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# Establishing Modern Master-level Studies in Information Systems

**DEVELOPMENT**

**MPIS Capacity Building**

**Work Package 3 (WP3) Handbook**



**Lead Organisation:**

*University of Maribor (P5),  
Vinnytsia National Technical  
University (P13)*



**MASTIS**



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## 1. INTRODUCTION

### 1.1. Tasks of WP3

According to Project MASTIS Handbook, there are next tasks of WP3:

- 3.1. Train Academic Staff (for Master (month 9; P7); (month 12; P3); for PhD (month 15; P5); for LLL (month 15; P6).
- 3.2. Develop IT Infrastructure (month 8; P11); (month 10-11; all PC); (month 8-11, P7); (month 11; P7).
- 3.3. Develop Teaching Materials (Master for I semester (month 9-12; PC); for II semester (month 13-16; all PC); for III semester (month 17-20; all PC); LLL, PhD (month 21-23; all PC).
- 3.4. Pilot teaching MSc, PhD, LLL (for Master I semester (month 13-15; all PC)); II semester (month 17-20; all PC); III semester (month 24-27; all PC); IV semester (month 29-32; all PC); for LLL, PhD (month 28, 34; all PC).

### 1.2. WP3 description

#### 3.1. Train Academic Staff

EU trainers will prepare trainings for Ukrainian teachers (academic staff) to analyse modern approaches to IT-courses teaching methods, techniques and formats. Meetings in EU to learn modern approaches to IT-courses teaching methods, techniques and formats.

#### 3.2. Develop IT Infrastructure

Nomination of PC teachers, responsible for each course.

#### 3.3. Develop Teaching Materials

Description and development of learning & teaching materials and the main assessment criteria & methods for each course. Publication of teaching materials. Purchase of the books for the courses. Specify, purchase and install the necessary equipment and software. Launch Web-platform. Organize teaching materials exchange.

#### 3.4. Pilot teaching MSc, PhD, LLL

Pilot teaching of Master students according to MPIS. Pilot teaching of PhD students according selective MPIS courses. Pilot training of LLL.

### 1.3. Related assumptions and risks

A: Ministries of Education of PCs & HEIs administration are interested, willing and able to support MPIS implementation;

B: Availability of human resources in PC HEIs which have corresponding to MPIS knowledge and are flexible to learn new courses and apply new teaching methodologies;

C: Students, academic staff, LLL and businesses are willing and able to participate in the project activities and networking;

D: PC HEIs are ready to provide resources (premises etc.) for IT labs;



E: Risk of legislation changes in the field of PCs education systems;

F: Changing in EU and PC visa policies;

G: Lack of mobility & interest of HEIs academic staff & administration & students.

## **2. TRAINING OF ACADEMIC STAFF**

This deliverable will be achieved by the activity 3.1 “Train Academic Staff for Masters”.

This program is expected to be realized during 1st year in “training of the trainers” format that includes lecturers, workshops, master classes, role play & simulation, schools for sharing know-how & experience at EU universities & companies. Including the development of the program & training courses for academic staff dedicated to design of learning and teaching strategies, assessment methods, pedagogical & learning approaches for students, PhD and LLL teaching. The training for PC academic staff will be held at each partnering EU University.

### **2.1. List of Teachers**

All Ukraine and Montenegro partners should determine teachers for all courses which were agreed:



Table 1

Partner	Core Courses & Leading Universities							
	IS Development and Deployment	MIS and Data Warehousing	Enterprise Architecture Management	Management of IS Projects	IT Infrastructure	Innovations and Entrepreneurship	IS Strategy	IS Security
	KPI	KhPI	KSU	KhNUE	VNTU	LPI		
KhNUE	Oleksandr Shcherbakov oleksandr.shcherbakov@hneu.net	Serhii Znakhur darkserg@ukr.net	Oleksii Besedovskiy balex78@gmail.com	Olena Plokha olena.plokha@hneu.net	Oleg Rudenko ro590@yahoo.de	Ganna Plekhanova ganna.plekhanova@hneu.net	Iryna Zolotaryova izolotaryova@gmail.com	Iryna Ushakova varavina.ira@gmail.com
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Partner	Core Courses & Leading Universities							
	IS Development and Deployment	MIS and Data Warehousing	Enterprise Architecture Management	Management of IS Projects	IT Infrastructure	Innovations and Entrepreneurship	IS Strategy	IS Security
LPNU	Oleksa Skorokhoda, oleksa-sow@ukr.net	Anastasia Doroshenko, anastasia.doroshenko@gmail.com	Bohdan Andriietykyi, bohdan.andriietykyi@gmail.com	Ivan Izonin, ivanizonin@gmail.com	Natalia Lotoshynska, natlotsv@gmail.com	Ihor Oleksiv, ol.ih33@gmail.com	Maria Nazarkevych, mar.nazarkevych@gmail.com	Yurii Tsymbal, yurij.tsymbal@gmail.com



## 2.2. Coordination and control of subjects for learning

Before and during the training we should coordinate main subtopics of every training meeting.

Table 2

Place	Date	Topic (from Table 2)	Trainers	Subtopics	Execution note
Lyon	Friday 12 February	EQF, competences, ECTS, Tuning methodology	by Pr. Yury Rashkevich, Lviv Polytechnic National University		Done
Rome	June 2016	Tools and platforms for IS education	Vitaliy Kobets, KSU Paolo Spagnoletti and Silvia Menegazzi, LUISS	<ul style="list-style-type: none"> <li>• Students competencies' requirements of the labor market. Innovation tools and platforms to create competencies</li> <li>• Digital tools for open, collaborative and adaptive learning: current trends in online education</li> </ul>	Done  Done
Kaunas	Wednesday, October 5th	Experiences from study programme's accreditation by the European Quality Assurance Network for Informatics Education (EQANIE).	Agnius Liutkevičius, Head of the Informatics Engineering Study Programme Committee, KTU Ramūnas Kubiliūnas, head of Distance Learning Information Technologies study programme, KTU Gytis Cibulskis, head of the E- Learning Technology Centre, KTU	<ul style="list-style-type: none"> <li>• Experiences from study programmes' self-evaluation</li> <li>• Information Technologies of Distance Education</li> <li>• Advanced Learning Technologies in Higher Education</li> </ul>	Done  Done  Done



