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**Establishing Modern Master-level Studies in Information Systems
561592-EPP-1-2015-1- FR-EPPKA2-CBHE-JP**

**WP2
Information Systems Development and Deployment**

Kyiv 2017

Tabl. 1**List of Competences**

Competences Area	Competences
Systems Development and Deployment	1. Managing plan-based, hybrid, and agile development approaches
	2. Specifying and documenting systems requirements
	3. Managing IS development projects
Data, Information and Content Management	4. Selecting appropriate data management technologies based on the needs of the domain
	5. Integrating and preparing data captured from various sources for analytical use
	6. Selecting and using appropriate analytics methods
Innovation, Organizational Change and Entrepreneurship	7. Developing a business plan
	8. Understanding how to apply creative problem solving to technology-related issues
IS Strategy and Governance	9. Engaging in IS strategic planning
	10. Planning and implementing IS governance
Enterprise Architecture	11. Understanding enterprise architecture principles and the value it provides to business
	12. Communicating and deploying an EA
Business Continuity and Information Assurance	13. Implementing and managing quality audit processes
	14. Managing Information Systems risks
IS Management and Operations	15. Managing IS/IT projects and programs
IT Infrastructure	16. Monitoring emerging technologies to understand their potential to support the domain

Tabl. 2

List of Programme learning Outcomes

No	Professional Learning Outcomes	P
1.	to understand essential concepts, facts, principles, and theories of information system	P1
2.	to understand the diversity and state-of-the-art in area of information system	P2
3.	to be able to analyze, model, and evaluate organization's business processes from the perspective of information systems development	P3
4.	to be able to apply various methods of information systems analysis	P4
5.	to understand problems of users of information systems, to be able to identify, analyze and specify user requirements	P5
6.	to be able to manage information systems development projects and identify, analyze, evaluate, and solve the arising management problems	P6
7.	to be able to identify, analyze, and understand unorthodox problems of information systems development	P7
8.	to be able to apply various methods of information systems design	P8
9.	to be able to apply methods of knowledge, metadata analysis and information safety engineering	P9
10.	to be able to identify, find and evaluate information relevant to information systems by using data bases and other sources of information	P10
11.	to be able to apply various computerized tools for model driven information systems analysis and design	P11
12.	to be able to choose and apply various technologies of information systems' development	P12
13.	to be able to apply various tools for management of information systems projects	P13
14.	to be able to develop innovative decisions for IT business creation and support	P14
Personal and Social Learning Outcomes		
15.	to be able to think systematically when analysing different situations, solving problems and tasks	PS1
16.	to be able to apply the acquired knowledge creatively	PS2
17.	to be able to work individually with minimum guidance, manage one's work and time	PS3
18.	to be able to work efficiently in a group, manage the team, and act collectively	PS4
19.	to be able to understand the impact of information systems solutions on the society and environment and their economic aspects	PS5

Tabl.3

Correlation matrix of Competences and Programme learning Outcomes

Competencies/ Learning Outcomes	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	PS1	PS2	PS3	PS4	PS5
1. Managing plan-based, hybrid, and agile development approaches	x	X						x		x	x	x	x	x	x	x	x	x	x
2. Specifying and documenting systems requirements	x	x			x					x					x	x	x	x	x
3. Managing IS development projects					x			x		x	x	x	x		x	x	x	x	x
4. Selecting appropriate data management technologies based on the needs of the domain	x	x							x	x	x	x			x	x	x	x	x
5. Integrating and preparing data captured from various sources for analytical use	x	x							x	x	x	x			x	x	x	x	x
6. Selecting and using appropriate analytics methods	x	x	x				x		x	x	x				x	x	x	x	x
7. Developing a business plan	x	x					x			x	x			x	x	x	x	x	x
8. Understanding how to apply creative problem solving to technology-related issues	x	x					x			x	x			x	x	x	x	x	x

