modeling and areas of application - Introduction; modeling and its role in traffic planning; models for traffic flow analysis; use of models for traffic flow analysis; functions of models in the process of planning traffic;</li> <li>2. 4 - step modeling - Modeling process (4-step modeling); trip production and attraction, trip distribution; modal split, time period; assignment.</li> <li>3. A theory of travel choice behavior – Travel choice; an individual utility theory of travel behavior; a general travel choice model; derivation of logit model.</li> <li>4. Transportation system network and data: types of network and data; problem presenting; study area; network description; travel resistance; shortest path calculation; assignment map.</li> <li>5. Trip generation (production and attraction) modeling – Trip classification; Factors affecting trip generation; regression analysis model; cross-</li> </ol>

	<p>classification or category analysis model; discrete choice methods; trip balancing.</p> <ol style="list-style-type: none"> <li>6. Trip distribution models - Gravity model, direct demand model, distribution functions; growth factor models, departure time choice.</li> <li>7. Mode choice models - Sequential trip distribution modal split; Simultaneous distribution/modal split model.</li> <li>8. Route choice and traffic assignment - Purpose of traffic assignment; All-or-nothing assignment; deterministic equilibrium assignment; stochastic assignment; stochastic equilibrium assignment; other assignment techniques; multi user-class traffic assignment; assignment to public transit networks; elasticity of travel demand; some paradoxical examples.</li> <li>9. Estimate origin-destination trip tables and distribution functions - Purpose; types of data used in transport planning; model estimation and calibration; the Poisson estimator; estimate the base year matrix using a fixed distribution function; estimate parameters in an exponential distribution function; updating OD matrices.</li> <li>10. Traffic flow characteristics, volume and level of service (LOS) - Characteristics; flow measurement processes; node control; traffic light phases and various road signs; flow volume and LOS calculation.</li> <li>11. Macro simulation of traffic flows and standard software - Overview of various macro simulation programs; main purposes and functions; creating models; alternative options; KPI calculation and comparison.</li> <li>12. Micro simulation of traffic flow and standard software. Overview of various micro simulation programs; main purposes and functions; creating models; alternative options; KPI calculation and comparison.</li> <li>13. Freight and distribution models - Inbound-outbound flows at the regional level; process of receiving and delivering cargo; urban cargo distribution models.</li> <li>14. Transit - Graphical representation of the network; frequency-based model; stop model; transit traffic modeling; schedule-based model; choice of departure time</li> <li>15. Comparative analysis and methodology - Existing and planned flow parameters (waiting, service level, link speed, etc.); KPI calculation and comparative analysis, using the simulation tools.</li> </ol> <p>1.</p>
Textbooks	<ol style="list-style-type: none"> <li>1. Transport modeling and simulation, lecture notes in Georgian, G. Doborjginidze, R. Tedoradze, T. Ugulava, 2020 Year</li> <li>2. E. Cascetta, Transportation Systems Analysis, Models and Applications, Springer Science &amp; Business Media, Vol. 29, NY/USA, 2009 Year</li> <li>3. Denos C. Gazis, Traffic Theory, Kluver's International Series, NY/USA, 2012 Year</li> </ol>

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

	<p>4. CITY LOGISTICS NETWORK MODELLING AND INTELLIGENT TRANSPORT SYSTEMS, 2001 EIICHI TANIGUCHI - Kyoto University, RUSSELL G THOMPSON - University of Melbourne, TADASHI YAMADA - Kansai University, RON VAN DUIN - Delft University of Technology.</p> <p>Transport Modeling, prof. Dr. P.H.L. Bovy; Dr. M.C.J. Bliemer; Dr. R. van Nes</p>
Support tools	MS Office (Excel, Word, Power Point, Visio); PTV VISUM/VISIM

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP  <b>Master in SMArt transport and LOGistics for cities</b>  <b>SMALOG</b></p>
--	---	--