Lulea	Wednesday, February 15 <sup>th</sup>	LTU Pedagogical Idea	Tero Päivärinta Oskar Gedda Peter Parnes Ali Awad	<ul style="list-style-type: none"> <li>• Learning Diaries as a form of learning and examination</li> <li>• Virtual teaching environment</li> <li>• Demonstration / Participation in InfoSec Lab</li> </ul>	Done  Done  Done
Munster	April 2017	Methods and didactics to train academic staff	Muhammed Geuad (WWU Münster), Tero Päivärinta (Lulea University)	<ul style="list-style-type: none"> <li>• Pedagogical basics and values (practice-based teaching vs. science-based teaching)</li> <li>• Experiences with industry cooperation in teaching</li> </ul>	Done  Done
Kyiv	Monday, June 27 <sup>th</sup>	Experience of IS Master education in Europe universities	Westfälische Wilhelms-Universität Münster / University of Münster Kęstutis Kapočius, Kaunas University of Technology, João Alvaro Carvalho, University of Minho, Portugal – member of MSIS 2016 team	<ul style="list-style-type: none"> <li>• Master of IS in EU, ERCIS experience</li> <li>• IS Master in MASTIS partner Universities and worldwide</li> </ul>	Done  Done
Maribor					
Grimstad					
Liechtenstein					

### 2.3. Creating and assessment the plan for teachers training

We should discuss and agree the plan to teach and train the teaching staff. Every teacher taking part in the training is added to the plan Table 2 through travels from Table 3 or local internships.

Agenda of each next training meeting (Maribor, Grimstad, Liechtenstein) should include determining the methodic materials of 2-3 core courses. Every Teacher from Table 1 must be included to Tables 2 and 3.



Table 3

Place	Date	Topic	Participants (from Table 1)	Execution note

### 3. DEVELOP IT INFRASTRUCTURE

This deliverable will be achieved by the activity 3.2 “Develop IT Infrastructure”.

#### 3.1. Specify, purchase and install the necessary equipment and software

MASTIS labs is planned to be integrated into PC Universities infrastructure to amplify their training capacity generally and to support the MASTIS project activity particularly.

For fulfilling these tasks, it is necessary: 1) making equipment needs analyses; 2) purchasing necessary equipment, 3) installing & testing equipment; 4) training technical staff in equipment operation and maintenance. These activities are performing by PC project team including academic staff, IT experts and trainers. Complete set of MPIS e-learning components, video-materials, MASTIS platforms with statistics of users; MASTIS labs at 8 PC universities working in accordance with timetable can serve as indicators of progress.

**Procedure applied:** The purchase of this equipment will be financed by the coordinator. However, the individual purchase will be managed by each partner in accordance with the internal procedures of the coordinator. In addition to that, the Grant agreement, the Guidelines for use of grant must be taken into an account.

Each partner must proceed to the public tender in order to find a supplier of requested material. Before the public tender publication, each partner must follow the procedure published in the the Guidelines for the use of grant in order to respect all exigencies of the EACEA related to public tender. In addition to that, each partner must provide the coordinator with at least 3 quotations from 3 different suppliers.

Once the public tender will be achieved, a selected supplier will provide the coordinator with the final quotation stated in EUR and in the VAT free system. The 3 parties’ contract will be signed between the coordinator, the supplier and the partner university in Ukraine. The equipment will be delivered to the partner in Ukraine. After the reception of the material, the partner will send to the coordinator the acknowledgment receipt of the material together with the original of the invoice. The coordinator will then proceed to the payment of the invoice directly to the supplier. On the base of the invoice, the coordinator will proceed to the revision of the total amount of the actual costs assigned to the partner concerned. The difference between the foreseen actual cost and the real actual cost will be reimbursed to the EACEA.

The coordinator will provide the partner with the necessary stickers with the logo of Erasmus + funding once the material has been delivered.



In order to justify the equipment costs, each partner needs to send to the coordinator the following documents:

**Documents to be sent before the equipment purchase:**

- § All documents proving that all exigencies of the public tender were respected
- § Copy of 3 quotations without the VAT and in EUR
- § Copy of any relevant documents that were sending to the ministry level in Ukraine.

**Deadline:** 2 months before equipment purchase

**Documents to be sent after the equipment purchase:**

- § An original of all invoices edited on the name of the University Lumière Lyon 2 (in EUR and VAT free system)
- § Copy of the public tender documents
- § Original of the Acknowledgement receipt of material (signed and stamped by the representing of the partners university)
- § Copy of inventory of the organisation
- § Photo of the material with the logo of the Erasmus+

**Deadline:** 1 month after the reception of the material at latest.

Required Documents for equipment MASTIS from BILATERAL PARTNERSHIP AGREEMENT 7.5.1 Equipment:

- collect at least three quotes from different equipment suppliers;
  - select the quote for the best value for money – minutes of the University on the blank + stamp;
  - send all quotes with required information to the Coordinator.
2. The agreement is signed for the purchase of equipment between the beneficiary and the supplier.
  3. Engagement letter from Lyon 2 for supplier.
  4. Final invoice must be edited on the name of the beneficiary university (delivery address) in “EUR”, excluding taxes in English.
  5. A copy of the inventory OR the certificate signed by the Rector and proving that the equipment is a part of the inventory of the beneficiary university.
  6. Acknowledgment receipt signed by the beneficiary university.
  7. Photos of the material with the logo of Erasmus+.
  8. Bank account details of the supplier in the international format (in agreement).

### **3.2. The Launch of Web-platform**

We have to discuss suggestions about creating and supporting the MASTIS web-portal.

1. According to the first version of the Project Handbook proposition, MASTIS web-portal is designed for: 1) modelling multi-disciplinary & multiple-stakeholder training & research environment; 2) virtual seminars; 3) students’ project teamwork on-line; 4) project developers teamwork on-line 5) students’ “free university” communication; 6) cross-cultural communication of academic, professional, graduates, students to support sustainable interaction after project work. The work of many universities on a single server is not expedient due to issues concerning possible unexpected stops, the need to administrate for very large number of users as well as the needs of adapting the teaching materials to the peculiarities of the programs of different universities. All these issues could become very complicated to deal with, a better approach is for each teacher to solve all of these issues (and more if necessary)



individually, and more effectively through use of his university distance learning system that is habitual for him/her.

