ERASMUS+ PROGRAMME
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Master in SMArt transport and LOGistics for cities / SMALOG

Grant Agreement Number 2017-2893/001-001

Master Curricula

development and implementation

at the Batumi State Maritime Academy

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

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Summary: Deliverable series presents the curricula process of the 2nd level Master educational program developed for the Ukraine and Georgian Universities according to the Bologna process standards within the SmaLog project. This curriculum deliverable report was developed and implemented at Batumi State Maritime Academy - BSMA. After a short introduction, the deliverable describes the local conditions and needs and the results of the international reviews on which the curricula have been built. The deliverable provides the structure in terms of modules, the expected learning outcomes, the referenced publications and the materials needed to deliver the Master program.

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1 Introduction

Within the framework of the Erasmus+ Capacity Building in the Higher Education programme the Master in smart transport and logistics for cities project (SmaLog in the following) has been selected for funding. The project started in October 2017 and will end in October 2020.

The consortium is composed of 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 Autotransport 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. Local Universities are the key actors to start this process.

Starting from these concepts and knowledge developed by the European partners, the project aims to:

- develop and test in Ukraine and Georgia a 2-year University Master 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. This analysis was carried out and several important aspects were highlighted. First, the Local University system guarantees an adequate level for designing, managing and analysing smart transport and logistics.

Besides, there are some gaps. First, 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 the current laboratories, useful for the purposes of a SmaLog Master.

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

User Needs Analysis carried out at 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 Master 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 Masters courses. In some Masters, there are no practical or laboratory activities whatsoever, whilst in others they are not extensive and need to be improved.

To avoid administrative barriers, some local academics suggest revising/extending an existing Masters programme rather than setting up a new Masters programme. This is a major opportunity since it will allow the delivery of the Master from the second year of the project and the local needs can be captured in greater depth, exploiting the skills and competences of current teaching and research staff.

In order to improve the employment opportunities at local level of the Masters' graduates, the academics from local technical universities suggest focusing first 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 have been used as inputs in the present series of deliverables whose main objective is to define the Masters 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 in smart transport and logistics for cities according to the original application, and normative/law constraints in Georgia for EU recognition. Chapter 3 details the SmaLog Masters describing: master objectives, profile of the Master graduates, Masters Curricula, Programme structure and equipment and material. The last section, Chapter 4, presents conclusions.

2 General structure, objectives and contents of the Masters

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 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 will be 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 Masters 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:

- Create and Update contents and methods of courses for students with the most recent international experience;
- Create and Update research topics in the field of smart transport and logistics for cities with the most recent international experience;
- 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.

The 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 adequate and 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 relevant 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 system. For

this reason, the Masters curricula will include practical activities, laboratory activities and field activities. Moreover, the final thesis, envisaged for each Masters student, will be oriented to research and practical activities rather than desk analysis.

Batumi State Maritime Academy - BSMA

BSMA's existing curricula of Masters Programmes are based on the needs of the market, industry and region. Taking into account the important logistic location of Georgia and especially the city of Batumi, the scientific approach to Smart Transport logistics is essential for the local municipality. The city of Batumi combines all types of logistics and in terms of developing Georgia's logistic role and potential in the region, Batumi State Maritime Academy understands the importance of academic approach to the management of logistic flows in the city.

The development of the Masters programme in BSMA was initiated in closed collaboration with local authorities, such as Batumi City Hall, ministries of economic and finance, revenue service, Batumi Transport Department, Ports/Terminals and NGOs related to the logistics sector.

The overall objective of the curricula is to offer a Master's Programme that is comprehensive and provides students with complex knowledge in the field of Smart Transport logistics and is able to prepare specialists in accordance with international standards.

The Masters Programme curricula cover all the main aspects related to logistics: freight, smart transport, passenger flows, traffic and environmental aspects.

The students on the programme will be able to participate in laboratory-based research into city transport and its influence on the different levels. The lab will give students an opportunity to simulate and make transport models.

This is a completely new educational approach to Logistics for Georgia. The involvement of EU universities and its specialists have made a good contribution to the quality of the educational programme. BSMA teaching and research staff had the opportunity to share best practices from EU colleagues through training, internships and seminars. The mobility period for EU universities was used to participate in the educational process of the Partner University, work with teaching and learning materials, work closely with colleagues and discuss problematic issues.

3 SmaLog at Batumi State Maritime Academy

3.1 Masters objectives and profile of the Masters graduates

The main objectives of the Masters Programme are to prepare highly qualified specialists in field of Logistics, who will have employment opportunities in the Logistics sector, research organisations, governmental and non-governmental institutions and BSMA. The program is responding to the needs of the country as logistic hub of the region and based on that national priorities to develop Georgia's potential in this field. The location of Region of Ajara and city of Batumi makes this objective more important, taking into consideration strategic location on Black Sea coast and combinations of all means of transport in one city transport chain. The actuality of educational program is strengthened with economic, organisational, technical and informational factors.

Below is a description of the Masters curriculum as reported in Table 1 together with its modules.

The Master's Educational Program "Master of Business Administration in Logistics" is envisaged for granting an Academic Degree in the special subject "Logistics".

In respect of the mission of Batumi State Maritime Academy, the aim of the Educational Programme is:

1. **To prepare** competent specialists in the field of logistics equipped with high qualifications, versatile theoretical knowledge and practical skills and abilities, scientific research and creative activity;
2. **To teach** compulsory socio-political, economic aspects, principles of management science and current affairs;
3. **To give** a thorough professional education in the field of economy, business and logistics;
4. **To develop** the skills and abilities for applying modern technologies in the field of business administration and logistics and decision-making in the field of economy;
5. **To give** an in-depth knowledge for organizing and running a logistics service in the International Organizations and Companies, planning business processes, organizational projecting, structural development, as well as application of the research methods in practice;

6. **To form** the skills and abilities necessary for the practical activity in the field of business administration we as logistics services of the Civil Society Organizations;
7. **To develop** practical skills and abilities for the management of Smart Transport and Civil Logistics;
8. **To prepare** highly-responsible leaders meeting modern requirements with relevant competences, equipped with the skills and abilities for identifying and settling professional problems, team-work, implementation of personal potential and communication, high ethical standards which will ensure their competitiveness on the Internal and External Labour Market.

3.2 Masters Curriculum

The Masters Programme curricula are designed in order to satisfy needs of industry and to cover the main competences based on the national Qualification Framework.
The curricula consist of mandatory speciality core courses amounting to 60 credits and the concentrated component of SmaLog courses in all of 60 credits. See the Table: Overview of the BSMA curriculum.
In all the programme consists of 120 credits divided into two years and four semesters.

3.3 Programme structure

3.3.1 Basic concepts of smart transport and logistics for cities

The Educational and Scientific programme “Smart Transport and Logistics for cities” corresponds to:

- The National Qualifications Framework – Level 7;
- The Framework for Qualifications for the European Higher Education Area FQ-EHEA – Second cycle;
- The European Qualifications Framework for lifelong learning in the EQF-LLL – Level 7.