Table 5-Traffic control

Title	Traffic control
Number of ECTs	6
Year and Semester	3 <sup>rd</sup> year, 1 <sup>st</sup> semester
Lecturer	Temur Gorshkov
Teaching Method	Innovative, verbal, visual, practical, active and control methods with the use of the best European practices of learning
Prerequisites	First (Bachelor) Degree or educational qualifying level of specialists
Examination procedure	Theoretical part – questions (written and oral), practical part – exercises
Project envisaged	Individual course project
Aim	<p>The goal of the course is to study the main characteristics of transport automotive flows, their regulation and control systems, the impact of major environmental impacts on the organization of traffic and their effect on human life. Selection of optimal and rational use of road networks, using methods of regulation and control, professional approach to traffic safety problems, regulation and control methods.</p>
Contents	<ol style="list-style-type: none"> <li>1. Traffic regulation - Overview of the traffic flow theory - basic definitions; the meaning and tasks of regulation of traffic flows; the main indicators of the urban networks.</li> <li>2. Traffic regulation - Traffic description in cities; transit flow generation; transit traffic in the central business districts of city's; organization of public transport.</li> <li>3. Traffic regulation. Organizational measures for traffic regulations. Operational methods of traffic regulation and areas of use.</li> <li>4. Traffic regulation. The meaning and tasks of traffic flow control. Classification of traffic control techniques.</li> <li>5. Traffic control. Effectiveness of implementation of traffic monitoring systems.</li> <li>6. Transport. Operational indicators of motor vehicles, their technical equipment; technical inspection of vehicles.</li> <li>7. Road signs. Meaning of traffic lights in traffic control and regulation; their criteria for use; technical characteristics of traffic lights.</li> <li>8. Road signs. Road signs and marking; their purpose and classification, traffic rules; road lighting.</li> <li>9. Traffic accidents. Analysis of traffic accidents and classification; the main factors causing the traffic accidents.</li> </ol>

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP  <b>Master in SMArt transport and LOGistics for cities</b>  <b>SMALOG</b></p>
--	---	--

	<p>10. Traffic accidents; Traffic accidents and risks; risk factors and causes; traffic accidents as community problems.</p> <p>11. Infrastructure of the traffic network. Types of facilities in the network; parking and bus stops.</p> <p>12. Infrastructure of the traffic network. Differences of traffic organization in the network; pedestrian zones; one-way and multi line streets and their characteristics. .</p> <p>13. Normative basis of traffic control. Legislative regulations of the normative basis of traffic control; purpose and classification of the legal basis.</p> <p>14. Drivers and pedestrians. Areas for drivers and pedestrians in the network; requirements for drivers; providing information for pedestrians.</p> <p>15. Traffic control and management. Traffic control efficiency factors. Prioritization of traffic management and control in the planning and analysis processes</p>
Textbooks	<p>1. Norwegian Institute of Transport Economics, MADI, Nordic Council of Ministers “Road Safety Handbook,” Oslo, Moscow, Helsinki, 2001</p> <p>2. Road signs. B. Sulakauri, Tbilisi 2018</p>
Support tools	MS Office (Excel, Word, Power Point, Visio, Adobe Reader)

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP Master in SMArt transport and LOGistics for cities SMALOG</p>
--	---	--

Table 6-Transportation system modelling and simulation (project)

Title	Transportation system modelling and simulation (project)
Number of ECTs	7
Year and Semester	3 <sup>rd</sup> year, 1 <sup>st</sup> semester
Lecturer	George Dobarjginidze
Teaching Method	Innovative, verbal, visual, practical, active and control methods with the use of the best European practices of learning
Prerequisites	First (Bachelor) Degree or educational qualifying level of specialists
Examination procedure	Theoretical part – questions (written and oral), practical part – exercises
Project foreseen	Individual course project
Aim	<p>The purpose of the practice is students' participation in a specific project related to the modelling and simulation of transport systems and making decisions. The practice is in the form of a particular case study (examination), which will be developed by the head of the practice. Practical work is done in groups with 3-4 students. In practice, students are actively involved in the modelling and analysis of transport systems and making the decisions based on theoretical knowledge. The practice will allow students to use the theoretical material and the knowledge acquired in practice.</p>
Contents	<ol style="list-style-type: none"> <li>1. Study and project areas - Analysis of the project area, study of the infrastructure and collection of important geometric data, insert collected network geometric data in micro simulation software Vissim.</li> <li>2. Collection of transport flow data - Count vehicle flow by directions using different methods (manual count, video record), enter submitted data in standard forms.</li> <li>3. Collection of pedestrian data – Count pedestrians by directions using different methods and enter submitted data in standard forms.</li> <li>4. Vehicle categories and factors – Vehicle differentiation by categories and identification of the factors to update the side data and insert in vissim.</li> <li>5. Process of modelling automated management systems - Arranging traffic lights on the network and inserting appropriate phases in Vissim, update network with various road signs and other functions.</li> <li>6. Modelling uncontrolled junctions – Arrange speed limits, identify priority rules and insert in vissim to manage the conflict areas.</li> <li>7. Collecting and processing of public transport data - Collect public transport data and determine the workload in accordance with the project-defined task, evaluate online transit data, schedules and stops.</li> </ol>