2. We suggest creating a portal as a platform to teachers' collaboration: placement of educational materials, exchange of experience, discussion about common themes - for example, on the forum the discussion about masters training process analysis, etc. This goal is the most affordable and viable for finishing of the Project.
3. The portal should provide separate sections for recommended materials for each of the 8 already identified core courses. Moderation of such section is carried out by the partner that is responsible for the discipline - for example VNTU is moderating the block for the *Information technology infrastructure* discipline.
4. Besides the common materials, there should be included: the section of curricula's of Ukrainian partners (+2 from Montenegro), links to additional external resources, toolboxes for checking the quality of learning outcomes (tests, tasks, questions for self-control, etc.).
5. According to the MASTIS documents (Handbook proposition and WPs Results Responsible), the launch of the portal is carried out by LTU and NTUU KPI (Partners P7 and P11).

### 3.3. Requirements to the Web portal and its structure

- Ability to create folders for 8 courses in accordance with section 4.
- Ability to publish educational materials in the formats of text, presentations, spreadsheets, graphics, driving, videos, forms, maps, etc.
- Using calendars for learning processes.
- Publishing announcements, possibility to obtain student feedback.
- Possibility of placing separate sections of courses in sub-portals that are related to the main educational Web portal MASTIS.
- For the sake of stability and reliability, it is desirable to use cloud technologies to create and maintain a portal.

### 3.4. The procedure for administering the Web portal

- The super administrator and coordinator of the Web portal is KPI, on the site of which or on the cloud the portal is placed.
- Persons responsible for sections receive the rights of its administrators.
- The sections administrators may invite and authorize the post / modification / deletion of materials to other project participants.
- Students can access by link or by invitation. Should be resolved by the section administrator.
- Administrators if need have the opportunity to open communication with students - posts, comments, etc.

## 4. DEVELOPING TEACHING MATERIALS

MASTIS Teaching Materials include Bologna-compliant Degree Profile, curriculum for MSc, courses for PhD & LLL comprising in the framework of educational modularization. The framework of curriculum for MSc provide for 8 core courses, elective professional courses, possible internships, participating in the student's science conference and creating the MSc thesis. Each module includes hard & soft competences training, self-testing and case studies from business (real assignments from IT companies). Full circle is crowned by multidisciplinary project teamwork with used the famous software products or environments. Every course is developed by PC experts' team from 8 Universities.



Elective courses developed by each partner will be open at a distance for the students of the network. The assessment will be done by partners' University proposing the course. These elective courses will be included in the Master Degree accreditation.

Course materials with presentations, lectures, e- & video components and self-testing are expected to be indicators of progress.

Working schedules must have:

- A task for each topic;
- Software;
- Education methods;
- Ukrainian and English literature;
- Recent articles on the topic for discussion;
- Learning outcomes are specified for each course.
- Teaching materials, exercises, case studies and knowledge assessment are developed.

Courses can be flexibly used for MSc, PhD & LLL in the context of concrete needs. Every course unit has definite structure including: description of course aims; glossary; lists of used & recommended literature; introduction & summary; hyperlinks; questions & tasks for self-testing; answer keys.

Teaching materials and e-components will be included in the knowledge database.

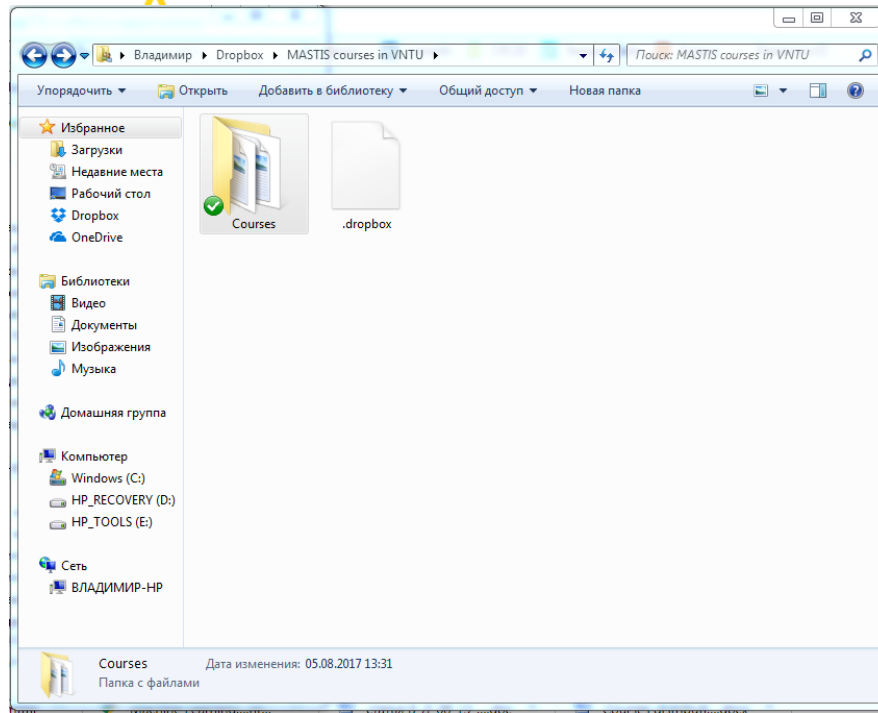
Every partner sends all courses to company representatives, concentration on the course a partner is responsible for. Then the means of participation of company representative are discussed (lectures, trainings, etc.)

All teaching components should be translated in English.