The Masters programme lasts two years for 120 ECTS consisting of:

- 20 ECTS for modules that create general competences;
- 20 ETCS for modules that characterise professional courses;
- 40 ETCS for SMALOG module;

- 5 ECTS for Research Methodology training;
- 5 ECTS for Internship;
- 30 ECTS for Master's thesis.

Table 1. Diagram of Master's educational programme 2-MP.09.01 "Logistics" with credits

I year	I term	International Economic Relations 5 ECTS	Global Business 5 ECTS	Corporate Logistics 5 ECTS	Strategic Marketing 5 ECTS	Financial Management in International Business 5 ECTS	Block of elective and/or free training courses - I 5 ECTS
	II term	Strategic Management 5 ECTS	Business and Logistics Law 5 ECTS	Supply Chain Management 5 ECTS	Research Methods 5 ECTS	International Business Statistics 5 ECTS	Block of elective and/or free training courses - II 5 ECTS
II year	III term	Concentration learning course - I 5 ECTS	Concentration learning course -II 5 ECTS	Concentration learning course - III 5 ECTS	Concentration learning course - IV 5 ECTS	Concentration learning course - V 5 ECTS	Block of elective and/or free Concentration learning courses - III 5 ECTS
	IV term	Preparation and defence of the master's thesis 30 ECTS					

Table2. Overview of the curriculum at BSMA

№	Code	Title of Learning course	Status	ECTS Credits	I	II	III	IV
1. speciality core courses (60 credits)				**60**	**20**	**20**	**20**	**-**
1.	2-MS-09.01-12	**Logistics management**	Mandatory	5	5	-	-	-
2.	2-MS-09.01-15	Commodity Study and Standardization	Mandatory	5	5	-	-	-
3.	2-MS-09.01-07	International business	Mandatory	5	5	-	-	-
4.	2-MS-09.02-09	Managerial economics	Mandatory	5	5	-	-	-
5.	2-MS-09.01-09	**Transportation and customs logistics**	Mandatory	5	-	5	-	-
6.	2-MS-09.02-15	Financial Management in International Business	Mandatory	5	-	5	-	-
7.	2-MS-09.02-17	Strategic marketing	Mandatory	5	-	5	-	-
8.	2-MS-09.01-10	**Freight forwarding**	Mandatory	5	-	5	-	-
9.	2-MS-09.02-18	Strategic management	Mandatory	5	-	-	5	-
10.	2-MS-09.01-16	**International Project Management**	Mandatory	5	-	-	5	-
11.	2-MS-08.04-04	**Research Methodology**	Mandatory	5	-	-	5	-
12.	2-MS-09.01-08	**Internship**	Mandatory	5	-	-	5	-
1.1 Concentrated component (module): **Logistics and Forwarding** **Elective and free learning course block (60 credits)**								
Elective and free learning course block				**15**	**5**	**5**	**5**	**-**
1.	2-MS-08.05-03 2-MS-08.05-07	• Business English • Business Russian	Elective	5	5	-	-	-
2.	2-MS-09.01-18 2-MS-09.01-19	• Commercial logistics • E-Business and Internet Banking	Elective	5	-	5	-	-

3.	2-MS-09.0 2-MS-09.0	• Logistics strategic management • Corporate logistics	Elective	5	-	-	5	-
Elective learning course block				**15**	**5**	**5**	**5**	**-**
4.	2-MS-09.01-01/2-MSE-09.01-01 2-MS-09.01-22	• Modern Business • World economy	Elective	5	5	-	-	-
5.	2-MS-09.03-01 2-MS-09.03-08	• Business Ethics and Leadership • Business negotiations and commercial conflict ology	Elective	5	-	5	-	-
6.	2-MS-09.02-23 2-MS-09.02-07/ 2-MSE-09.02-07	• Marketing Management • Innovation Management	Elective	5	-	-	5	-
7.		**Preparation and defence of master's thesis**	**Mandatory.**	**30**	**-**	**-**	**-**	**30**
8.	**Concentrated component (module) credits - Total**			**60**	**10**	**10**	**10**	**30**
1.2 Concentrated component (Module): Smart Transport and Logistics (60 credits)								
1.	2-MS-09.03-011	*Smart Transport and City Logistics*	Mandatory	**5**	**5**			
2.	2-MS-09.03-012	*Modelling and management of traffic flows*	Mandatory	**5**	**5**			
3.	2-MS-09.03-013	*Control of traffic flows*	Mandatory	**5**		**5**		
4.	2-MS-09.03-014	*City Passenger transport*	Mandatory	**5**		**5**		
5.	2-MS-09.03-015	*Smart Transport*	Mandatory	**5**			**5**	
6.	2-MS-09.03-016	*Human and environmental impacts, safety and sustainability*	Mandatory	**5**			**5**	

7.	2-MS-09.03-0102-MS-09.03-018	*Preparation and defence of mastersmaster's thesis Effectiveness of city transport systems*	MandatoryMandatory	30	-	-	-	30
8.	**Concentrated component (module) credits - Total**			**60**	**10**	**10**	**10**	**30**

Table 3. Programme Structure

		Characteristics	Notice
1.	programme framework (number of credits - ECTS, description about common and special parts, number of block choices - special parts, meaning of ECTS, i.e. how many hours of class, individual study and exercises)	**Volume of the programme 120 ECTS (credits):** Including: speciality core courses **(60 ECTS)** 1.Concentrated component (module): Logistics and Forwarding (**60 ECTS)** **or** 2.Concentrated component (module): Smart transport and logistics **(60 ECTS)**	**2 years, 4 semesters)**
2.	Outcomes expected according to our **original application and your local constraints**	In the original application 90 ECTS were mentioned, but the main constraints occur according to the legislation of Georgia: BSMA was not allowed to provide the Master's degree with 90 ECTS, which is why we use the 120 ECTS system.	
3.	Employment outlet	**The Maritime Academy cooperates** with education and research institutions in Georgia and abroad. National and international organizations of employers (Cruise companies, Stevedore firms, maritime port administrations, etc.). The information about employers and partners is available on the website of the Maritime Academy	

		Characteristics	Notice
		Professional activities: ✓ Transportation companies and organizations operating in the state and dish sector; ✓ Logistics departments / services of state structures and business sectors; ✓ Logistics centres and transport-logistics companies;Revenue services (customs clearance zones, customs check points, etc.). ✓ Transportation infrastructure facilities (ports, airports, railways, transport terminals); ✓ Scientific and research organizations of transport and neighbouring profile, firms, private companies, investment and scientific-technical funds; ✓ transport and economy management systems; ✓ Educational institutions; ✓ Non-profit and non-governmental organizations; ✓ State units/entities;	
4.	Enrolment description	For enrolment on the master's educational programme those with a bachelor's or equivalent degree are eligible. They will be admitted to study on the basis of the results of national master exam and according to internal university examinations in English and economics	
5.	Modules (title, brief description according to the outcomes expected and number of ECTS; semester)	**Hours, total: 3120 hours**, 1. Contact - **720 hrs**, including • Concentrated component – "Logistics and forwarding": Lectures - **255 hrs**, Practical / Seminar Study - **465 hrs**. • Concentrated component – "Smart Transport and Logistics" - Lectures - **285 hrs**,	I - Semester. Duration of the semester - 19 weeks (Contact hours - 15 weeks Examination - 4 weeks examinations)