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Competencies/ Learning Outcomes	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	PS1	PS2	PS3	PS4	PS5
9. Engaging in IS strategic planning	x	x	x			x				x	x			x	x	x	x	x	x
10. Planning and implementing IS governance	x	x				x				x	x		x	x	x	x	x	x	x
11. Understanding enterprise architecture principles and the value it provides to business	x		x	x						x					x	x	x	x	x
12. Communicating and deploying an EA	x		x							x	x				x	x	x	x	x
13. Implementing and managing quality audit processes	x		x	x			x		x	x					x	x	x	x	x
14. Managing Information Systems risks	x		x	x		x	x		x	x	x				x	x	x	x	x
15. Managing IS/IT projects and programs	x				x	x				x	x	x	x		x	x	x	x	x
16. Monitoring emerging technologies to understand their potential to support the domain	x			x			x			x					x	x	x	x	x

Tabl.4

Correlation matrix of Programme Learning Outcomes and Courses

Programme Learning Outcomes	Courses							
	IS Development and Deployment	MIS and Data Warehousing	Enterprise Architecture Management	Management of IS Projects	Enterprise Architecture Management	IS Strategy	IT Infrastructure	Innovations and Entrepreneurship
1	2	3	4	5	6	7	8	9
to understand essential concepts, facts, principles, and theories of information system	x			x				
to understand the diversity and state-of-the-art in area of information system	x							
to be able to analyse, model, and evaluate organization's business processes from the perspective of information systems development				x				
to be able to apply various methods of information systems analysis								

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1	2	3	4	5	6	7	8	9
to understand problems of users of information systems, to be able to identify, analyse and specify user requirements	x			x				
to be able to manage information systems development projects and identify, analyse, evaluate, and solve the arising management problems				x				
to be able to identify, analyse, and understand unorthodox problems of information systems development								
to be able to apply various methods of information systems design	x			x				
to be able to apply methods of knowledge, metadata analysis and information safety engineering								

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1	2	3	4	5	6	7	8	9
to be able to identify, find and evaluate information relevant to information systems by using data bases and other sources of information	x			x				
to be able to apply various computerized tools for model driven information systems analysis and design	x			x				
to be able to choose and apply various technologies of information systems' development	x							
to be able to apply various tools for management of information systems projects	x			x				
to be able to develop innovative decisions for IT business creation and support	x							

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1	2	3	4	5	6	7	8	9
to be able to think systematically when analysing different situations, solving problems and tasks	x			x				
to be able to apply the acquired knowledge creatively	x			x				
to be able to work individually with minimum guidance, manage one's work and time	x			x				
to be able to work efficiently in a group, manage the team, and act collectively	x			x				
to be able to understand the impact of information systems solutions on the society and environment and their economic aspects	x			x				

Course Descriptors

Course title:	IS Development and Deployment
Course unit code	SDAD
Course Program:	MPIS
University delivering the course:	Igor Sikorsky KPI
Type of course unit	Core course
Level of course unit	Masters level
Number of ECTS credits allocated	5 Credits (150 hours of student work)
Mode of delivery	lectures, workshop, business games, independent work, distance learning...

Module Structure:

No	Type	Course	CP (h)	Presence (h)	Self-Study (h)
1	Course	IS Development and Deployment	150	54	98

Relevant Work:

Number and Type; Connection to Course	Duration	Part of final mark in %
Final Written Exam	120 min.	60 %
4 Exercises, case study with presentation	Each 10 pages + 20 min. presentation	40 %

Tabl.5

List of Course Learning Outcomes (IS Development and Deployment (SDAD))(Igor Sikorsky KPI)

