



RTU Course "Systems Thinking"

12307 Sistēmu teorijas un projektēšanas katedra

General data

Code	DSP737
Course title	Systems Thinking
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Computer Science
Responsible instructor	Jānis Grundspenķis
Volume of the course: parts and credits points	1 part, 4.0 Credit Points, 6.0 ECTS credits
Language of instruction	EN
Possibility of distance learning	Not planned
Abstract	The goal of the course is to acquire foundations of systems thinking providing inclusion of all critical factors for logistics and supply chain management. In this course students acquire basics of general systems theory. The focus is on logistics and supply chain management systems. Students obtain understanding how the parts are related to the whole. Foundations of cybernetics are included into the course to get knowledge about the role of control parameters. Students learn how to analyse complex structures of systems and situations as well as foundations of system engineering, system dynamics, system-oriented management and knowledge based system analysis, evaluation and design.
Goals and objectives of the course in terms of competences and skills	The goal of the course is to acquire system thinking as fundamental principle of systems theory, systems control and management and to get competence and skills to use them for identification, analysis and modelling of dependences, influence and impact relationships between components of complex systems and situations in logistics and supply chain management field.
Structure and tasks of independent studies	Students must choose some real world case of highly complex systems which operate according to multimodal and/or intermodal scenarios, describe them in the report together with a conceptual model of systems structure, must interpret all elements of the system using system theory concepts as well as analyse the systems structure.
Recommended literature	<ol style="list-style-type: none"> 1. Skjottner L. General Systems Theory: Problems, Perspectives, Practice, 2nd edition. World Scientific Publishing Company, 2006. 2. Seddon J. Systems Thinking in the Public Sector. Triarchy Press, United Kingdom, 2008. 3. Dadlenbach H.G., McNickle D., McNickle D.C. Management Science: Decision Making through Systems Thinking. Palgrave MacMillan, 2005. 4. Gharajedaghi J. Systems Thinking Managing Chaos and Complexity: A Platform for Designing Business Architecture. Elsevier, 2006. 5. Fenton N.E., Hill G. Systems Construction and Analysis: A Mathematical and Logical Framework. Mc Graw-Hill, 1993, 465 p. 6. Bose N.K. Multidimensional Systems Theory and Applications. Springer, the Netherlands, 2009, 292 p.
Course prerequisites	None

Course outline

Theme	Hours
Basic concepts of systems	8
Laws and principles of systems	4
Cybernetic view on systems	6
Components of control system; communication and information in complex systems	6
System-oriented management	4
System dynamics	4
Foundations of system engineering	8
Complex system structure and its models	10
Knowledge based system analysis, evaluation and design	6
Applications of system thinking in logistics and supply chain management	8

Learning outcomes and assessment

Learning outcomes	Assessment methods
Student is able to interpret basic concepts of system theory concerning critical factors for logistics and supply chain management	During practical the student must identify elements of systems thinking, components of systems description and subsystems of real logistics and/or supply chain management systems
Student knows laws and principles of systems	During the examination the student must define laws and principles of systems

Student understands principles and parameters of system control and management	During practical the student must identify mechanisms of system control, open and closed control loops, types of feedback and goal based management
Student is able to apply system dynamics approach	During practical the student must apply system dynamics approach to real life situation
Student is able to analyse complex system structure and its models	During practical the student must apply methods of modelling and analysis of complex system structure in the field of logistics and/or supply chain management
Student understands foundations of system engineering	During the examination the student must define and explain the essence of system engineering
Student understands knowledge based system analysis, evaluation and design	During the examination the student must explain basics of knowledge based system analysis, evaluation and design

Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	4.0	6.0	3.0	1.0	0.0		*	