	<ol style="list-style-type: none"> <li>8. Run the simulation - Run the simulation in Vissim after the data is displayed correctly and the necessary adjustments and simulation parameters are specified.</li> <li>9. Management of simulation processes and analysis - Acceleration function and multiple simulation run and generate important data of the transport network as a result of analysis.</li> <li>10. Data validation and calibration - Systematic (calibration of speed, geometric data, demand, route selection and traffic control) and operational (calibration of distances between vehicles, line change behaviours and distance required for line changes)</li> <li>11. Gaps' identification and necessary changes - Definitions, assumptions and basic mathematical calculations, overloaded and unloaded networks, management and optimization.</li> <li>12. Example-oriented processes - Interpret the results and identify gaps, discuss optimization opportunities and outline ways to improve.</li> <li>13. Methodology definition - Determine ways to solve a given task using the simulation methods, Vissim.</li> <li>14. Different scenario modelling and simulation – Demand planning and modelling different scenarios, update existing model and simulate scenarios.</li> <li>15. Indicators KPI – Calculate KPIs for each scenario and conduct the comparison analysis, define the best and worst scenarios.</li> </ol> <p>1.</p>
Textbooks	<ol style="list-style-type: none"> <li>1. E. Cascetta, Transportation Systems Analysis, Springer Optimization and Its Applications 29, DOI 10.1007/978-0-387-75857-2, © Springer Science+Business Media, LLC 2009.</li> <li>2. CITY LOGISTICS NETWORK MODELLING AND INTELLIGENT TRANSPORT SYSTEMS, 2001 EIICHI TANIGUCHI - Kyoto University, RUSSELL G THOMPSON - University of Melbourne, TADASHI YAMADA - Kansai University, RON VAN DUIN - Delft University of Technology.</li> </ol>
Support tools	MS Office (Excel, Word, Power Point, Visio); PTV VISUM/VISIM

Table 7-Environmental and Human Impacts of Transport

Title	Environmental and human impacts of transport
Number of ECTs	5
Year and Semester	3 <sup>rd</sup> year, 1 <sup>st</sup> semester
Lecturer	Bogvelishvili Zurab
Teaching Method	Lecture, practical assignment, independent work
Prerequisites	N/A
Examination procedure	Theoretical part – questions (written and oral), practical part – exercises
Project envisaged	
Aim	The course aims to assess the positive and negative impacts of transport on nature, society and people; determine the role of multimodal transport in the globalization and urbanization of the modern world in the socio-economic and sustainable development of cities; review safety and ecological issues in road traffic operations and study the ways and means to mitigate their negative impact.
Contents	<p>Name of topics and contents</p> <p>1 The role and place of transport in socio-economic development of countries. Unified transport systems, transport structures, types of transport, advantages and disadvantages, areas of use. Strategic planning of transportation services.</p> <p>2 Urban environment and transport assurance. Transport infrastructure. Sustainable transport systems development. Optimizing the transport processes using logistical transport techniques. Motor transport, as a major source of social and environmental impact, risk analysis.</p> <p>3 Modern directions of motor transport development. Complexity of factors affecting motor transport efficiency and safety. System analysis of the transport process, characterization of main components - "road-car-driver-environment" and subsystems, reliability, perfection and optimization through a logistical approach.</p> <p>4 Motor transport safety as a global problem. The level of motoring in the world and traffic accident statistics. The role of international organizations in improving traffic safety. Georgia's fleet and road accident statistics. Vision Zero concept for motor safety (Vision Zero).</p>





Co-funded by the  
Erasmus+ Programme  
of the European Union



www.smalog.uniroma2.it

585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP  
**Master in SMArt transport and LOGistics  
for cities  
SMALOG**

5 Vehicle construction safety: active, passive, post-accident and ecological safety. Vehicle testing for construction safety (Crash test)

6 The characteristics of pollutant impact on the transport biosphere. Transport impact on the environment, human health. Basic principles of environmental protection. Types of environmental impacts of transport and classification of sources. The main pollutant substances generated by motor transport use. Maximum permissible concentrations of environmental pollution with harmful substances for motor transport, euro-norms. Protection from the noise of cars. Noise impact on the human body. Permitted levels of noise for the population, motor noise protection measures.