		Characteristics	Notice
		Practical / Seminar Study - **435 hrs**; 2. Independent work - **2280 hours**; 3. The examination - **120 hrs.**	
6.	Internship activity	According to the Master's educational programme, internship is planned in the **III semester (5ECTS),** which precedes the preparation of a Master's thesis and defence. The internship will be conducted in the companies and organisation representing the industry. Relevant MOUs are signed with such companies and organisations.	**I semester** student should accumulate 30 ECTS (780 hours) Contact hours 180. Class hours 90. Seminar hours 90. Independence work hours 570. Evaluation 30 hours.
7.	Master's thesis preparation and defence	1.Concentrated component (module): Logistics and Forwarding (**30 ECTS)** 2.Concentrated component (module): Smart transport and logistics **(30ECTS)**	
8.	How many students have been enrolled and why there are differences with respect to what we planned and reported in our original application?	Given the novelty of the educational programme, from 2017 to 2018 **43** students are enrolled overall: 2017-2018 - 30 stud. 2018-2019 - 13 stud. 2019 - 2020 - 1 stud. 2020-2021 - 7 stud	

3.3.2 Concentrated Component (Module) of SmaLog: Smart Transport and Logistics for Cities

<table>
<tr><td>Title</td><td>Smart Transport and Logistics for Cities</td></tr>
<tr><td>Number of ECTS</td><td>5</td></tr>
<tr><td>Year and semester</td><td>2nd year</td></tr>
<tr><td>Teaching method</td><td>innovative, verbal, visual, practical, active and control methods with the use of the best European learning practices</td></tr>
<tr><td>Examination procedure</td><td>Will be held at the students' examination centre
The Overall Assessment of Student's Knowledge is Formulated as:
<table>
<tr><th></th><th>Assessment Components</th><th>% & Maximum Points</th></tr>
<tr><td>1</td><td>Cumulative assessment</td><td>30% - Maximum 30 points</td></tr>
<tr><td>2</td><td>Rating assessment of the teacher</td><td>30% - Maximum 30 points</td></tr>
<tr><td>3</td><td>Final exam</td><td>40% - Maximum 40 points</td></tr>
<tr><td colspan="2">Final (summary) evaluation</td><td>100% - Maximum 100 points</td></tr>
</table></td></tr>
<tr><td>Project envisaged</td><td>Individual course project</td></tr>
<tr><td>Aim</td><td>The aim of the module "Smart Transport and Logistics for Cities" is to obtain the theoretical and practical basis of city logistics and smart transport technologies.
The main objectives of the module "Smart Transport and Logistics for Cities" are to study of the mechanism of solving transport problems in the city, tools for improving the efficiency of urban logistics and transport within the city.

Learning Outcome of the module is for students to acquire the following competencies:

Knowledge and understanding in this section students must know:
- methods of analysis of city transport and assessment of system effectiveness;
- approaches of the application of information communication technologies and smart transport systems in the city transport system
- approaches and methods for studying and managing the operation of transport systems for freight and passengers in the city;
- measures to improve transport technologies using modelling of transport processes in cities;

Skills
- students must be able to assess the existing transport system and city logistics, alternatives and their impact;
- should investigate and manage the operation of transport systems for freight and passengers in the city;
- improve transport technologies using modelling of transport processes; evaluate the effectiveness of the selected activities;
- apply information communication technologies and smart transport systems in the city transport system.

Responsibility and Autonomy in this section students must have the competence to:
- apply the acquired knowledge based on the application of techniques;
- analyse city transport systems, in particular using smart transport systems and information communication technologies;
- research and management of the operation of integrated transport systems;
- management of freight, passenger transportation, traffic control within the city;
- implementation of information communication technologies and intelligent transport systems in the city transport system.</td></tr>
<tr><td>Contents</td><td>1. Stakeholder analysis and the role of the public sector.
Differences between types of urban area. Road congestion.
2. The urban freight and passenger transport markets in Georgia and the EU.</td></tr>
</table>

	3. European policy on urban transport. 4. Transport System in the EU and Georgia. 5. Evaluation and Comparison of Transportation Systems. 6. Demonstrations of data opportunities due to advances in Big Data and smart cities: 7. City logistics and applications. 8. Supply-demand curves for a transport system 9. Equilibrium allocation of travellers on two parallel routes 10. Urban freight activity analysis for economic and environmental sustainability
Textbooks	1. JOSEPH Y.J. CHOW. Informed Urban Transport Systems: Classic and Emerging Mobility Methods Toward Smart Cities (2018); https://www.pdfdrive.com/informed-urban-transport-systems-classic-and-emerging-mobility-methods-toward-smart-cities-e189956530.html 2. Cascetta, E. (2009). Transportation Systems Analysis: Models and Applications. Springer. 3. Nuzzolo, A. and Lam, W. H. K. (eds. 2017), Modelling Intelligent Multi-Modal Transit Systems, CRC Press, Taylor & Francis Group, Boca Raton (FL, USA) 4. DG MOVE. European Commission: Study on Urban Freight Transport. FINAL REPORT. MDS Transmodal Limited in association with Centro di ricerca per il Trasporto e la Logistica (CTL), 2012.
Support tools	MS Office (Excel, Word, PowerPoint, Visio)

3.3.3 Concentrated Component (Module) of SmaLog Modelling and Management of Traffic Flows

<table>
<tr><td>Title</td><td>Modelling and Management of Traffic Flows</td></tr>
<tr><td>Number of ECTS</td><td>5</td></tr>
<tr><td>Year and semester</td><td>2nd year,</td></tr>
<tr><td>Teaching method</td><td>innovative, visual, practical, active and control methods, Verbal Narrative/Report; Discussion; Debates; Groupwork; Group and individual case studies;</td></tr>
<tr><td>Examination procedure</td><td>Exams will be held at the students’ examination centre
The Overall Assessment of The Student's Knowledge is Formulated as:
<table>
<tr><th></th><th>Assessment Components</th><th>% & Maximum Points</th></tr>
<tr><td>1</td><td>Cumulative assessment</td><td>30% - Maximum 30 points</td></tr>
<tr><td>2</td><td>Rating assessment of the teacher</td><td>30% - Maximum 30 points</td></tr>
<tr><td>3</td><td>Final exam</td><td>40% - Maximum 40 points</td></tr>
<tr><td colspan="2">Final (summary) evaluation</td><td>100% - Maximum 100 points</td></tr>
</table></td></tr>
<tr><td>Aim</td><td>The aim of the module "Modelling and Management of Traffic Flows" is to obtain the theoretical and practical basis for traffic flow simulation and management according to the best European practices and current methods of traffic flow simulation and management.
The main objective of the module "Modelling and Management of Traffic Flows" is the ability to manage the reliability and efficiency of road traffic in the central parts of cities, taking into account the latest knowledge and best practices in the field of intelligent transport and logistics.

