



## COURSE UNIT DESCRIPTION

Course unit title	Course unit code
Requirements Engineering	<b>PMRI7124</b>

Lecturer(s)	Department
<b>Coordinator:</b> Audronė Lupeikienė	Department of Software Engineering Institute of Informatics Vilnius University

Cycle	Type of the course unit
Second	Compulsory

Mode of delivery	Semester or period when the course unit is delivered	Language of instruction
Face-to-face	1 <sup>st</sup> semester (3 <sup>rd</sup> semester part-time)	Lithuanian, English

Prerequisites
<b>Prerequisites:</b> none

Number of credits allocated	Student's workload	Contact hours	Individual work
5	135	48	87

Purpose of the course unit: programme competences to be developed		
Purpose of the course unit – to gain deeper theoretical and practical requirements engineering knowledge, necessary to elicit, model, document, manage, analyse and validate requirements; to develop the competences to practically use requirements engineering methods; to develop abilities to choose and adopt the most appropriate requirements engineering methods, models, processes, and tools; to develop creativity and critical thinking.		
Learning outcomes of the course unit: students will be able to	Teaching and learning methods	Assessment methods
Ability to creatively apply gained requirements engineering knowledge in developing well-engineered systems; to identify requirements of different levels and types; to apply a range of requirements elicitation techniques; to model, document, analyse, prioritise and validate requirements; to select and use the principles and techniques for effective requirements management.	Lectures, problem-oriented teaching, case studies, discussions, information search, individual work, tutorials, laboratory works	Final assessment of subjects – written exam (open-ended questions). Laboratory works, documentation, and oral presentation of their results.
Ability to choose the most appropriate requirements process model; to measure and assess the requirements engineering process; to competently improve this process; to choose an architectural style to best meet the requirements; to allocate requirements to architectural components; to operationalize non-functional requirements; to choose the most appropriate tools and techniques.		
Ability to work and communicate in a team environment, to cooperate with representatives of other professional fields.	Individual work, tutorials, laboratory works	Laboratory works and oral presentation of their results.
Ability to communicate the results effectively, articulate a personal position, to present arguments, to give reasons to support the opinion.	Report preparation, discussions, oral presentation of results	Oral presentation, the content of presentation, answers to questions, argumentation.

Course content: breakdown of the topics	Contact hours							Individual work: time and assignments	
	Lectures	Tutorials	Seminars	Practice	Laboratory work	Practical training	Contact hours	Individual work	Assignments
1. Conceptual analysis of key concepts. Requirements types. Levels of requirements. Zachman's framework for requirements engineering (RI).	2						2	4	Self-study of literature.
2. Requirements artefacts: business level requirements for enterprise system.	3				2		5	6	First laboratory work: assign the roles to group members; decide on the system type (including application and problem domains) and tool to support the requirements engineering process; compile the list of necessary requirements artefacts; perform business analysis and identify user needs; derive software system requirements from business and users needs; document them.
3. Requirements artefacts: user level requirements for enterprise system.	2				1		3	4	
4. Requirements artefacts: enterprise wide information system requirements. Architectural design and requirements allocation.	2				1		3	6	
5. Requirements artefacts: enterprise software requirements.	2				1		3	10	
6. Conceptual analysis of requirements process, its relation with the other software engineering processes. The requirements process models.	4				2		6	8	
7. Advanced requirements elicitation, analysis and modelling methods. Requirements consistency analysis, requirements prioritization.	5				3		8	12	Second laboratory work: define viewpoints and perspectives (aspects under consideration) related to requirements levels; choose documents templates for the requirements levels in question; plan the requirements flowdown; use requirements flowdown method; on the basis of the results obtained, analyze and evaluate the consistency of requirements at different levels, the quality of software system requirements specification and improve it.
8. Requirements flowdown and operationalization.	4				3		7	10	
9. Formal, semi-formal and informal requirements verification and validation methods.	2				1		3	6	
10. International standards and templates for writing requirements. Requirements documents.	2				1		3	6	
11. Practical problems of requirements engineering, including requirements management and tool support for requirements engineering.	4				1		5	8	Get ready to defend laboratory work - prepare a presentation. Make a presentation and defend work.
12. Preparation for and taking the exam.								7	Self-study of literature.
<b>Total</b>	<b>32</b>				<b>16</b>		<b>48</b>	<b>87</b>	