7 Environmental laws and international normative documents applicable in Georgia. State regulation and development of international cooperation for mitigation of harmful impact of transport on environment. UN (Stockholm Declaration 1972, Montreal Agreement 1987, Declaration of Rio de Janeiro 1992, Kyoto Protocol 1997, etc.) and pan-European (Amsterdam Declaration 2009, Paris Declaration 2014, Global "Green" Agreement, etc.) programmes on transport, healthcare and the environment.

8 The main directions for improving ecological safety of motor vehicles: improvement of existing internal combustion engines, use of alternating types of fuel, development of combined (hybrid) energy equipment and electric automobiles.

9 The role and place of transport in urban sustainable development. Problems of sustainable transportation in settlement areas. Ecologically rational "green" cities. Improving the ecological situation of cities using logistical methods.

10 Organizational problems of city transport infrastructure planning. Road network of urban areas, traffic safety and environmental safety impact on urbanized environment.

11 Description of the characteristics of traffic movement and their representation in geo-information systems. Traffic characteristics and factors affecting the formation of transportation flows. Key parameters and characteristics of transport and pedestrians, their characterization and

	<p>methods of determination.</p> <p>12 Multimodal transport generated and attached travel and modal distribution. Connecting the traffic flows of the urban areas with optimal routes. EU Programme "Alternative Movement in Cities" (ALTER).</p> <p>13 Fundamentals of traffic organization in the city. Transport flow characteristics, transport and road infrastructure, the level of complexity of transport nodes, intensity of transport and pedestrian flow, street bandwidth and load coefficient. Technical systems of traffic control (road marking, traffic signs and traffic lights).</p> <p>14 The role of public transport in the development of modern towns. Classification of transit transport. Passenger flows and methods of study, public transportation load coefficient, methods for determining load coefficient.</p> <p>15 Review of mathematical models of transport flows, analytical and imitation models, micro- and macro-models, modelling of urban transport network loads, modern theories of transport chaos.</p>
Textbooks	<p>The main literature:</p> <p>1. Bogvelishvili Z., Bubuteishvili L. Main issues of motor traffic safety. - Tbilisi, Technical University, 2017, UAK 656.13.02.</p> <p>Optional literature:</p> <p>1. Bogvelishvili V., Iosebidze J., Bogvelishvili Z. Traffic safety as a global problem for the world and its prospective measures in Georgia - Tbilisi, Technical University, 2016, UAK 656.13.02</p> <p>2. Bogvelishvili Z. Modern systems and equipment for motor constructive safety - Tbilisi, Technical University, 2010. UAK 656.13</p>
Support tools	

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP Master in SMArt transport and LOGistics for cities SMALOG</p>
--	---	--

Table 8- Multi-modal transport systems (Project)

Title	Multi-modal transport systems (Project)
Number of ECTs	5
Year and Semester	2 <sup>nd</sup> year, 2 <sup>nd</sup> semester
Lecturer	Tedoradze Rezo
Teaching Method	Lecture, seminar (working in groups) consultation, independent work
Prerequisites	Transport logistics
Examination procedure	Theoretical part – questions (written and oral), practical part – exercises
Project envisaged	
Aim	<p>The aim of the course is to study material flows (freight) transportation methods, organizing freight transportation and integration of logistic actions in urban areas, intercity and international logistics channels, the main stages of multi-modal systems for freight delivery and the basic project parameter setting methods.</p>
Contents	<p style="text-align: center;">Topics of the Project</p> <ol style="list-style-type: none"> <li>1 Methods of transportation of material flows (cargo) in modern logistic practice. Their classification, characteristics and technical-economic indicators.</li> <li>2 Globalization and the need for international trade between countries; The strategies and policies of multinational companies for international trade, the main indicators. Analysis of trends in international transportation. Inco-terms.</li> <li>3 Organization of freight transfer and integration of logistic activities in city, intercity and international cargo channel areas: in large maritime ports, transport nodes and land cargo locations.</li> <li>4 Basic stages of the multimodal system project process; component parts of the system and their characteristics. Determining parameters for system performance efficiency; system participants. Methods for determining the values of the main project parameters for multimodal system participants.</li> <li>5 Basics and objectives of municipal transport logistics. Peculiarities and goals of city transport services. Variability of dynamics of working days for freight road transportation in Tbilisi in 2013-2018.</li> <li>6 Determining the location of consolidation (logistics centres) for</li> </ol>



Co-funded by the  
Erasmus+ Programme  
of the European Union



www.smalog.uniroma2.it

585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP  
**Master in SMARt transport and LOGistics  
for cities  
SMALOG**

multimodal transport systems for international, regional and municipal distribution. Transport chains in urban logistics; potential field; attachment to freight transportation centres and city-cargo terminals; relationship value of goods delivery. Dependence of value for goods delivery on delivery capacity.

