



## RTU Course "Systems Theory"

12307 Sistēmu teorijas un projektēšanas katedra

### General data

Code	DSP703
Course title	Systems Theory
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	LV, EN
Possibility of distance learning	Not planned
Abstract	The goal of systems theory is to develop general description methods of systems, based on systems thinking, providing inclusion of all critical factors that have influence on systems performance. In this course students acquire foundations of systems theory. The focus is on specific systems theories which represent relevant factors for business development. Students obtain understanding of principles of systems classification and system classes. Foundations of cybernetics are included into the course as well as theories of living systems and viable systems. Students learn to use set theory and graph theory which are needed for systems modelling and are used in other courses.
Goals and objectives of the course in terms of competences and skills	The goal of the course is to acquire foundations of systems theory, systems control and management principles and to get acquainted with living and viable system concepts, and with applications of systems theory in the business informatics context.
Structure and tasks of independent studies	Students must choose any business system (organization), which must be described in the report together with a conceptual model of systems structure, must interpret all elements of the system using systems theory concepts as well as analyse the system's structure.
Recommended literature	L. Skyttner. General Systems Theory: Problems, Perspectives, Practice, World Scientific Publishing Company; 2nd edition, 2006. J. Seddon. Systems Thinking in the Public Sector. Triarchy Press, United Kingdom, 2008. Dadlenbach H.G., McNickle D., McNickle D.C. Management Science: Decision Making through Systems Thinking. Palgrave MacMillan, 2005. Gharajedaghi J. Systems Thinking Managing Chaos and Complexity: A Platform for Designing Business Architecture, Elsevier, 2006.
Course prerequisites	None

### Course outline

Theme	Hours
Basic concepts of systems	8
Classification of systems and system classes	4
Laws and principles of systems	4
Cybernetic view on systems	10
Components of control system, communication and information in complex systems	8
Complex system structure and its models	14
Living systems theory	4
Viable systems theory	6
Applications of systems theory in the business informatics context	6

### Learning outcomes and assessment

Learning outcomes	Assessment methods
Student is able to interpret basic concepts of systems theory concerning phenomena of real world.	During practical the student must identify elements of systems thinking, components of system description and subsystems of real world objects.
Student knows laws and principles of systems.	During the examination the student must define laws and principles of systems.
Student is able to classify systems accordingly with different classification criteria.	During the examination the student must classify given set of real world systems according to different criteria.
Student is able to construct the model of system's structure and to carry out its analysis.	During the test the student must construct the model of system's structure and to carry out its analysis.
Student understands principles of system control and management.	During practical the student must identify mechanisms of system control, open and closed control loops and types of feedback.

Student knows basic notions of living and viable systems and applications of systems theory in business informatics context.	During the examination the student must explain the essence of living and viable systems and must give examples of real applications of systems theory in business informatics context.
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**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		*	