Learning Outcomes of the module are for students to acquire the following competencies:
Knowledge and understanding in this section students must know:
- modern approaches and methods of simulation traffic flows;
- approaches and methods for managing traffic flows in cities.
- the theoretical basis for assessing the impact of traffic flows on the efficiency of the transport network and traffic safety

Skills

- students must be able to apply the main approaches to the simulation of traffic flows and the assessment of traffic conditions in practice;
- must be able to determine the main indicators for ensuring the safety of traffic flows;
- should determine the values of criteria for evaluating the effectiveness and safety of the functioning of transport networks
- have to put into practice a suitable traffic management system in cities.

Responsibility and Autonomy in this section students must have the competence in:
- the use of modern methods of traffic flow management and simulation;
- improving ways to assess the impact of traffic flows on the efficiency and safety of transport networks;
- organization of safe and efficient traffic flow in cities;
- traffic management in cities using different control systems.</td></tr>
<tr><td>Contents</td><td>1. General approaches to traffic flow simulation
2. Basic theory of traffic flows.
3. Assessment of traffic conditions.
4. Safety of movement of traffic flows.
5. Criteria for assessing the efficiency of transport networks.
6. Criteria for assessing the safety of the functioning of transport networks.
7. Classification of traffic management systems in cities.
8. Highway control systems.
9. Traffic control with pre-signals and speed indicators.</td></tr>
</table>

	10. Constraints and speed control. Adjustment of entry to the highway.
Textbooks	1. Slinn M., Matthews P., Guest P. Traffic Engineering Design Principles and Practice. Second edition. — Elsevier Butterworth-Heinemann, 2005. 2. Manual for the design of road traffic facilities: HBS 2015 / FGSV; Part A: Highways 3. Urban Transportation and Logistics: Health, Safety, and Security Concerns 4. TOWARDS ZERO Ambitious Road Safety Targets and the Safe System Approach 5. Cascetta, E. (2009). Transportation Systems Analysis: Models and Applications. Springer.
Support tools	MS Office (Excel, Word, PowerPoint, Visio), PTV Visum, (or similar soft)

3.3.4 Concentrated Component (Module) of SmaLog Control of traffic flows

<table>
<tr><td>Title</td><td>Control of traffic flows</td></tr>
<tr><td>Number of ECTS</td><td>5</td></tr>
<tr><td>Year and semester</td><td>2nd year,</td></tr>
<tr><td>Teaching method</td><td>presentation and Multimedia Transmissions. Seminar/Practical Work - Verbal Narrative/Report; Discussion; Debates; Groupwork; Group Case Exercises; Searching and Processing of Relevant Information; Multimedia Transmissions;</td></tr>
<tr><td>Examination procedure</td><td>Exams will be held at the students' examination centre
Overall Assessment of the Student's Knowledge is Formulated as:
<table>
<tr><th></th><th>Assessment Components</th><th>% & Maximum Points</th></tr>
<tr><td>1</td><td>Cumulative assessment</td><td>30% - Maximum 30 points</td></tr>
<tr><td>2</td><td>Rating assessment of the teacher</td><td>30% - Maximum 30 points</td></tr>
<tr><td>3</td><td>Final exam</td><td>40% - Maximum 40 points</td></tr>
<tr><td colspan="2">Final (summary) evaluation</td><td>100% - Maximum 100 points</td></tr>
</table></td></tr>
<tr><td>Project envisaged</td><td></td></tr>
<tr><td>Aim</td><td>Objectives.
The ability to conduct research on the functioning of urban transport systems, identify problems, set and solve tasks that are oriented towards the integration of intelligent transport and information technologies in the management of such systems.

Learning Outcomes of the module are that students acquire the following competencies:
Knowledge and understanding in this section students must know:
– characteristics of the road and modern methods for their study;
– methods for assessing the effectiveness and safety of road and pedestrian traffic
– modern approaches to traffic management at intersections and roads
– modern methods of traffic management at intersections and roads;
– patterns of change in the parameters of traffic flow.

Skills
students must be able to:
– investigate the parameters of traffic and pedestrian flows;
–use modern methods of traffic management at intersections and roads;
– perform modelling of traffic flows and pedestrian flows;

Responsibility and Autonomy in this section students must have the competence in:
– analysis of the characteristics of the road;
– justify the use of traffic management techniques at intersections and roads, suggest practical measures;
– investigate traffic flow parameters;
– implement modern approaches to traffic management at intersections and roads;</td></tr>
<tr><td>Contents</td><td>1. System approach in traffic management.
2. Transport flow.
3. Transport studies and traffic forecasting.
4. Task and classification of transport research.
5. Interchanges of streets and roads of the same level.
6. The concept and classification of the intersection.
7. Interchanges of streets and roads at different levels.
8. Analysis and evaluation of traffic conditions.
9. Road traffic control methods and measures.
10. Assessment of road safety.</td></tr>
<tr><td>Text book</td><td>1. Traffic Engineering Design. Principles and Practice. Second edition. (2005) Mike Slin, Elsevier Ltd;
5. Urban Transportation and Logistics: Health, Safety, and Security Concerns</td></tr>
</table>

	6. TOWARDS ZERO Ambitious Road Safety Targets and the Safe System Approach. 7. Vukan R. Vuchic Transportation for Livable Cities 8. Manual for the design of road traffic facilities: Part A: Highways 1. HIGHWAY CAPACITY MANUAL 2010
Support tools	MS Office (Excel, Word, PowerPoint, Visio (or similar soft)

3.3.5 Concentrated Component (Module) of SmaLogCity Passenger Transport

<table>
<tr><td>Title</td><td>City Passenger Transport</td></tr>
<tr><td>Number of ECTS</td><td>5</td></tr>
<tr><td>Year and semester</td><td>2nd year,</td></tr>
<tr><td>Teaching method</td><td>presentation and Multimedia Transmissions. Seminar/Practical Work - Verbal Narrative/Report; Discussion; Debates; Work in group Method; Group Case Exercises; Searching and Processing of Relevant Information; Multimedia Transmissions;</td></tr>
<tr><td>Examination procedure</td><td>Will be held at the students' examination centre
The Overall Assessment of the Student's Knowledge is Formulated as:
<table>
<tr><td></td><td>Assessment Components</td><td>% & Maximum Points</td></tr>
<tr><td>1</td><td>Cumulative assessment</td><td>30% - Maximum 30 points</td></tr>
<tr><td>2</td><td>Rating assessment of the teacher</td><td>30% - Maximum 30 points</td></tr>
<tr><td>3</td><td>Final exam</td><td>40% - Maximum 40 points</td></tr>
<tr><td colspan="2">Final (summary) evaluation</td><td>100% - Maximum 100 points</td></tr>
</table></td></tr>
<tr><td>Aim</td><td>
Aim of the module "City passenger transport" is to obtain the theoretical and practical basics on methods and tools of public transit systems design, operation and management transportation on the basis of the advanced smart transport technologies.
The main objectives of the module "City passenger transport" are to study the mechanism of solving public transit operation problems, principles of the tools and equipment usage for solving tasks of transit systems design, operation and management.