7 The task of urban logistics for determining the location of parking for telecommunication services and transport; tax system for hiring telecommunication services; functioning of digital controlling device.

8 Scheme of land, marine and air modern logistics transportation centres; their main characteristics; additional services.

9 Organizing loading and unloading processes on transport vehicles in logistics transport centres; the technical means of vertical and horizontal integration during loading-unloading and their characteristics.

10 Method of determining the number of posts for loading and unloading freight at logistics transport centres.

11 Multimodal transportation network schemes. Calculation of the criteria for determining the optimal route.

12 Types of multi-modal transport, analysis of their technical and operational characteristics, characteristic parameters. New types of multimodal transport; Different transport equilibrium "points".

13 Ecological aspects in multimodal transport systems; ways to solve urban ecological problems using logistical methods

14 Types of expenditure on the service of multimodal transport systems and their calculation.

15 Project drafting and presentation.

Textbooks

The main literature:

1. 1. L.Botsvadze, O. Gelashvili, V.Botsvadze, G.Archvadze, T. Gorshkov, D.Sharabidze, "Logistics Management of Transport and Warehouse Systems". Georgian Technical University, 2017. ISBN: 978-9941-20-758-7.
2. Herbert Sonntag. Lectures. Cargo and transport logistics. Wildau Technical University. 2017. Georgian translation.
3. R. Tedoradze, J. Iosebidge, N.Navadze and others. Principles and legal grounds for organizing international car freight transportation in Eurasian countries. Georgian Technical University, 2012
4. D. Fridonashvili, J. Iosebidge, N. Liasamidze. Automobile equipment; Lectures Concept, Georgian Technical University, Tbilisi. 2017.

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

	<p>Optional literature:</p> <ol style="list-style-type: none"> <li>1. L.Botsvadze, K.Eradze, V.Botsvadze, "Logistic Management and Modeling" Tbilisi 2010, p. 805</li> <li>2. Herbert Sonntag. LV Guter – und Transportlogistik. Technische Hochschule Wildau. 2017.</li> <li>3. Herbert Sonntag. Citylogistik oder Urbane Logistik. Technische Hochschule Wildau. 2017</li> </ol>
Support tools	

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMARt transport and LOGistics for cities SMALOG</b></p>
--	---	---

Table 9-Smart transport and logistics

Title	Smart transport and logistics
Number of ECTs	5
Year and Semester	2 <sup>nd</sup> year, 1 <sup>st</sup> semester
Lecturer	Doborjginidze Giorgi
Teaching Method	Lecture, seminar (group work), consultation, independent work
Prerequisites	Systems of Telematics
Examination procedure	
Project envisaged	
Aim	<p>Introduce students to systems of modern smart transport and logistics that involve planning and management of passenger and freight transport in cities and urban areas, as well as movement and organization management. Students will also learn about the main characteristics of smart transport systems (ITS), the possibilities and methods of their use. During the course, the student will study management and control mechanisms of smart, integrated transport systems, as well as modern research methods used to solve urban logistics problems.</p>
Contents	<p>Topic name and contents</p> <p>1 Introduction to smart transport systems</p> <p>Introducing the programme, the role and use of smart transport systems (ITS) in modern urban and city-planning. The importance of integration of modern ITS systems in green transport.</p> <p>2 Urban logistics</p> <p>Review of stakeholders in urban logistics, their role and interests. The role of the state in regulating urban transport. The main challenges of urban transport ecology.</p> <p>3 Urban transfer transport logistics</p> <p>Logistic optimization tasks for urban transport. Use of ITS Technologies in optimizing and managing urban transport.</p> <p>4 Urban freight transport logistics</p> <p>The main players of the urban freight market - retail and wholesale trade, courier service, e-commerce operators, waste logistics, city logistics and its</p>



Co-funded by the  
Erasmus+ Programme  
of the European Union



www.smalog.uniroma2.it

585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP  
**Master in SMARt transport and LOGistics  
for cities  
SMALOG**

role in the optimization of transport in urban areas.

#### 5 European Policy for Urban Transport

Legislative framework related to urban transport in the European Union. The European system of smart transport systems. Sustainable transport strategies for cities. Ecological issues of transport.

