RTU Course "Systems Theory"

33000 Datorzinātnes, informācijas tehnoloģijas un enerģētikas fakultāte

General data

Code	DE0752
Course title	Systems Theory
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Jānis Grundspeņķis
Academic staff	Arnis Staško
Volume of the course: parts and credits points	1 part6.0 ECTS credits
Language of instruction	LV, EN
Abstract	Within systems theory, there have been developed general methods for the description of systems, which are based on systems thinking and allow including all relevant factors that affect the functioning of a system. In this study course, students learn the basics of systems theory and study deeper the specific systems theories that are relevant in the business context, as well as learn the basics of cybernetics. Students gain skills to use the graph theory constructs necessary for modelling of system structure and are introduced to the systems approach to the management of organizations, as well as the living and viable systems theories.
Goals and objectives of the course in terms of competences and skills	The goal of the study course is to provide knowledge about systems theory and its applications in the context of business informatics. The objectives of the study course are: 1) to acquaint with the basics of the general and specific systems theories; 2) to provide knowledge about the basics of cybernetics; 3) to develop skills to create and analyse models of system structure; 4) to acquaint with the systems approach to the management of organizations; 5) to acquaint with the basic concepts of the living and viable systems theories.
Structure and tasks of independent studies	Students must work out coursework consisting of five tasks. In the coursework, students must choose a real-world system, create a conceptual model of its structure, interpret its elements using systems theory concepts and perform analysis of the system’s structure.
Recommended literature	Obligāta/Obligatory: 1. Dekkers R. Applied Systems Theory (2nd edition). Springer, 2017. 2. von Bertalanffy L., Hofkirchner W., Rousseau D. General System Theory: Foundations, Development, Applications. George Braziller, 2015. 3. Skyttner L. General Systems Theory: Problems, Perspectives, Practice (2nd edition). World Scientific, 2006. Papildu/Additional: 1. Seddon J. Systems Thinking in the Public Sector. Triarchy Press, 2008. 2. Daellenbach H. G., McNickle D. C. Management Science: Decision Making Through Systems Thinking. Palgrave Macmillan, 2005. 3. Gharajedaghi J. Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture. Elsevier, 2006.
Course prerequisites	Not necessary.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Basics of systems theory.	20	32	0	0
Cybernetics approach to systems thinking.	16	20	0	0
Systems structure: representation and analysis.	12	20	0	0
Systems approach to management of organizations.	8	12	0	0
Living and viable systems.	8	12	0	0
Total:	64	96	0	0

Learning outcomes and assessment

Learning outcomes	Learning outcomes assessment methods and assessment criteria
Can classify real-world systems according to different classification criteria, being able to identify business goals which are supportable by ICT solutions.	In the theoretical part of the examination, students must classify a given set of real-world systems according to different criteria and identify business goals which are supportable by ICT solutions.
Can interpret basic concepts of systems theory concerning real-world systems and are able to identify business problems which are solvable by ICT solutions.	In the tasks of the coursework, students must identify elements of systems thinking, components of system description and subsystems in a real-world system and business problems which are solvable by ICT solutions.
Knows the laws and principles of systems, being able to use appropriate technologies for development of organization/enterprise improvement strategies.	In the theoretical part of the examination, students must define the laws and principles of systems.

Understands the basic principles of cybernetic control of systems, being able to model and analyse business processes and information flows using appropriate technologies.	In a task of the coursework, students must identify mechanisms of system control, open and closed control loops and types of feedback.
Can construct models of system structure and carry out qualitative and quantitative analysis of enterprise and business architectures.	In a task of the coursework, students must construct a model of enterprise and business architecture structure and carry out its qualitative and quantitative analysis. In the practical part of the examination, students must carry out the qualitative and quantitative analysis of a given structure.
Knows applications of systems approach to management of organizations and can interpret business concepts in computer science and ICT terms, and vice versa.	In the theoretical part of the examination, students must explain examples of application of systems approach to management of organizations in the context of business informatics.
Knows the basic notions of living and viable systems and can identify business problems which are solvable by ICT solutions.	In the theoretical part of the examination, students must explain the essence of living and viable systems and for a given system must identify business problems which are solvable by ICT solutions.

Course tests

Tests	% of final assessment
Coursework	50
Theoretical part of the examination	35
Practical part of the examination	15
Total:	100

Course planning

Part	Semester			CP	Academic hours			Tests		
	Autumn	Spring	Summer		Lectures	Practical	Lab.	Test	Exam	Work
1.	*			6.0	48.0	16.0	0.0		*	