Learning Outcomes of the module are that students acquire the following competencies:
Knowledge and understanding in this section students must know:
- principles and requirements for city route systems planning;
- approaches and methods of transit network design;
- the essence, principles and structure of passenger path choice models;
- classification of assignment models for transit networks; the essence, conditions and areas of usage of existing methodological approaches;
- structure of tasks, principles and methods of operation and transportation process
- the tasks, normative requirements and the essence of methodical approaches to estimating transit quality of service;

Skills
students must be able:
- by analysing the existing situation, to choose the strategic directions of the city passenger transport development based on transit-oriented methods;
- to perform input data formation, to adjust models and to conduct programme-based evaluation of the transit network parameters;
- to carry out an analysis of the effect of applying smart transport technologies on service parameters;
- to determine the conditions of application expediency and parameters of rapid transit operation;
- to identify the factors and conditions of unsatisfactory transit services;
- to conduct research into the value of travel time and assess passenger fatigue;
- on the basis of a critical analysis, identify the problematic aspects of the city passenger transport operation and, through creative thinking, pave the way for their solution.

Responsibility and Autonomy in this section students must have the competence in:
- strategic planning of the city transport systems development based on transit-oriented methods;
- conception of transit network models, with using the relevant knowledge in order to develop measures for their improvement;
- solving the tasks of transit service operation and management based on demand estimation;
</td></tr>
</table>

	- analysis of the consequences of rapid transit applying efficiency indicators on the transit system; - to provide the transit quality of service estimation and determine the means for its increase;
Contents	1. Transit planning, Transit-oriented development methods. 2. Models for the analysis and design of urban passenger transport systems. 3. Passenger path choice models. 4. Assignment models for transit networks. 5. Route operation management. 6. Reorganization and management of local public transport services. 7. Intelligent transportation systems on public transit. *8.* Rapid transit trends in transit ridership and in use of different modes. 9. Transit quality of service estimation. 10. Value of travel time and fatigue estimation.
Textbooks	1. Cascetta, E. (2009). Transportation Systems Analysis: Models and Applications. Springer. 2. Ortúzar S, J. D. D. and Willumsen, L. G. (2001). Modelling transport. Chichester New York, J. Wiley. 3. Nuzzolo, A. and Lam, W. H. K. (eds. 2017), Modelling Intelligent Multi-Modal Transit Systems, CRC Press, Taylor & Francis Group, Boca Raton (FL, USA) 4. Lam, W. H., Bell, M. G. (Eds.). (2002). Advanced modeling for transit operations and service planning. Emerald Group Publishing Limited. 5. Gentile, G., & Noekel, K. (2016). Modelling public transport passenger flows in the era of intelligent transport systems. Gewerbestrasse: Springer International Publishing. 6. Nielsen, G., Nelson, J. D., & Mulley, C. (2005). Public transport: planning the networks. HiTrans.
Support tools	MS Office (Excel, Word, PowerPoint, Visio); PTV VISUM (or similar soft)

3.3.6 Concentrated Component (Module) of SmaLog Smart Transport

<table>
<tr><td>Title</td><td>Smart Transport</td></tr>
<tr><td>Number of ECTS</td><td>5</td></tr>
<tr><td>Year and semester</td><td>2nd year,</td></tr>
<tr><td>Teaching method</td><td>presentation and Multimedia Transmissions. Seminar/Practical Work - Verbal Narrative/Report; Discussion; Debates; Groupwork Method; Group Case Exercises; Searching and Processing of Relevant Information; Multimedia Transmissions;</td></tr>
<tr><td>Examination procedure</td><td>Will be held at the students' examination centre
Overall Assessment of the Student's Knowledge is formulated as:
<table>
<tr><td></td><td>Assessment Components</td><td>% & Maximum Points</td></tr>
<tr><td>1</td><td>Cumulative assessment</td><td>30% - Maximum 30 points</td></tr>
<tr><td>2</td><td>Rating assessment of the teacher</td><td>30% - Maximum 30 points</td></tr>
<tr><td>3</td><td>Final exam</td><td>40% - Maximum 40 points</td></tr>
<tr><td colspan="2">Final (summary) evaluation</td><td>100% - Maximum 100 points</td></tr>
</table></td></tr>
<tr><td>Aim</td><td>Objectives.
The ability to conduct research on the functioning of urban transport systems, identify problems, set and solve tasks that are oriented towards the integration of intelligent transport and information technologies in the management of such systems.

Learning Outcomes of the module are that students acquire the following competencies :
Knowledge and understanding in this section students must know:
– characteristics of intellectual systems of road safety, their purpose, their functionality and the impact on road safety;
– Global Navigation Satellite Systems. Positioning and technical fundamentals;

Skills
– students must be able to practise the methods of modelling traffic,
– be able to use the capabilities of intelligent road safety systems, suggest methods for improving road safety;
– apply global navigation satellite systems to transport;

Responsibility and Autonomy in this section students must have competence in:
– analysis of traffic characteristics using traffic modelling methods to predict the speed of traffic flow;
– explore the results of the application of intelligent traffic safety systems. Perform an assessment of the application of intelligent systems;
– to form effective routes of movement using global navigation satellite systems in transport</td></tr>
<tr><td>Contents</td><td>1. Road traffic monitoring systems.
2. Road traffic control, road traffic speed control systems, speed measurement.
3. Control and guide for drivers.
4. Network and traffic management systems.
5. Classification of vehicle safety systems.
6. Active safety of vehicles.
7. Passive safety of vehicles.
8. Modern traffic safety systems.
9. Classification of satellite navigation systems.
10. Principles of satellite navigation systems operation.</td></tr>
<tr><td>Textbook</td><td>1. Traffic Engineering Design. Principles and Practice. Second edition. (2005) Mike Slin, Elsevier Ltd;
2. Urban Transportation and Logistics: Health, Safety, and Security Concerns
3. TOWARDS ZERO Ambitious Road Safety Targets and the Safe System Approach (JTRC). – ISBN 978-92-821-0264-0 OECD/ITF, 2009.
4. Manual for the design of road traffic facilities: HBS 2015 / FGSV; Part A:</td></tr>
</table>

	Highways 5. HIGHWAY CAPACITY MANUAL 2010 6. R. Galati – Geographical Information System Demystified – Artech House
Support tools	MS Office (Excel, Word, PowerPoint, Visio),

3.3.7 Concentrated Component (Module) of SmaLog Human and Environmental Impacts, Safety and Sustainability

<table>
<tr><td>Title</td><td>Human and Environmental Impacts, Safety and Sustainability</td></tr>
<tr><td>Number of ECTS</td><td>5</td></tr>
<tr><td>Year and semester</td><td>2nd year,</td></tr>
<tr><td>Teaching method</td><td>presentation and Multimedia Transmissions. Seminar/Practical Work - Verbal Narrative/Report; Discussion; Debates; Groupwork; Group Case Exercises; Searching and Processing of Relevant Information; Multimedia Transmissions;</td></tr>
<tr><td>Examination procedure</td><td>Will be held at the students' examination centre
The Overall Assessment of The Student's Knowledge is Formulated as:
<table>
<tr><th></th><th>Assessment Components</th><th>% & Maximum Points</th></tr>
<tr><td>1</td><td>Cumulative assessment</td><td>30% - Maximum 30 points</td></tr>
<tr><td>2</td><td>Rating assessment of the teacher</td><td>30% - Maximum 30 points</td></tr>
<tr><td>3</td><td>Final exam</td><td>40% - Maximum 40 points</td></tr>
<tr><td colspan="2">Final (summary) evaluation</td><td>100% - Maximum 100 points</td></tr>
</table></td></tr>
<tr><td>Aim</td><td>The aim of the module "Human and Environmental Impacts, Safety and Sustainability" is to obtain the knowledge and skills to determine the economic, social and environmental impacts of transport systems on city logistics.
The objective of the module "Human and Environmental Impacts, Safety and Sustainability" is to acquire knowledge to determine measures to improve the environment, ergonomic support in the transport sector and the human factor in ensuring the reliability and sustainability of urban logistics systems taking into account regional conditions.