#### 6 Urban transport market in Georgia

City transport service providers. Review of city transport network on the example of Tbilisi. Service integration. City cargo / commercial transport in Georgia. Distribution companies, cargo distribution systems. City distribution systems.

#### 7 The theory of transport systems

Transportation networks. Models of transport networks and their use in transport planning. Methods of modelling transport networks. Motion flow theory. Demand models.

#### 8 Assessment of transport projects

Transport impact on environmental and urban centres. Transport efficiency assessment methods (CBA, CEA, MCA). Monitoring of transport systems and instruments needed.

#### 9 Transport impact assessments

Transport environmental impact assessment (EIA). Strategic Impact Assessment of Transport. Impact Assessment on Transport Infrastructure. Road Safety Impact Assessments.

#### 10 Smart transport and logistics directions

Smart transport applications. ICT and ITS instruments needed for transport infrastructure planning and multi-modal network management. Functional architecture of smart cities and related issues.

#### 11 City logistics

European models of city logistics in urban centres. Night Supply Strategies in distribution. The role of electric transport in city logistics. Telematics systems used in distribution logistics.

#### 12 Using ITS in commercial transport

Modern Systems of Fleet Management. Cargo tracking & tracing systems. Applications of transport management systems and their use in commercial

	<p>transport.</p> <p>13 Green Transport Concept for Cities  Using ecological transport. Advanced technologies in green transport. The use of modern concepts: Car sharing, Uber. Non-motorized transport and its role in transport ecology.</p> <p>14 Passenger Information Systems  Passenger Information System Components in Municipal Transport. Types of information: routes, schedules, fares. Information system types in real time and international practice of their usage.</p> <p>15 ITS telecommunication systems  Advanced applications of ITS and telecommunication systems that are used to increase traffic efficiency and security. The importance of ITS systems standardization. Advanced ITS Technologies: SMART CAR, MART ROAD.</p>
Textbooks	<p>The main Literature:</p> <p>Optional literature:</p> <ol style="list-style-type: none"> <li>1. Nuzzolo, A. and Lam, W. H. K. (eds. 2017), Modelling Intelligent Multi-Modal Transit Systems, CRC Press, Taylor &amp; Francis Group, Boca Raton (FL, USA)</li> <li>2. Cascetta, E. (2009). Transportation Systems Analysis: Models and Applications. Springer.</li> </ol>
Support tools	



 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP  <b>Master in SMArt transport and LOGistics for cities</b>  <b>SMALOG</b></p>
--	---	--

Table 10-Transport Policies and Regulations

Title	Transport policies and regulations
Number of ECTs	4
Year and Semester	2 <sup>nd</sup> year, 2 <sup>nd</sup> semester
Lecturer	Shengelia Zurab
Teaching Method	Lectures, practical assignments, consultation, independent work
Prerequisites	Transport Economics
Examination procedure	
Project foreseen	
Aim	<p>The course aims to introduce students to the issues of transport policy and transport regulations, the main priorities of transport policy, integration issues of Georgia in international transport systems, issues on transportation system regulation, transport infrastructure formation and development, environment protection and safety of transport processes, trends of international trade development; International transport and trade conventions; international transport and trade organizations; international maritime, railway, motor and air transportation; specific terms of INCOTERMS; International transport documentation; the role of insurance institutes in international transactions. To study: read and analyze the INCOTERMS terminology; work on international transport documentation; analysis of international trade transactions; The role and function of financial institutions in international trade transactions; Types of freight, according to transportation demands.</p>
Contents	<p><b>Topic names and contents</b></p> <ol style="list-style-type: none"> <li>1 Georgia's integration into the international transport system – the transport sector's legislative and regulatory framework, transport systems of Georgia and the EU, cooperation of Georgia and international organizations in transportation, participation of Georgia in international transportation projects and programmes, existing and new transport infrastructure.</li> <li>2 Improvement of state regulation of the Georgian transport system - distribution of budget funds among different types of transport, regulation for anti-monopoly, fiscal policy, technical regulation system, coordinated development of all types of transport.</li> <li>3 Formation and development of transport infrastructure - Major rail networks, roads for general use, airports, marine harbours, global systems ensuring information processes of transport, transportation systems of large cities.</li> <li>4 Environment Protection and Safety on Transport Processes - Safety and</li> </ol>



Co-funded by the  
Erasmus+ Programme  
of the European Union



www.smalog.uniroma2.it

585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP  
**Master in SMArt transport and LOGistics  
for cities  
SMALOG**