Assessment strategy	Weight %	Deadline	Assessment criteria
			A 10-mark evaluation system is applied. Accumulative marks are applied as well. The mark of the subject consists of the evaluation of the laboratory works (the minimum required is 2.5 points; the maximum is 5 points) and the exam (the minimum required is 2.5 points; the maximum is 5 points). If at least one minimum rating has not been received the subject mark is less than 5.
2 laboratory works	50	The 10th and 16th week	<p>Matters assessed:</p> <p>1. Content. The assessment criteria of laboratory works (requirements specification, requirements specification analysis, requirements specification verification and validation, requirements flowdown) are the following: comprehensiveness; consistency; choice of appropriate models, methods and tools; validity of recommendations and conclusions; ability to work according to specified requirements; ability to prepare technical documentation; ability to work in a group; use of appropriate professional terminology; ability to plan the work and keep time constraints.</p> <p>2. Oral presentation of work. The assessment criteria of oral presentation are the following: presentation structure and style (clear and logical structure, all the necessary components, use of visual aids); presentation content completeness and consistency; recommendations and conclusions; answers to questions; argumentation.</p> <p>Evaluation. The evaluation of each laboratory work consists of the sum of its content and presentation (maximum score is 5). Each laboratory work (content) is rated up to 4 points. Presentation of each laboratory work is evaluated up to 1 point. If the work is incomplete, it contains errors, the score is reduced proportionally. After one week's delay in presentation the mark is reduced by 1 point, after 2 or more weeks by 2 points, that is, the mark is reduced for being unable to work according to the given instructions and the plan. The total mark of practical work is the arithmetic mean of all laboratory works estimates.</p>
Exam (written)	50	The end of exam session	The exam consists of 3-7 open-ended questions of different types, each with a score of 0.5 to 1.5 (depending on its type – short or long answer question). The questions cover topics presented and discussed in the lectures. It is allowed to take the exam if all laboratory works are defended during practical classes and at least 2.5 points have been collected for them. The exam is not passed if its mark is less than 2.5.

Author	Publishing year	Title	Number or volume	Publisher or URL
<b>Required reading</b>				
K. Pohl	2010	Requirements Engineering. Fundamentals, Principles, and Techniques		Springer-Verlag
A. Čaplinskas	2006	Requirements Engineering (in Lithuanian)		Vilnius University
S. Robertson, J. Robertson	2013	Mastering the Requirements Process	3rd edition	Addison-Wesley Professional
I. K. Bray	2002	Introduction to Requirements Engineering		Addison Wesley

P. A. Laplante	2017	Requirements Engineering for Software and Systems	3rd edition	Auerbach Publications
<b>Recommended reading</b>				
D. C. Hay	2002	Requirements Analysis: From Business Views to Architecture		Prentice Hall PTR
K. E. Wiegers	2013	Software Requirements	3rd edition	Microsoft Press
S. Lauesen	2002	Software Requirements: Styles and Techniques		Addison-Wesley
D. Kulak, E. Guiney	2004	Use Cases: Requirements in Context.	2nd edition	Addison Wesley Professional
L. Chung, B.A. Nixon, E.Yu, J. Mylopoulos	2000	Non-Functional Requirements in Software Engineering		Kluwer Academic Publishers
S. R. Schach	2010	Object-Oriented and Classical Software Engineering	8th edition	McGraw-Hill Higher Education
I. Sommerville	2015	Software Engineering	10th edition	Pearson