Learning Outcomes of the module are to acquire the following competencies by students:
Knowledge and understanding in this section students must know:
– influence of features of the external environment on the driver's functional state: reliability, perception of information, monotony and fatigue;
– principles of rationing vibration, noise, ultrasound and infrasound, methods and means of protection from their negative impacts;
– general measures to improve environmental performance;
– the main principles of collection, aggregation and analysis of road accident data.

Skills
students must be able to:
– improve approaches and methods for conducting commercial, technical, social, environmental, institutional, financial and economic analysis in the development of innovation and investment projects;
– study theoretical and experimental models of managing the reliability and efficiency of transport technologies by modes of transport.

Responsibility and Autonomy in this section students must have the:
– ability to manage the reliability and efficiency of transport technologies by type of transport;
– ability to evaluate transport systems in urban infrastructure;
– ability to determine the impacts of transport on the environment</td></tr>
<tr><td>Contents</td><td>1. Characteristics of the driver's work in the system "Human – Engineering – Environment".
2. The structure of the driver's activities. Analysis and description of activity at the operational-psychological level.
3. The significance of analyzers, senses and perceptions of information in the driver's activity.</td></tr>
</table>

	4. Psycho-physiological characteristics of the driver's work in the system "Human – Engineering – Environment". 5. Environmental assessment of traffic noise of the urban road network. 6. Estimation of the effect of transport on air pollution in conditions of urbanization. 7. Characteristics of parking objects as sources of environmental hazard. Types of emissions. Fuel and consumption. Rationing and ways to reduce the negative impact of vehicle exhaust. 8. The role of the human factor in ensuring the reliability and sustainability of urban logistics. 9. Management of city logistics security. 10. Sustainable Urban Mobility Plans.
Textbooks	1. Elvik R., Truls V. Handbook of road safety measures/ R. Elvik, V. Truls // Emerald Group Pub Ltd, 2. Usami D. S. Persia L., Picardi M., Saporito. Identifying driving behaviour profiles by using Multiple Correspondence Analysis and Cluster // Transport Infrastructure and Systems. 3. European Commission. Developing and implementing a sustainable urban mobility plans: Guidelines. – European Platform on Sustainable Urban Mobility Plans, 4. Essays, UK. (November 2013). Environmental Problems Linked to Developing Transport Systems Environmental Sciences Essay. 5. World Health Organization Regional Office for Europe. Transport, environment and health. – WHO regional publications. European series;
Support tools	MS Office (Excel, Word, PowerPoint)

3.3.8 Concentrated Component (Module) of SmaLog Traffic Flows Management in the City Centre

<table>
<tr><td>Title</td><td>Traffic Flow Management in the City Centre</td></tr>
<tr><td>Number of ECTS</td><td>5</td></tr>
<tr><td>Year and semester</td><td>2nd year,</td></tr>
<tr><td>Teaching method</td><td>presentation and Multimedia Transmissions. Seminar/Practical Work - Verbal Narrative/Report; Discussion; Debates; Groupwork; Group Case Exercises; Searching and Processing of Relevant Information; Multimedia Transmissions;</td></tr>
<tr><td>Examination procedure</td><td>Will be held at the students' examination centre
The Overall Assessment of The Student's Knowledge is Formulated as:
<table>
<tr><td></td><td>Assessment Components</td><td>% & Maximum Points</td></tr>
<tr><td>1</td><td>Cumulative assessment</td><td>30% - Maximum 30 points</td></tr>
<tr><td>2</td><td>Rating assessment of the teacher</td><td>30% - Maximum 30 points</td></tr>
<tr><td>3</td><td>Final exam</td><td>40% - Maximum 40 points</td></tr>
<tr><td colspan="2">Final (summary) evaluation</td><td>100% - Maximum 100 points</td></tr>
</table></td></tr>
<tr><td>Aim</td><td>The aim of the module "Traffic Flow Management in the City Centre" is to acquire the theoretical and practical basis of traffic flow management in the city centre on the basis of the best European practices and current methods of traffic flow management in the city centre.
The main objective of the module "Traffic Flow Management in the City Centre" is the ability to manage the reliability and efficiency of road traffic in the central parts of cities, taking into account the latest knowledge and best practices in the field of intelligent transport and logistics.

Learning Outcome of the module is that students acquire the following competencies :
Knowledge and understanding in this section students must know:
- modern approaches and methods of managing traffic flows in the city centre;</td></tr>
</table>

	- theoretical basis of organization of parking in the central part of the city; ***Skills*** *students must be able to:* - assess the existing system of management of traffic and pedestrian flows in the city centre, the efficiency of traffic control, the degree of influence of public and freight transport on traffic flow efficiency; - explore and manage the work of intelligent transport systems in city centres; - determine environmental damage from the impact of traffic flows, develop measures to reduce the harmful effects of traffic flows on the environment. ***Responsibility and Autonomy*** *in this section students must have the competence in***:** - applying the acquired knowledge based on the application of techniques; - using modern methods of traffic management in city centres; - the organization of parking in city centres, determining their number and location.
Contents	1. Modern issues of functioning of traffic flows in city centres. 2. Intelligent transport systems in city centres. 3. Influence of «Park and Ride» parking lots on city centre traffic. 4. Classification of parking lots. 5. Parking characteristics of the parking lot. 6. Features of the organization of parking in the city centre. 7. The ratio of the motorization level and the number of places for cars in the parking lot. Determine the area and type of parking in the city centre. 8. Environmental problems of road transport. 9. Evaluation of the impact of traffic flows on the environment. 10. Characteristics of traffic flows. Determine the mileage of vehicles through the city centre network.
Textbooks	1. Cascetta, E. (2009). Transportation Systems Analysis: Models and Applications. Springer. 2. Urban Transportation and Logistics: Health, Safety, and Security Concerns 3. Vukan R. Vuchic Transportation for Livable Cities 4. TOWARDS ZERO Ambitious Road Safety Targets and the Safe System Approach 5. Slinn M., Matthews P., Guest P. Traffic Engineering Design Principles and Practice. Second edition. — Elsevier Butterworth-Heinemann, 2005. 6. Manual for the design of road traffic facilities: HBS 2015 / FGSV; Part A: Highways
Support tools	MS Office (Excel, Word, PowerPoint, Visio)