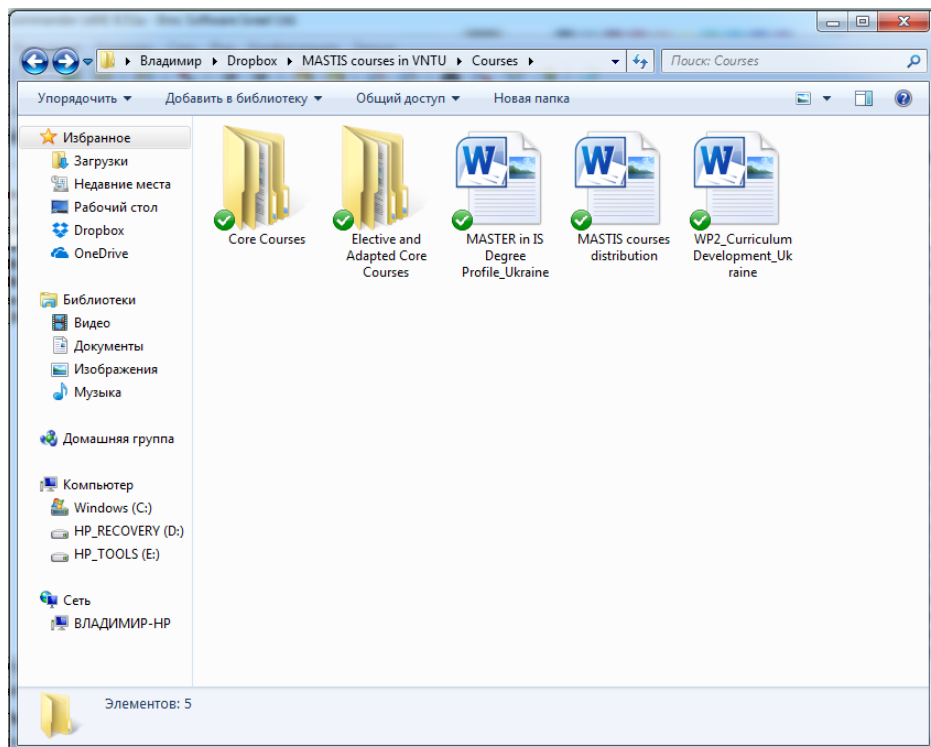
#### **4.1. Preparation and collection of teaching materials**

Each curriculum for each discipline must be prepared and placed in the appropriate section of the portal by each partner before the 1st or 2nd semester of 2017-18 academic year.

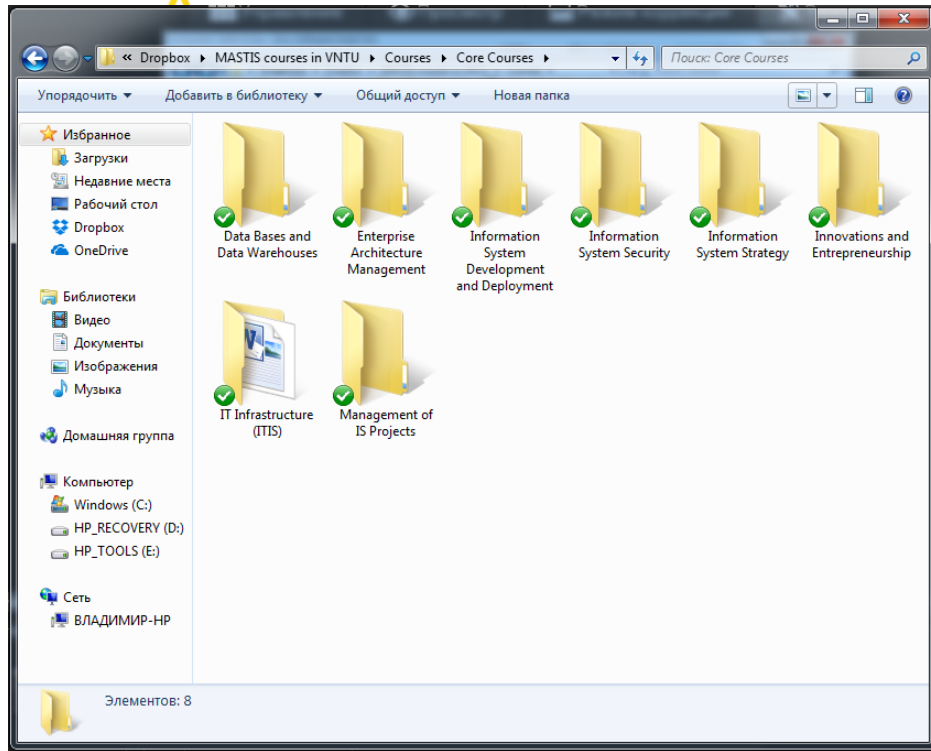
Before the portal has launched, all training materials should be uploaded to the <Dropbox-MASTIS-Courses> folder.



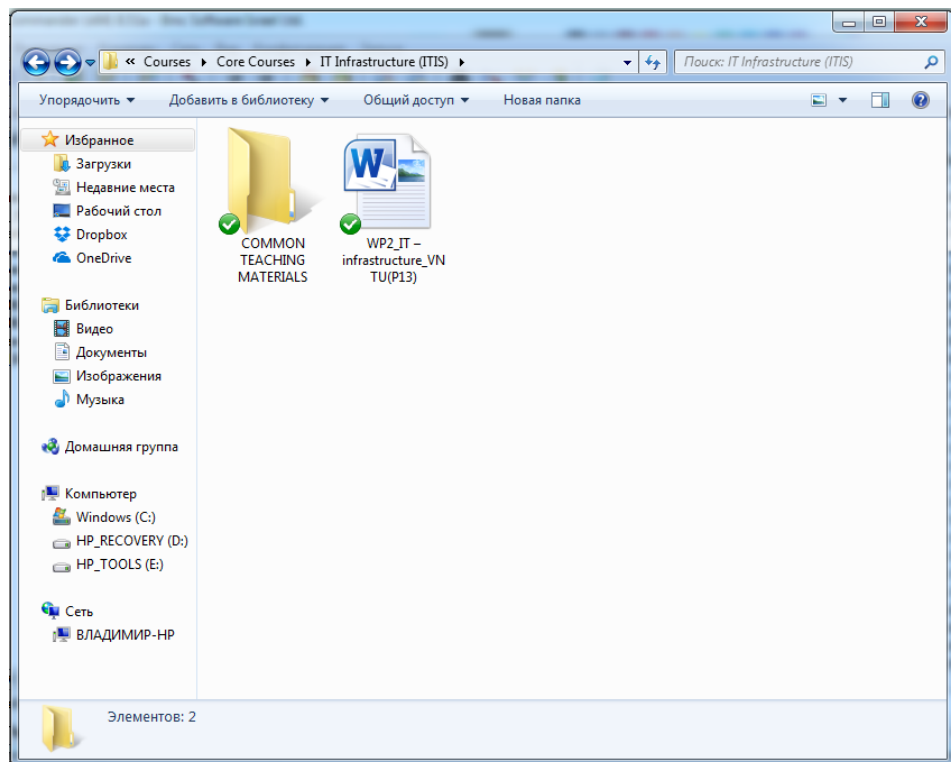
For this purpose, the general materials of the MASTIS project are placed in the <Dropbox-MASTIS-Courses> folder, and the following structure is created. Folders are created for general materials of core courses and for elective courses, as well as adapted to the peculiarities of different universities and their courses.