	<p>Environmental Impact Standards on Transport Processes, Basic Requirements for ecology and safety.</p> <p>5 Logistic systems and multimodal transportation - multimodal transportation development, terminals and transport logistics centres, container transportation and container terminals.</p> <p>6 International Transport and Trade Conventions - International Transport and Trade Conventions. Georgia's participation in international conventions.</p> <p>7 International transport and trade organizations - functions of organizations and role in international trade. Analysis of international organizations - FIATA, IATA. Their importance and functions. International transport associations.</p> <p>8 International Maritime Shipping - Organizational Forms of Maritime Transport. Legal Issues. Responsibility for shipping parties.</p> <p>9 International motor transportation - organizational-legal issues. Commodity-transportation waybills. TIR book.</p> <p>10 International Railway Shipping - Technical and Organizational Problems. The Convention of International Transport. General Provisions of CMFC/COTIF.</p> <p>11 International air shipping - organizational issues of air transportation / shipping. Organizational issues of aviation transportation. The rights and obligations of the Parties.</p> <p>12 INCOTERMS. General overview – purpose of INCOTERMS, history of its creation and development. The role of terminology in international transport and trade transactions. Term groups and their meaning.</p> <p>13 INCOTERMS. Introduction and analysis of specific terms - Detailed analysis of each term of INCOTERMS. Their importance and use in international transportation practice.</p> <p>14 International Transport Documentation - International Transport Shipping Documentation (MBL / HBL, Packing List). Rules for document preparation. The main factors to consider for document preparation.</p> <p>15 Role of Insurance Institutions in International Transactions - The role of transport insurance in international trade and transport operations. Cooperation models between insurance and transportation organizations. Basic procedures required for compensation.</p>
Textbooks	<p>The main literature:</p> <p>1. Chkheidze T., International contracts and transportation. Technical University, Tbilisi 2013.</p>

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

	<p>2. INCOTERMS 2000, INCOTERMS 2010.</p> <p>Optional literature:</p> <ol style="list-style-type: none"> <li>1. The Civil Code of Georgia.</li> <li>2. Georgian Railway Code</li> <li>3. The Marine Code of Georgia</li> <li>4. Georgian Air Code.</li> <li>5. Law of Georgia on Motor Transport</li> </ol>
Support tools	

### 3.3.4 Employment opportunities

Graduates in Smart Transport and Logistics for Cities can easily find their way into public and private organizations (e.g. freight transporters, transport infrastructure planners, state and local institutions) dealing with traffic management and infrastructure planning, IT companies in the field of transportation and logistics. Posts as lecturers in institutes of higher education could be a work opportunity, too.

The following are positions that could be held by a graduate at the city hall transport department: transport manager, transport engineer, urban planning engineer, traffic service manager, inspector, design engineer, new equipment and technology introduction engineer.

Possible place of work: public authority, department of infrastructure, transport enterprises, research and design institutes, etc.

Areas of activity: implementation of organizational and management activities in the state transport administration, transport departments of local governments and in transport enterprises of various forms of ownership.

Graduates of this programme can also actively participate in freight transportation planning and management by logistics service providers and distributors, also companies managing city logistics operations.

### 3.3.5 Admission procedure

In accordance with the Enrolment Conditions approved by the Ministry of Education and Science of Georgia, to be admitted to a master's degree course, students must have at least a Bachelor's degree. The procedure for admission to the Master's degree is based on the student's rating and examination. The examination procedure includes two exams: unified state entrance examination for the master's

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

programmes and foreign language. The admission procedure is held from July to August each year.

### *3.3.6 Examination procedure for the thesis defence*

Attainment of the master's degree involves defence of one's thesis. Students begin to write their thesis and defend it in the 4th semester. Development and defence of the Master's thesis is allocated 30 ECTs. Before starting to develop a thesis, the student has to pass all modules of the Master's programme. For the defence of the thesis, the student develops a thesis on a topic proposed by a professor from the Transport Systems and Logistics Department.

The Master's degree sessions are set by the faculty administration within the time intervals set in the curriculum. . The Examination Commission for the thesis defence consists of a number of representatives – at least one external expert from industry, the others are Professors from the Department. The Examination process is public and open to all stakeholders.

### *3.3.7 Support for students for learning and training*

Under the SmaLog programme, GTU established the traffic modelling and simulation laboratory. Equipment and software for the laboratory were procured and installed. Students already have the opportunity to model the traffic and simulate the flows, which allows them to analyse the traffic optimization possibilities and environmental impact.