Code of Learning Outcomes	Course Learning Outcomes
SDAD1	to understand, determine and implement the basic SDAD principles, methodologies, technologies and systems development approaches.
SDAD2	to be able to apply key DevOps concepts to integrate between development and operations, determine their relevance to specific domain.
SDAD3	to be able to analyze, modelling and evaluate business processes of the customer organization for their adaptation to IS development and deployment capabilities
SDAD4	to be able to analyze, evaluate and manage risks associated with various design and implementation alternatives
SDAD5	to be able to select appropriate requirements specification methods considering the system type, organizational context, and selected systems development approach
SDAD6	to be able to estimate costs of various system design and implementation alternatives using formal estimation techniques appropriate to the systems development approach.
SDAD7	to be able to analyze the domain impact of various design and implementation alternatives.
SDAD8	to be able to implement processes of IS development and deployment (planning, analysis requirements, design, Implementation, support, ongoing activities)
SDAD9	to be able to use a modern application development environment to produce an IS artifact based on relevant design documentation.
SDAD10	to be able to implement and test the IS application
SDAD11	to be able to install, integrate and configure the IS applications
SDAD12	to be able to acquire IS applications from the market
SDAD13	to be able to manage external systems development resources
SDAD14	to be able to make decision and take responsibility for them
SDAD15	to be able to argue, justify and present their decision and plans

Tabl.6

Correlation matrix of Programme Learning Outcomes and Course Learning Outcomes (IS Development and Deployment (SDAD)_from_Igor Sikorsky KPI)

Code of Programme Learning Outcomes	Programme Learning Outcomes	Course Learning Outcomes	Code of Course Learning Outcomes
1.	2.	3.	4.
Professional Learning Outcomes			
P1	to understand essential concepts, facts, principles, and theories of information system	to understand, determine and implement the basic SDAD principles, methodologies, technologies and systems development approaches.	SDAD1
		to be able to apply key DevOps concepts to integrate between development and operations, determine their relevance to specific domain.	SDAD2
P3	to be able to analyze, model, and evaluate organization's business processes from the perspective of information systems development	to be able to analyze, modelling and evaluate business processes of the customer organization for their adaptation to IS development and deployment capabilities	SDAD3
P4	to be able to apply various methods of information systems analysis	to be able to analyze, evaluate and manage risks associated with various design and implementation alternatives	SDAD4
P5	to understand problems of users of information systems, to be able to identify, analyze, specify user requirements	to be able to select appropriate requirements specification methods considering the system type, organizational context, and selected systems development approach	SDAD5
P8	to be able to apply various methods of information systems design	to be able to estimate costs of various system design and implementation alternatives using formal estimation techniques appropriate to the systems development approach.	SDAD6
		to be able to analyze the domain impact of various design and implementation alternatives.	SDAD7
P10	to be able to identify, find and evaluate information relevant to information systems by using data bases and other sources of information	to be able to implement processes of IS development and deployment (planning, analysis requirements, design, Implementation, support, ongoing activities)	SDAD8

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Code of Programme Learning Outcomes	Programme Learning Outcomes	Course Learning Outcomes	Code of Course Learning Outcomes
1.	2.	3.	4.
P11	to be able to apply various computerized tools for model driven information systems analysis and design	to be able to use a modern application development environment to produce an IS artifact based on relevant design documentation.	SDAD9
P12	to be able to choose and apply various technologies of information systems' development	to be able to implement and test the IS application	SDAD10
		to be able to install, integrate and configure the IS applications	SDAD11
		to be able to acquire IS applications from the market	SDAD12
		to be able to manage external systems development resources	SDAD13
Personal & Social Learning Outcomes			
PS1	to be able to think systematically when analysing different situations, solving problems and tasks	to be able to make decision and take responsibility for them	SDAD14
PS2	to be able to apply the acquired knowledge creatively	to be able to make decision and take responsibility for them	SDAD14
		to be able to argue, justify and present their decision and plans	SDAD15
PS3	to be able to work individually with minimum guidance, manage one's work and time	to be able to argue, justify and present their decision and plans	SDAD15
PS4	to be able to work efficiently in a group, manage the team, and act collectively	to be able to make decision and take responsibility for them	SDAD14
PS5	to be able to understand the impact of information systems solutions on the society and environment and their economic aspects	to be able to argue, justify and present their decision and plans	SDAD15

Tabl.7

IS Development and Deployment Outcomes (Igor Sikorsky KPI)