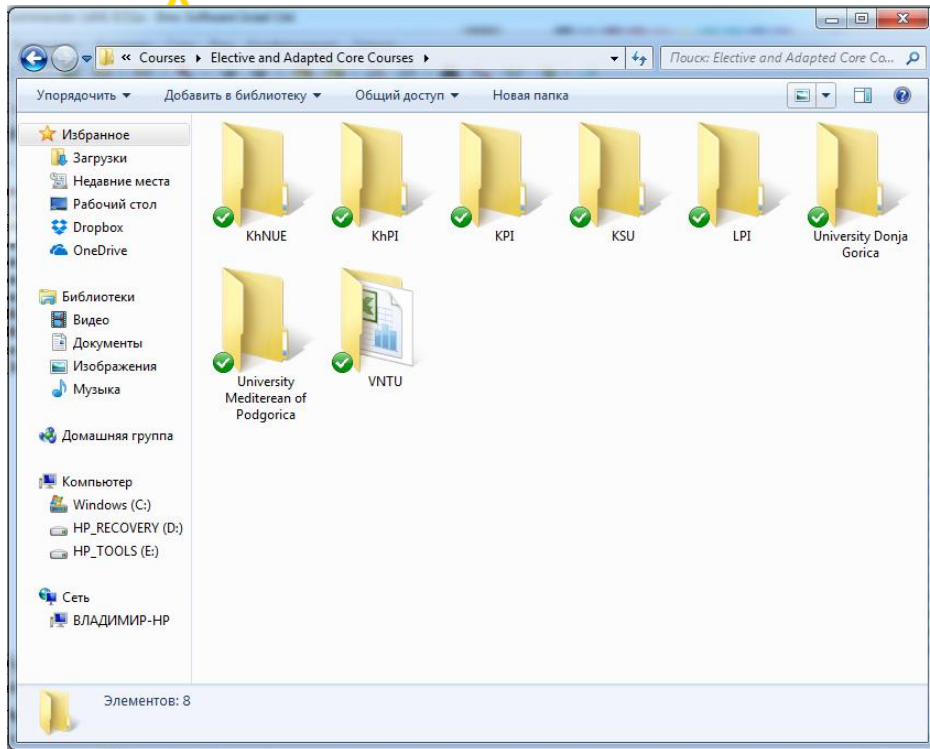
Folders for all core courses are created in the folder <Dropbox-MASTIS-Courses-Core Courses>.



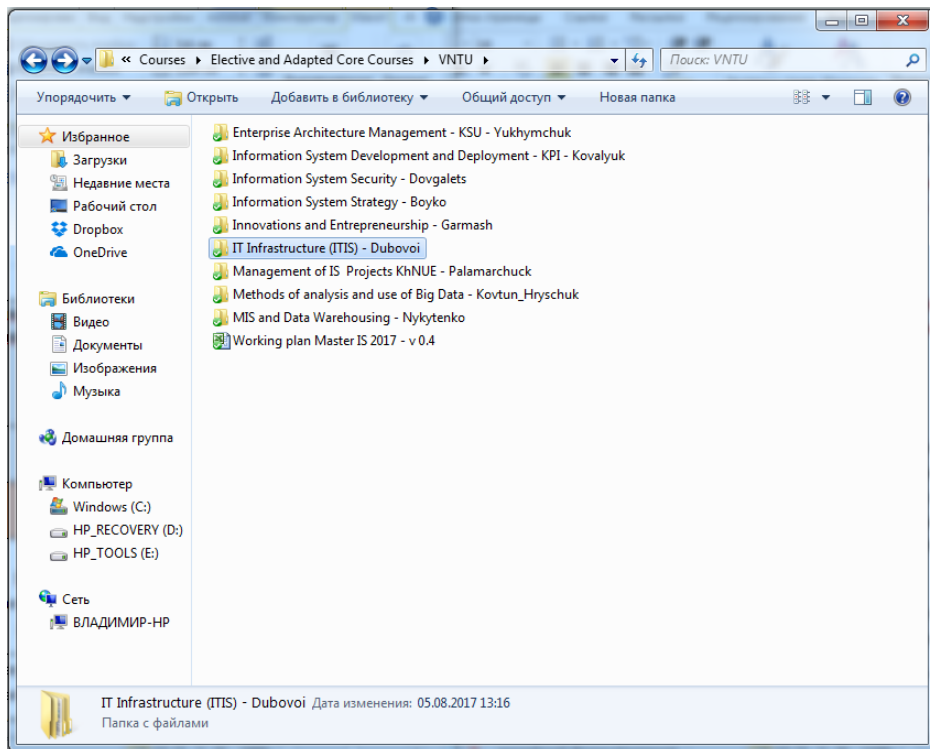
<Core Courses> folders contain Curriculums, developed in the MASTIS project, as well as teaching materials, which have been tested and recommended for common use. For example, for the "IT infrastructure" course