### *3.3.8 Tutor activity*

The tutoring activity is one of the institutional tasks of professors and researchers, as an integral part of their teaching commitment aimed at guiding students' cultural education and providing study support. The tutoring activities are scheduled by the Faculty at the beginning of each academic year. Each student has a tutor who can be consulted for evaluations and general suggestions regarding the progress of the student's study activities.

### *3.3.9 Fees*

There are two options to finance students studying: government payment (budgetary) and own student payment (contract) which amounts to 2250 GEL (ca 750 Euro). Successful students who receive

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

higher grades are financed partially or fully by the State budget.

### 3.3.10 Stages

Internships for student have a duration of four weeks. Activities can be:

- Internship activities (or internships) in companies, public administrations, public or private bodies, including those in the third sector, professional orders and colleges;
- Activities approved by the Head of Department;
- Training activities for the preparation of the final exam.

These requests must be approved by the supervisor / tutor. At the end of the training activities, the teacher will have to assess training and fill in the exam certificate, on the training activity carried out, which must be delivered in the Faculty of Department.

## 4. Equipment and material

As mentioned above, GTU procured the software and equipment for the modelling and simulation Laboratory. A list of the equipment is presented in the table below.

Table 11- Detailed list of equipment and materials for the Master's Students Research Centre

Computers	Quantity
Workstation Intel Corei 7-7800 (3.2 GHz -Turbo 4.6 GHz); 2x8 GBDDR4; 2TB; 240GBSSD; GeForce GTXGDDR5 4GB, 128bit; DVD±RW; MicroATX	10
Notebook Intel Core i7 8550U 1800 MHz/13.3"/1920x1080/16Gb/512Gb SSD/DVD/Intel UHD Graphics 620/Wi-Fi/Bluetooth	1
Notebook Convertible, Intel Core i7 8550U 1800 MHz/15.6"/1920x1080/16Gb/512Gb SSD/DVD/Intel UHD Graphics 620/Wi-Fi/Bluetooth	1
Monitor 24" FULL HD LED LCD	10
<b>Sum</b>	
Epson L1800 Ink Tank Printer A3+ (By Order)	1
Genius DX-120 OPTICAL USB Mouse	10
Genius KB-110X USB, Water Resistant	10
<b>Sum</b>	
Kaspersky Internet Security	12
WinMultiPointSvrPrem 2012 RUS OLP NL Acdmc	1
WinMultiPointSvrCAL 2012 RUS OLP NL AcdmcwWinSvrCALDvcCAL (11 unit)	12
STATGRAPHICS Centurion XVI (32-bit/64-bit) Multilingual (5 unit (1525 per/unit))	5
PTV Vision Traffic Suite (Visum, Vissim, Vistro) academic licence	1
AnyLogic University Researcher	1
One Year of Maintenance and Technical Support Services	1
AutoCAD Civil 3D 2018	1
Copert street level	
<b>Sum</b>	
VGA ATcom M/M 15M (9152)	1
Walfix PB-14B	1
Intech RD80A	1
Walfix SNM-4 120"	1
<b>Sum</b>	
Traffic counting radar tms-sa	2
Pupil world camera	1
<b>Sum</b>	
Urban Transportation and Logistics: Health, Safety, and Security Concerns	1
Public Transit Planning and Operation: Modeling, Practice and Behavior, Second Edition	1
Modelling Intelligent Multi-Modal Transit Systems	1
Transportation Systems Analysis	1
<b>Sum</b>	
<b>Total</b>	

 <p>Co-funded by the Erasmus+ Programme of the European Union</p>	 <p>www.smalog.uniroma2.it</p>	<p>585832-EPP-1-2017-1-IT-EPPKA2-CBHE-JP <b>Master in SMArt transport and LOGistics for cities SMALOG</b></p>
--	---	---

## 5. Conclusions

Implementation of the SmaLog Master's Programme will allow GTU (and all other Georgian universities benefiting from this experience) to update course methods for students with the most recent international experience, explore research topics in the field of smart transportation and logistics for cities with the most recent international experience, and involve teachers in international research networks. The curriculum of the SmaLog Master's Programme will be the basic Master's Programme at the Transport Department, which will replace the existing Master's Programme in Transport. Students enrolling in SmaLog can besides benefit from international agreements, which allow them to study and train in several European countries (submission of proposals for E+/KA1 call).