Themes	Theoretical component	Practical component	Learning Objectives	Learning Outcomes	
				Professional	Personal & Social
1	2	3	4	5	6
Module 1. Information System Analysis and Development Approaches					
Topic 1. Introduction into Information System (IS) Development	1.1 What is an IS 1.2 Types of IS 1.3 IS Development 1.4 IS Development Life Cycle (SDLC)	<i>Using Enterprise Architect (Power Designer and other tool) as a tool for understanding the concept of SDLC methodology</i>	p. 85. Analyze the effect and impact of IS on industries, firms, and institutions.	SDAD1	SDAD14 SDAD15
Topic 2. Business analysis of IS Requirements	2.1 Business and User Requirements 2.1 Requirements planning and management 2.2 Requirements elicitation (techniques for collecting requirements) 2.3 Requirements analysis and documentation 2.4 Requirements communication	Using UML for Identification business needs of organization/ Using standards (ISO 15288, ISO 12207) for analyze and specify requirements for IT artefacts. Using standards IDEF0, IDEF3 and DFD for analyze business processes	Identify business needs of organization; p. 90. Analyze and specify requirements for IT artifacts through study and documentation of the whole or of part of some form of domain activities (e.g., work unit, work team, process, organization, market, society setting) in terms of the actions they involve and the information they deal with; 76a. Select appropriate data collection methods and techniques for the investigation of domain activities. 76c. Involve stakeholders in the investigation process, leading to a shared	SDAD3 SDAD5	SDAD14 SDAD15

1	2	3	4	5	6
			understanding of the domain activities; ensure that stakeholders have a shared understanding of the requirements and how they will be implemented;		
Topic 3. IS Analysis	3.1 IS Analysis basics 3.2 IS Analysis Methods 3.3 IS Analysis Goals 3.4 IS Structured Analysis and Tools	Using UML for Identification business needs of organization/ Using standards (ISO 15288, ISO 12207) for analyze and specify requirements for IT artefacts. Using standards IDEF0, IDEF3 and DFD for analyze business processes	Analyze requirements and specify software and systems; 78a. Identify multiple alternatives for systems design and implementation based on requirements and the systems development approach; 78b. Select the most appropriate systems design and implementation approach in a specific organizational and system context; 86a. Search for suitable solutions and vendors	SDAD4 SDAD5 SDAD6 SDAD7	SDAD14 SDAD15
Module 2. <i>Managing of Information System Development</i>					
Topic 1. Management of IS Development Processes	1.1. Managing Methodologies of IS Development Process 1.2. Agile development 1.3. Enterprise resource planning (ERP) system	Using business games for training scrum technology	82. Select between systems development approaches 82a. Determine the organizational and domain constraints to the use of plan-based, hybrid, and agile development approaches; 82b. Select a development approach for the organization and a system context; 83a. Manage a simple project following one of the key development approaches. 79d. Establish and maintain a communication model that is appropriate	SDAD8	SDAD14

1	2	3	4	5	6
			to the systems development approach with various stakeholders		
Topic 2. Management of Team Development Process	1.1. Stages of team development 1.2. Methods of team management 1.3 Problems in team management 1.4 Elements of a healthy and successful team 1.5 Resolving problems through team management 1.6 Leadership styles in team management	Using business games for training activities and team building for personal and corporate development	PS4. work efficiently in a group, manage the team, and act collectively; p 32. Manage projects to achieve optimal performance conforming to original specifications. Responsible for achieving optimal results; conforming to standards for quality, safety; and sustainability and complying with defined scope and schedule.	SDAD8	SDAD14 SDAD15
Topic 3. DevOps concepts in the IS Development Process	1.1. DevOps overview 1.2. Challenges for Development and Operations Team	Using DevOps tools for monitoring executions of repeated jobs, monitoring systems, cluster and grid monitoring capabilities, real-time traffic analysis and other	83b. Apply key DevOps concepts to integrate between development and operations and determine when they are relevant for application in a specific domain; 83c. Apply DevOps effectively.	SDAD2	SDAD14 SDAD15
Module 3. Information System Design and Development					
Topic 1. IS Development Methods	1.1 Data-Driven Methodology 1.2 Data Architectures 1.3 Prototyping 1.4 Business Information System Generators	Using Oracle Designer (Power Designer, Enterprise Architect, AllFusion (BPWIN, ERWIN) and other tools) for analysis, design and	84a. Use a modern application development environment to produce an IS artifact based on relevant design documentation. 84b. Select a development approach appropriate to the characteristics of the IS	SDAD9 SDAD10	SDAD14 SDAD15