3.3.9 Concentrated Component (Module) of SmaLog Efficiency of City Transport Systems

<table>
<tr><td>Title</td><td>Efficiency of City Transport Systems</td></tr>
<tr><td>Number of ECTS</td><td>5</td></tr>
<tr><td>Year and semester</td><td>2nd year,</td></tr>
<tr><td>Teaching method</td><td>presentation and Multimedia Transmissions. Seminar/Practical Work - Verbal Narrative/Report; Discussion; Debates; Groupwork; Group Case Exercises; Searching and Processing of Relevant Information; Multimedia Transmissions;</td></tr>
<tr><td>Examination procedure</td><td>Will be held at the students' examination centre
The Overall Assessment of the Student's Knowledge is Formulated as:
<table>
<tr><td></td><td>Assessment Components</td><td>% & Maximum Points</td></tr>
<tr><td>1</td><td>Cumulative assessment</td><td>30% - Maximum 30 points</td></tr>
<tr><td>2</td><td>Rating assessment of the teacher</td><td>30% - Maximum 30 points</td></tr>
<tr><td>3</td><td>Final exam</td><td>40% - Maximum 40 points</td></tr>
<tr><td colspan="2">Final (summary) evaluation</td><td>100% - Maximum 100 points</td></tr>
</table></td></tr>
<tr><td>Aim</td><td>The aim of the module "Efficiency of city transport systems" is to obtain a theoretical and practical basis for assessing the social, environmental and economic efficiency of projects in the field of transport systems and city logistics.
The objectives are to study of the theoretical and practical basis of project analysis, taking into account stakeholders and indicators of influence in transport systems and methods for comparing alternative projects.

Learning Outcomes of the module is to acquire the following competencies by students:
Knowledge and understanding in this section students must know:
- approaches and methods for conducting commercial, technical, social, environmental, institutional, financial and economic analysis in the development of innovative and investment projects;
- approaches and methods for assessing the social, environmental and economic efficiency of transport systems and city logistics projects;
- approaches and methods for comparing alternative projects.
Skills
students must be able to:
- identify stakeholders in transport systems and city logistics projects;
- carry out project analysis in the field of transport systems and city logistics, taking into account commercial, technical, social, environmental, institutional, financial and economic aspects;
- determine direct and indirect effects, social, ecological and economic efficiency of projects in the field of transport systems and city logistics.

Responsibility and Autonomy in this section students must have the competence in:
- assessment, evaluation and comparison of projects in the field of transport systems and city logistics.</td></tr>
<tr><td>Contents</td><td>1. Stakeholders in transport systems and logistics projects
2. Commercial, technical, social, environmental, institutional, financial and economic analysis
3. Development of innovative and investment projects in the field of transport systems and city logistics.
4. Social and environmental efficiency of transport systems.
5. Impact of the transport systems on the level of environmental pollution.
6. Assessment of the harmful effects of cars on the environment.
7. Economic efficiency of transport systems
8. Direct and indirect effects, approaches and methods for assessing the economic efficiency of projects in the field of transport systems and city logistics.
9. Approaches and methods for comparing alternative projects.
10. Multicriteria analysis for a transport infrastructure project.</td></tr>
</table>

Textbooks	1. Cascetta, E. (2009). Transportation Systems Analysis: Models and Applications. Springer. 2. Simchi-Levi, D., Chen, X., Bramel, J. The Logic of Logistics. Theory, Algorithms, and Applications for Logistics Management Series. 3rd edition. Springer. 2014 3. Taniguchi E., Russell G. Thompson (2015), City logistics: mapping the future. CRC Press, Nov 21, 2014 - Business & Economics 4. Guide to Cost-Benefit Analysis of Investment Projects. Economic appraisal tool for Cohesion Policy 2014-2020. EUROPEAN COMMISSION. Directorate-General for Regional and City policy. 5. Multi-criteria analysis: a manual. Department for Communities and Local Government: London, 2009
Support tools	MS Office (Excel, Word, PowerPoint, Visio), COPERT

3.3.10 Concentrated Component (Module) of SmaLog Preparation and defence of masters thesis

Title	**Preparation and defence of masters thesis**
Number of ECTS	30
Year and semester	2nd year, 2nd semester
Examination procedure	Will be held at the business administration department in accordance with the rule of Master's Thesis defence. Students should deliver 60-80 pages of work and prepare their final presentation.

3.3.11 Educational objectives/common and special parts

The educational objective is to obtain theoretical knowledge, skills and abilities sufficient to develop new ideas, solve complex problems in the field of transport technologies, which study the laws that determine the conditions of rational organization of transport services and transport processes and cover the problems of building and ensuring efficient operation of transport components, development of its material and technical base.

The learner must satisfy the programme requirements in the programme specification, which includes:

- theoretical classroom instruction on subjects (lectures, seminars and practical studies);
- consultations and student independent work, including fulfilment of a course project and a paper on speciality;
- pre-diploma training and thesis defence.

Credits are awarded based on the student's successful passing of written/oral tests and exams in subjects, defence of a course project, and defence of a report on the training, tests, practice, control tasks, seminars, and defence of the Master's thesis.

Level of qualification

Ability to solve complex problems and tasks in a given professional activity field either while researching and/or innovation implementation under ambiguous conditions and requirements.

3.3.12 Learning Outcomes

Knowledge and Acknowledgement

1. ***Describes*** the components of logistical systems integrated management and recent theories, concepts and approaches of the management;
2. ***Describes*** the modern tendencies, basic principles for administering of the logistical systems and freight shipments, legal, economic and organizational aspects for the management and execution of the logistical system;
3. ***Undertakes*** evaluation of the organizational potential of the logistical systems and elaboration of the effective business strategies;
4. ***Determines*** how to resolve separate problems faced before the organization of the functional field of the logistics;
5. ***Receives*** theoretical and practical knowledge in the field of Smart Transportation and urban logistics and describes basic principles of effective management of transportation flows.

With the concentration of "Logistics":

1. ***Describes*** complex issues in the logistics field, basic aspects of corporate logistics, management methods of transportation logistics systems;
2. ***Describes*** legal, economic and organizational aspects for the management of the logistics systems management;
3. ***Describes*** recent theories and principles of transportation and customs logistics;
4. ***Defines*** the approaches of strategic logistics management, modern concepts of International Logistics;
5. ***Acknowledges*** the necessity of a critical approach in relation to the issues defined in the field of the professional activity;

„Smart Transport and Urban Logistics with the following concentration:

1. ***Describes organizational***, legal and economic aspects of Smart Transportation and Urban Logistics;

2. ***Describes*** complex issues of Smart Transport management and the peculiarities for organizing, controlling and management of urban logistics;
3. ***Defines*** basic means for Smart Transport management;
4. ***Undertakes*** elaboration of effective strategies for management of urban passenger transportation;
5. ***Acknowledges*** the need for a critical approach to human and environment impacts, sustainability of the safety and transport system.