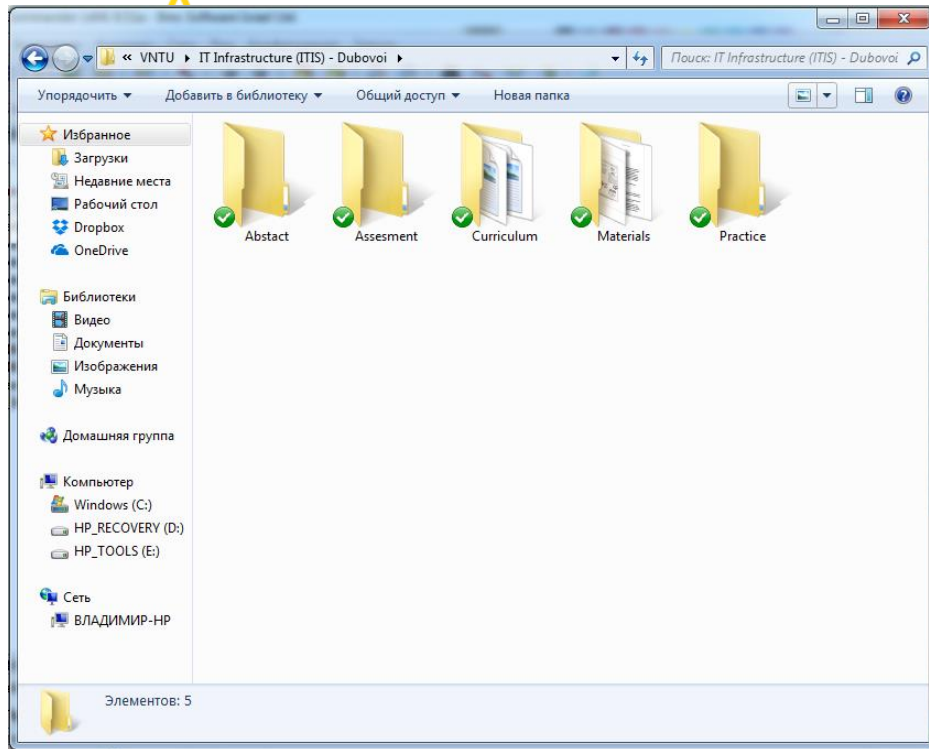
For elective courses as well as for adapted core courses in the folder <Dropbox-MASTIS-Courses-Elective and Adapted> the folders for every university are created.



In these folders University’s plans (curriculums) should be uploaded and folders for every course are created. The working plan Masters IS 2017 is presented in Appendix A.



This is the folder for some of the *Adapted Core Courses*:

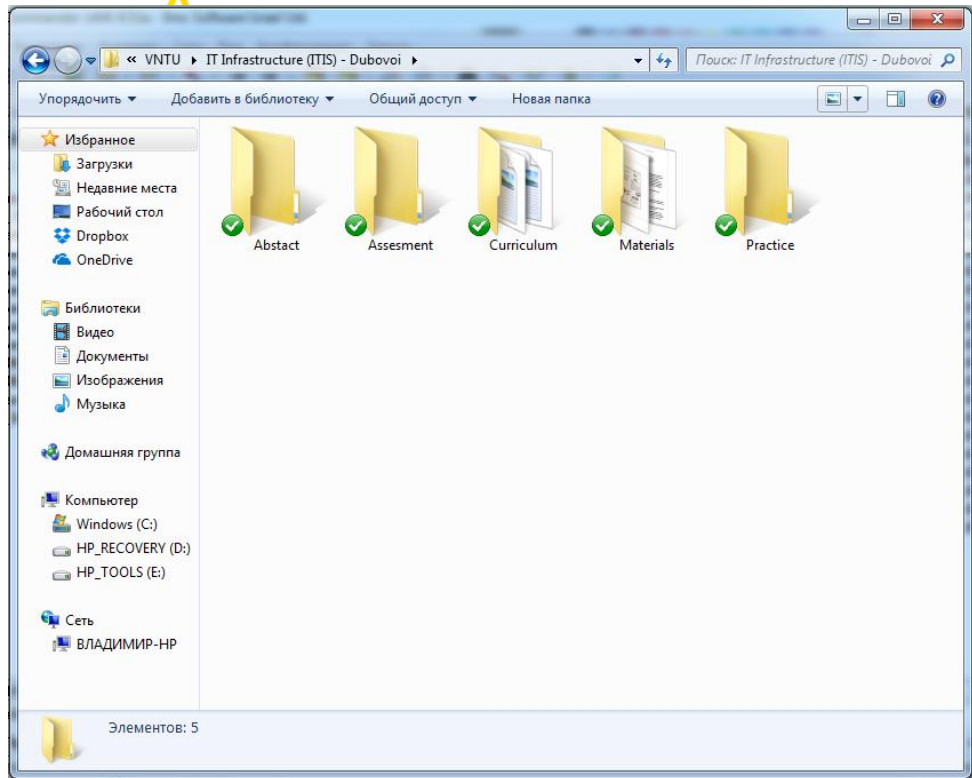


## 4.2. Plan for filling each curriculum with teaching materials

All partners take part in description and development of learning & teaching materials and the main assessment criteria & methods for each course.

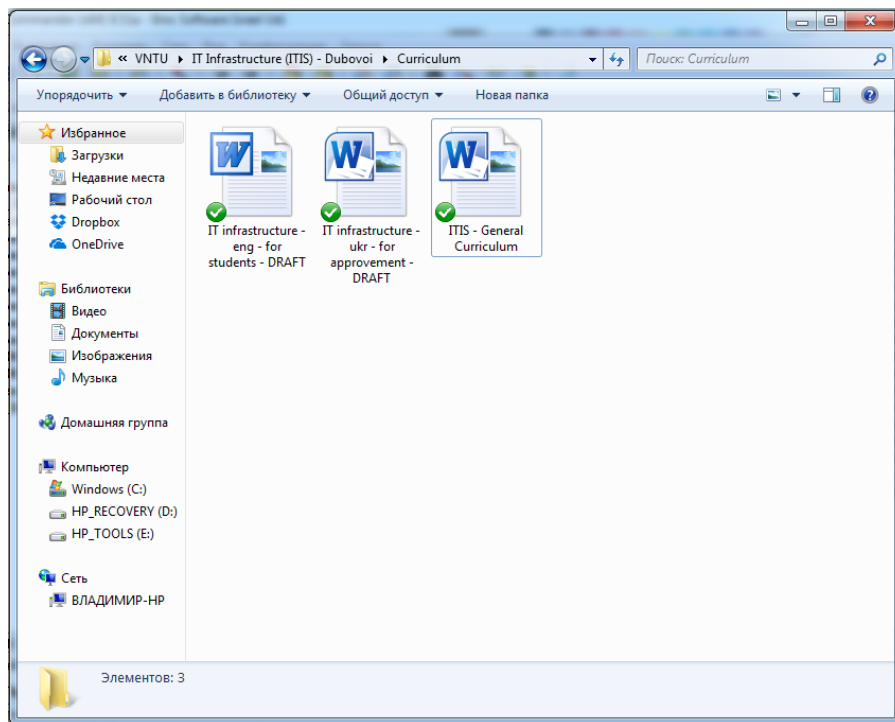
During the relevant semester, the course is filled with both each university's own and common educational materials (presentations, lectures, e- & video components, self-testing). The groups of 8 leading teachers for each course are organized to discuss and make decisions on filling the core of the curriculum.