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1	2	3	4	5	6
		development IS	application under consideration and to the existing resources and development team and conditions.		
Topic 2. IS Design	1.1 Design Concepts & Considerations 1.2 Modelling languages 1.3 Design patterns	Using Oracle Designer (Power Designer, Enterprise Architect, AllFusion (BPWIN, ERWIN) and other tools) for analysis, design and development IS	78a. Identify multiple alternatives for systems design and implementation based on requirements and the systems development approach. 79b. Design the architecture and the components of IS artifacts.	SDAD6 SDAD10	SDAD14 SDAD15
Topic 3. Modern IS Development Approach	3.1 Usage of development methodologies on practice. 3.2 Choose of appropriate environment, platform and technologies for IS Development. 3.3 Technical documentation	Using Oracle Designer (Power Designer, Enterprise Architect, AllFusion (BPWIN, ERWIN) and other tools) for analysis, design and development IS	81. Implementing a systems solution using a modern programming language 84a. Use a modern application development environment to produce an IS artifact based on relevant design documentation. 84c. Plan development work according to the principles and guidelines of the selected development approach. 84d. Document the implemented product for later reference and maintenance	SDAD9 SDAD10	SDAD14 SDAD15
Topic 4. Usage of Vendor Solutions	4.1 Acquiring IS Applications from the Market 4.2 Software license policies and procedures 4.3 Management of external systems development resources	Choose the best tools for your IS. Analyze their licenses. Justify the use of the selected tools. Are they suitable for your system? Form a list of licenses for each tool that you use in your IS.	86. Acquiring IS applications from the market. 86a. Search for suitable solutions and vendors. 86b. Assess and select solutions and the way they are provided (licensing, SaaS, etc.) 87. Managing external systems	SDAD12 SDAD13	SDAD14 SDAD15

1	2	3	4	5	6
			development resources: 87a. Communicate requirements and designs effectively with external development resources. 87b. Monitor the progress of external development resources. 87c. Validate the outcomes of the work of external development resources		
Topic 5. Database and Storages of Information	5.1 Types and purpose of database 5.2 Performance and availability of Database 5.3 Usages of BaaS (Backend-as-a-Service).	Select the database for your system. Describe its benefits for your system. Explain why you do not fit other solutions. Implement the database into your IS.	14. Implementing a database solution to serve systems consisting of multiple applications. 15. Using a contemporary data manipulation and retrieval language effectively.	SDAD8	SDAD14 SDAD15
Module 4. Information System Quality Assurance					
Topic 1. Quality Assurance Fundamentals	1.1 Testing methods: 1.1.1. White-box testing 1.1.2. Black-box Testing. 1.2 Overview of Testing levels. 1.2.1. Unit tests 1.2.2 Acceptance(Integration) tests 1.2.3 Migration tests 1.3 Automated and Manual testing 1.4 Testing Artefacts	Lab work for practice testing methods Understand various test methods and levels. Choose the optimal types of testing that are suitable for your IS. Justify their relevance. Make the chosen tests. It is advisable to use language utilities for unit testing and Selenium for functional testing	84a. Perform acceptance testing of the application. 84f. Carry out various tests (unit, integration, migration) of new software, new software modules.	SDAD10 SDAD10	SDAD14 SDAD15