Skills:

1. ***Identifies*** the problems faced before separate functional fields of the organization or the logistics and ***applies*** effective methods for settling these problems;
2. ***Takes decisions*** at the operational and tactical level, formulates aims, objectives and criteria;
3. ***Performs*** administrative-governmental and economic functions within the framework of its own competence, rational management of flow processes (human, informational, material, financial and service flows);
4. **Evaluates** various logistics approaches, appropriate methods and tools through application of a wide range of the skills characteristic for the specifics of the logistics field;
5. ***Undertakes analytical evaluation*** of the non-standard situations occurring in the management of the Logistics Processes and ***operatively diagnoses*** the problems arising, **undertakes management** of anti-crisis measures and within the frame of its competence applies decision-making skills and abilities;
6. ***Undertakes a generalized analysis*** of the innovations, contemporary conceptual approaches in the field the management of the logistics processes and expedition activity, **draws** relevant conclusions, **undertakes identification** of the compliance with the law and the tendencies;
7. ***Evaluates*** ongoing events at the regional and local markets and their potential impact on the logistics activity;
8. In successful implementation of the job-related duties and obligations **applies** managerial knowledge and **achieves** cooperation and collaboration at the internal organizational level, as well as with society at large; leads an effective communication with colleagues, scholars and in general with specialists on the issues of logistics and expedition;
9. **Organizes presentation** of research results related to their own professional activity through application of modern technologies***;***
10. ***Participates*** in business negotiations, ***organizes*** commercial and transportation documentation and ***analyses the results of*** cooperation with the custom's brokers, entrepreneurs and importers, various logistics mediators and business partners.

11. In respect of the norms of the professional ethics, **analyzes** the results of effective governance in the field of the business; **undertakes** the rights and obligations imposed over it, fulfilling the principles of team work and leadership;
12. ***Participates*** in the process of forming ethical values in the field of the business and **strives for** its introduction;
13. ***Respects*** universally recognized civil and social values;
14. ***Updates*** theoretical and practical knowledge and a**cknowledges** that career progress is only feasible on the basis of recent achievements in the field and modern management principles.

With the concentration of "Logistics":

- ***Undertakes management*** of the transportation and customs formalities and informational and computer provision;
- ***Analyses*** the risks in the field of commercial logistics and organizes their correct evaluation in a legal way;
- **Elaborates** the strategies of operations in the field of the International Logistics;
- ***Develops*** transportation documents, runs negotiations with the counter-agents;

With the concentration of the "Smart Transportation and Urban Logistics":

- ***Undertakes*** organization and control of the road transportation steams;
- ***Evaluates*** modern tendencies for the development of the Smart Transportation and urban Logistics;
- ***Elaborates*** schemes for urban passenger transportation and **undertakes** their effective management;
- ***Undertakes*** management of road transportation and takes relevant decisions in relation to management of anti-crisis measures.

Field development tendencies may be summarized as following:

The "logistics" Master's programme is extremely topical for a number of reasons, resulting from the following factors:

1. **Economic factor.** In a highly competitive environment, it is important to reduce production costs and waiting times to maximise profit and achieve success. Logistics gives possibility to connect to each other consumers and producers' interests.
2. **Organizational-economic factor.** In the freight transport process, integral forms of management and coordination are becoming increasingly important in accordance with the emergence and development of new organizational forms. As well as ensuring the interaction of manufacturers, consumers, intermediaries and infrastructure logistics systems.
3. **Information factor.** The market economy promotes the development of information connections. Information systems link reasons and results of market relations. Informatics connects market and logistics, as information flows represent the key to its management and part of the logistics processes.
4. **Technical factor.** Logistics, as a system, its subjects and management objects develop in the infrastructure on the basis of modern technical advances and computerized management.
5. **Government support in goods movement.** In modern conditions the task of regulating the process of goods movement arises not only at the production level but also across regions and at the national level.
6. **Logistics implementation** is urgent in order to expand and intensify commodity-money relations on a nationwide basis, increase economic ties between enterprises, develop industrial infrastructure, and establish independent enterprises and organizations. Scientific interests represent areas of material production, commodity turnover and services and are directed towards a rational organization of logistics management, taking into account the sectoral, regional and nomenclature specifics of production, which is especially actual under the conditions of modern scientific and technical progress;

7. **Smart transport and urban logistics implementation** are essential for efficient management of transport flows, for improvement the city environment and for compliance of transport systems with international requirements

3.3.13 Employment opportunities

Positions that can be held by Masters graduates: Researcher, research engineer in scientific, research, design organizations. Transport engineer, logistician, analyst and / or consultant in the field of transport systems and technologies. Teaching positions in higher education institutions. Opportunity to study according to the programme of the third (educational-scientific) level of higher education.
Possible workplace: public authority, infrastructure department, transport enterprises, research and design institutes, universities etc.
Areas of activity: implementation of organizational and management activities in state transport administration, transport departments of local governments and in transport enterprises of various forms of ownership.

3.3.14 Admission procedure

General academic access requirements
The examination procedure includes two exams: 1) external independent evaluation of foreign languages (held by the national centre of examinations); 2) internal professional entrance examination in a specialty. 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 (or equivalent) degree.

3.3.15 Examination procedure for the thesis defence

The achievement of the master's degree involves defence of the thesis. Students begin to write the thesis and defend it in the 4th semester. The Master's thesis includes 30 ECTS. The student develops his/her thesis on a topic proposed by a professor from the business administration academic

department.

The Master's degree sessions are set by the Head of the Educational Programme within the time intervals set in the curriculum. The date of thesis defence will be fixed according to the faculty decision which is reflected in faculty meeting minutes. The Examination Commission for thesis defence consists of 5-7 representatives – at least one external expert, others are Department professors. The Examination Commission process is public and open to all stakeholders.

3.3.16 Support to students for learning and training

The BSMA Business and Management Faculty is equipped with all the necessary infrastructure, together with teaching and learning material which supports academic staff and students during the educational process.

The educational programme in frames of Erasmus+ CBHE Project organised laboratory which is also part of the training process.

BSMA infrastructure consists of:

- a Modern library equipped with the latest literature
- SMALOG laboratory
- Navigational simulators
- Turnitin anti-plagiarism system
- E-learning system based on Moodle platform
- Student support services (student life, sport and cultural activities)
- Career support services

3.3.17 Tutor activity

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

3.3.18 Fees

There is a state regulation which fixes tuition fees in state universities of Georgia. For Master programmes the tuition fee is 2250 GEL. There is a possibility to receive state scholarships of 100%, 70%, 50% and 30% depending on the results shown in National exams.

3.3.19 Stages

Internship as part of an educational programme has a duration of four weeks. It is planned and approved by the Faculty Council. After the internship students should provide a written report with an analysis.

3.4 Equipment and material

The BSMA Masters Programme in Logistics uses teaching and learning materials provided in the BSMA library, which is fully sufficient for this educational programme.
The Erasmus+ SmaLog project provides funding for purchasing additional teaching materials and supplies a fully equipped laboratory for Smart City Logistics. The lab will be used in the teaching process, for simulation of processes and research work in related fields.

4 Conclusions

The SmaLog Masters programme applies modern learning methods on courses for students with international experience; research topics are implemented in the field of smart transport and logistics for cities; teachers are involved in international research networks.

The curriculum of the SmaLog Masters programme will be the basic Masters programme at the Business and Management Faculty, which will replace the existing Masters programme in Transport Systems. Despite of this replacement will be held according to the state accreditation standards. The current programme is being updated, to be completed in the coming months.

Students in SmaLog curricula are enrolled in the international mobility and training activities in European partner HEI's.