For uploading teaching materials the folders <Curriculum>, <Abstract>, <Practice>, <Assessment>, <Materials> are created in the folder of each course at each university.

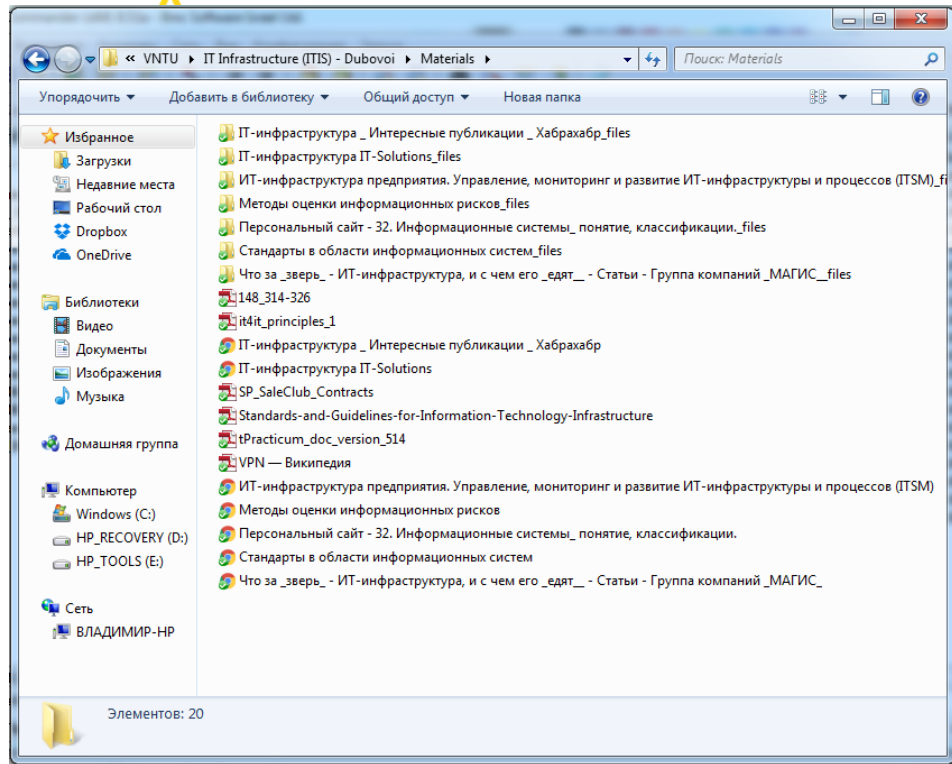


In the folder <Curriculum> of each course, the curriculums of three types are placed:

- General Curriculum (approved in MASTIS project)
- Curriculum for accreditation (with the Ukrainian educational standards)
- Curriculum for students (short curriculum in English)



The folder <Materials> is intended for additional materials to support course learning and teaching.



### 4.3. Using modern methods of education

Main method of education for students pursuing Master's degree is individual analytical and group project work, group discussions about achieved analytical and project results on seminars, research on the topic of Master's research paper with preparing of scientific articles.

#### Seminar style and papers

- Student-led class discussions;
- Based on critical review papers – for each course;
- address of the following questions:
  - What is the main argument of the article(s)? How does the author support this argument?
  - What are the strengths and weaknesses of the assigned readings? Do they offer theoretical insights?
  - What important questions are addressed by the readings? Are these questions important in terms of practical politics or theoretical development?
  - What important questions are neglected? What kinds of further research are suggested based on what the readings do or do not tell us?
- Students graded on quality of class discussion and on review papers.

#### Scientific article on the topic of Master's research paper

**Research paper goal:** the paper assignment is designed to make all participating students familiar with the process of writing a scientific journal article.

#### Paper structure:

- Introduction



This section summarizes what the issue is, why it is important, (briefly) how it has been addressed so far, how your work extends the literature and your results.

- Literature Review

The literature review is a summary of basic related findings in the literature (NOT a detailed summary of all of the contents of a couple of articles), with critiques and commentaries. (You should use at least 5 journal articles). The literature review is used to set up your own argument – showing where you will build upon some works and also where you will differ.

- Your Policy Suggestion (**This is the most important part of the paper** and will be graded accordingly)

This part uses economic, computer, mathematical science and/or sociological logic (and potentially economic or theoretic models) to specify an alternative to the current solution and to solutions proposed in the literature. *Be sure to extensively defend how and why this solution works.*

- Conclusion

The conclusion is a summary of the main conclusions of the paper and comments about issues that could be extended in future research.

- References: A complete bibliography

Throughout the class, drafts of the paper will be due. Each draft will be graded. All research papers should be presented in class.

#### **4.4. Publication of teaching materials**

Approved in MASTIS project teaching materials should be published in English by the universities which are responsible for developing the relevant course.

Purchase of the books for the courses is free of charge and can be done from the project web-portal.

#### **4.5. Control of the filling of each curriculum with the teaching materials**

Control of the sections for filling each course by the responsible partners is done through the WEB-portal (before the portal launching the control is carried out through Dropbox-MASTIS-Courses)

For operative control, the <Dropbox-MASTIS-Courses> folder contains the table "Appendix B"

The terms for the preparation of training materials should be agreed upon in the working groups.

General supervision of the development of teaching materials and use of Portal (while Portal is not ready – on Dropbox) should do the NTUU KPI partner.

### **5. PILOT TEACHING MSc, PhD, LONG LIFE LEARNING**

2 years MASTIS pilot training for MSc, PhD, LLL in IS is aimed at developing professional knowledge & skills in IS; soft competences and self-development, efficient communication and decision-making, teamwork; practical skills of using distance & e-learning resources; working in MOOCs.

Training is combining lectures, practical exercises, case studies, simulations, modelling field trips, project work, internship, research & professional thesis.



It is expected to involve students into practical activity on the bases of partnership with EU & PC enterprises; organizing series of International video conferences with participation of EU professors & professionals; developing bases for sustainable exchange program for PhD students by organizing thematic research groups that can integrate into European Research Area (ERA).