1	2	3	4	5	6
Topic 2. Testing process in IS	1.1 Types of testing methodologies (TDD, BDD) 1.2. Testing process in Waterfall and Agile development processes	Lab work for practice testing methods. Understand various test processes and metadata. Select the most appropriate approach for your IS, if one exists. Justify the choice.			SDAD14 SDAD15
Module 5. Information System Deployment					
Topic 1. Server Infrastructure	1.1 Physical hosting 1.2 Cloud hosting and customer's facilities 1.3 Availability, load balancing, etc.	Understand the principles of server architecture. Choose a suitable platform for deploying your IP. Deploy your IS on a remote machine (server). It is advisable to create container using Docker or Rocker.	65. Designing data communication networks and data center and server solution 65a. Select an appropriate design approach for local area and wide-area networks in a specific organizational situation. 65b. Select appropriate server architecture for the purposes of the domain. 65c. Design the characteristics of a network and data center solution based on the needs of the domain.	SDAD2 SDAD3 SDAD8	SDAD14 SDAD15
Topic 2. Delivery and Deployment	1.1 IS system isolation and stability principles 1.2 IS images and snapshots 1.3 Virtual machines and containers 1.4 Continuous integration and delivery	Understand the basic principles delivery and deployment. Develop a continuous integration and delivery process for your IS. Choose the optimal version of the virtual machine for your container. Add the automated test phase in delivery and deployment process. Start the	83b. Apply key DevOps concepts to integrate between development and operations and determine when they are relevant for application in a specific domain. 85b. Install the application onto a computing platform. 85c. Configure the application so it fits with the supporting computing	SDAD2	SDAD14 SDAD15

1	2	3	4	5	6
		<p>process of automatic creation of production and test version of your IS. Add the ability to snapshotting and rollback the IS version to the previous one. It is advisable to TeamCity, Travece or Circle CI.</p>	<p>platform and with other applications with which it must interact. 85d. Configure the application so it fits to the organizational environment. 85e. Plan and carry out tests to installation and configuration.</p>		
<p>Topic 3. Migration in IS</p>	<p>1.1 Migration of existing infrastructure 1.2 Data migration</p>	<p>Describe the problem of data migration in your application. Develop a mechanism for data migration for a new version of your IS.</p>	<p>85f. Migrate information stored in pre-existing applications to the new application.</p>	<p>SDAD2</p>	<p>SDAD14 SDAD15</p>
<p>Module 6. Information System Support and Maintenance</p>					
<p>Topic 1. IS Support and Maintenance</p>	<p>1.1 Importance of timely maintenance 1.2 On-site support and consultancy 1.3 Backup and recovery of IS</p>	<p>Use appropriate tools to track the performance of your IS. Develop a strategy to support and maintenance of your project.</p>	<p>32a. Managing IT facilities sustainably. Plan and manage IT physical facilities, including conducting environmental monitoring for adverse effects and adhering to health and safety standards at work. 39. Monitoring the technology environment 39a. Identify and evaluate sources of information regarding emerging methods and technologies. 39b. Identify domain advantages associated with specific emerging methods or technologies. 39c. Identify domain concerns associated with specific emerging methods or technologies. 72. Optimizing infrastructure utilization</p>	<p>SDAD8</p>	<p>SDAD14 SDAD15</p>

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1	2	3	4	5	6
			<p>72a. Select appropriate technologies to ensure effective use of server capacity. 72b. Implement a solution and monitor its performance.</p>		
<p>Topic 2. Monitoring, Logging and Alerts of IS</p>	<p>2.1 Purpose of Monitoring of IS resources 2.2 Mechanism of Logging and Monitoring of IS 2.3 Implementation of Alerts in IS</p>	<p>Implement logging and monitoring of the main business processes, performance of your IS. Form the optimal performance of your system. Use the alerts on data about your IS when they do not match the optimal data. Formulate a on-call schedule for your team.</p>	<p>3. Monitoring system operations 3a. Monitor and track system operations in order to ensure smoothness and continuity while avoiding and reducing interruptions and incidents. 3b. Track system performance, monitor security, and analyze user behavior. 3c. Assess the running conditions of the IT system within an organization and take appropriate actions when unexpected events occur. 88d. Monitor the usage of the new application</p>	<p>SDAD8</p>	<p>SDAD14 SDAD15</p>