20 MSc, PhD, LLL students trained at 8 PC & documents certifying their competence gained within project pilot phase can be considered as indicators of progress.

### 5.1. Identifying the training contingent - separately for the MSc, PhD, Long Life Learning

For the 2017-2018 academic year each partner is determining the list of 10 or more IS Masters Students. Also need to determine lists of PhD and LLL students that should to study one or more from 8 core courses together with IS Masters Students in the 2017-2018 academic year. LLL student can be teacher of local universities who need to traineeship on the subject of one of the core courses.

All Ukraine and Montenegro partners should determine lists of MSc, PhD, LLL students which were agreed:

Table 3

University	Name	Category	Courses								
			1	2	3	4	5	6	7	8	
Vinnytsia National Technical University	1.	MSc	•	•	•	•	•	•	•	•	•
	2.	MSc	•	•	•	•	•	•	•	•	•
	3.	MSc	•	•	•	•	•	•	•	•	•
	4.	MSc	•	•	•	•	•	•	•	•	•
	5.	MSc	•	•	•	•	•	•	•	•	•
	6.	MSc	•	•	•	•	•	•	•	•	•
	7.	MSc	•	•	•	•	•	•	•	•	•
	8.	MSc	•	•	•	•	•	•	•	•	•
	9.	MSc	•	•	•	•	•	•	•	•	•
	10.	MSc	•	•	•	•	•	•	•	•	•
	11.	MSc	•	•	•	•	•	•	•	•	•
	12.	MSc	•	•	•	•	•	•	•	•	•
	13.	PhD			•		•				
	14.	PhD	•								
	15.	LLL				•				•	
	...										
	20.	LLL		•			•	•			

### 5.2. Making syllabuses and schedules of learning process for each category (MSc, PhD, LLL)

IS Master's learning in the 2017-18 school year is aimed at obtaining official educational documents of level of the State sample. To do this, it is necessary to create syllabuses & schedules of learning process and place them in the university's sections on the Web portal (section 4). The learning process and the results of its assessment must comply with all university standards.



Training of PhD & LLL students at the separate disciplines is carried out together with IS Masters Students. The results of the training do not require the receipt of official documents of the state sample, it is enough to fix them into the individual curriculum and to give the certificates at the university level to the PhD & LLL students.

### **5.3. Assessment the learning process for each category (MSc, PhD, LLL)**

For all categories of students, it is necessary to draw up a control plan. Each Ukraine and Montenegro partner should place this plan in the own university's section on the MASTIS Web portal (section 4).

We also should to develop:

- Instruction for piloting of course and a form of a report on piloting, highlighting the positive features, features that need improvement.
- Instruction for course quality grading - before starting piloting.



## APPENDIX A

### VINNYTSIA NATIONAL TECHNICAL UNIVERSITY INFORMATION SYSTEMS AND INTERNET OF THINGS

#### MASTER PROGRAMME CURRICULA

##### Full-time studies

Code	Course	Cr.	Contact hrs	FC*	Semester			Coordinating Lecturer
					1	2	3	
<b>Core Courses</b>								
CC1	IS Development and Deployment	5	40	E	x			Assoc. Prof. O. Kovalyuk
CC2	IT Infrastructure	5	40	E		x		Prof. V. Dubovoj
CC3	Enterprise Architecture Management	5	40	E	x			Assoc. Prof. M. Yuhymchuk
CC4	MIS and Data Warehousing	5	40	E		x		Assoc. Prof. O. Nykytenko
CC5	IS Security	5	40	E	x			Prof. S. Dovgalets
CC6	Innovations and Entrepreneurship	5	40	E		x		Assoc. Prof. V. Garmash
CC7	IS Strategy	5	40	E	x			Assoc. Prof. O. Boyko
CC8	Management of IS Projects	5	40	E		x		Assoc. Prof. Y. Palamarchuck
<b>Total of Credits:</b>		<b>40</b>			<b>20</b>	<b>20</b>		
<b>Elective Courses</b>								
MM1	Economic justification of innovative solutions in the field of automation and instrumentation	3	24	GT	x			
MM2	Methods of "Big data" analysis and use	5.5	44	E		x		Assoc. Prof. T. Gryshhuk & V. Kovtun
MM3	Mechatronic Systems on the Internet of Things	5.5	44	GT	x			Assoc. Prof. V. Papinov
MM4	Elective course from university pool 1	3	24	GT	x(1.5)	x(1.5)		
MM5	Elective course from university pool 2	3	24	GT		x		
<b>Total of Credits:</b>		<b>20</b>			<b>10</b>	<b>10</b>		
<b>Final Degree Project</b>								
SA1	Pre-diploma Practice and Final Degree Project (Master's Thesis)	30		Rep			s	
<b>Total of Credits:</b>		<b>30</b>					<b>30</b>	
<b>Total of Credits</b>								
Per Study Programme and per Semester		<b>90</b>			<b>30</b>	<b>30</b>	<b>30</b>	

FC\* – The form of the Final Control:

E - Exam

GT – Grading Test

Rep - Report





2	(5,5 ECTS)																			
	Business Process Management (15 ECTS)	IT IS (5 ECTS)	20.07.2017	<a href="#">..\..\..\Dropbox\MASTIS courses in VNTU\Courses\Elective and Adapted Core Courses\VNTU\IT Infrastructure (ITIS) - Dubovoi\Curriculum\ITIS - General Curriculum.docx</a>	30.09.2017	<a href="#">..\..\..\Dropbox\MASTIS courses in VNTU\Courses\Elective and Adapted Core Courses\VNTU\IT Infrastructure (ITIS) - Dubovoi\Curriculum\IT infrastructure - ukr - for approval - DRAFT.docx</a>	1.09.2017	<a href="#">..\..\..\Dropbox\MASTIS courses in VNTU\Courses\Elective and Adapted Core Courses\VNTU\IT Infrastructure (ITIS) - Dubovoi\Curriculum\IT infrastructure - eng - for students - DRAFT.doc</a>												
		IE (5 ECTS)																		
		MISP (5 ECTS)																		
		Data Science (5 ECTS)	DBDW (5 ECTS)																	
	elective professional courses (5,5 ECTS)	BDAU (5,5 ECTS)																		
...	...																			
	...																			