Recommended or required reading

Main:

1. Pete Thompson, Debra Paul, Alan Paul, Lynda Girvan, Julian Cox, Tahir Ahmed, James Cadle. *Developing Information Systems: Practical guidance for IT professional*. Publisher: BCS Learning & Development Limited. 2014
2. Avison, D. and Fitzgerald, G. *Information systems development. Methodologies, techniques & tools*. 2006
3. Yanbo Han, Stefan Tai, Dietmar Wikarski. *Engineering and Deployment of Cooperative Information Systems*. Springer-Verlag Berlin Heidelberg. 2002
4. Wita Wojtkowski, Gregory Wojtkowski, Michael Lang, Kieran Conboy, Chris Barry. *Information Systems Development. Challenges in Practice, Theory, and Education Volume 1*. Springer Science+Business Media, LLC, 2009
5. Magda Huisman, Juhani Iivari. *Information Systems Development. Advances in Methodologies, Components, and Management*. Springer US. 2002
6. Roshen, W., *SOA-Based Enterprise Integration: A Step-by-Step Guide to Services-based Application*, McGraw-Hill Osborne Media, 2010.
7. William Wei Song, Shenghua Xu, Changxuan Wan, Yuansheng Zhong, Wita Wojtkowski, Gregory Wojtkowski, Henry Linger. *Information Systems Development*. Springer Science & Business Media, 2010 p.-576 стр.
8. Olegas Vasilecas, Albertas Caplinskas, Gregory Wojtkowski, Wita Wojtkowski, Jože Zupancic, Stanislaw Wrycza. *Information Systems Development: Advances in Theory, Practice, and Education*. Springer Science & Business Media, 2005 p 544
9. Lampathaki F., Koussouris S., Psarras J. *BUSINESS PROCESS MODELLING*. Business Process Reengineering . Decision Support Systems Laboratory NTUA, 2013, p.89

Additional:

1. Brian E. Nesbitt. *Integration and Deployment Techniques in Combination with Development Methodologies*. Regis University. 2009
2. Олейник, П.П. *Корпоративные информационные системы. Учебник для вузов.* / П.П. Олейник, С.П. Олейник. - СПб.: Питер, 2012. - 176 с
3. Олег Граничин, Владимир Кияев. *Информатизация предприятия*. <http://www.intuit.ru/studies/courses/13862/1259/info>

Internet based materials:

1. <https://play.google.com/store/books>
2. Information Systems Development. Michael Gorman/ <http://tdan.com/information-systems-development/6124>

Planned learning activities and teaching methods

The primary means of learning for student is through practice. This is supported and developed through:

1. Project briefings.
2. Set and self-initiated project briefs.
3. Peer learning.

4. Self and peer assessment.
5. Guest speakers.
6. Group discussions, reviews and critiques;
7. Working on live projects;
8. Mentoring;
9. Independent study.

For flexible and distributed learning

Web-based sessions lead by instructor provide methodological and conceptual framework for students' learning. All the slides and materials from the class will be available electronically.

Web-based seminars will be used to strengthen the knowledge of newly learned methods and concepts, and to explore their application to particular complex business cases.

Students are encouraged to ask questions and discuss the material in "live" mode online. There will be a web-based message board for the course. Students are welcome to post questions on this board and these discussions will be monitored and facilitated by the lecturer. The main accent will be made on independent learning

Assessment methods, criteria and regime

Progress and learning is assessed not only at the end but throughout the entire course. Evidence of an ability to think through and critically analyse challenges will be highly rewarded in the assessment.

Students' grades will be determined by individual **Assignments**, based on description of the key idea, normative regulation and steps necessary to build innovation pipeline and supply it with ground-breaking ideas.

- The relative weight of **Assignment Brief** will be set at 100%. It will be marked on the basis of: The aim of the report clearly formulated 20%; Coherence of the arguments and reflection 10%; Reflection based entirely on the description of facts and events 40%; Utilisation of adequate terminology to describe the project management 20%; Evidence of activities undertaken