

# RTU Course "Transmission Systems (special course)"

## 13105 Pārraides sistēmu katedra

General	data
O'unorun	unu

Code	RDE432
Course title	Transmission Systems (special course)
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Electronics and Telecommunications
Responsible instructor	Rolands Parts
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 course deals with transmission systems (TS) at an advanced level. It includes the theoretical analysis of TS, as well as their practical implementation. In the laboratory students are trained in the practical skills in the area of TS. The following topics are discussed: noise and its influence on transmission quality, regeneration of digital signals, baseband line codes, passband line codes, clock extraction and timing, xDSL technologies.
Goals and objectives of the course in terms of competences and skills	The goal of the course: to acquire advanced theoretical knowledge about transmission systems (TS). The objectives: 1. to get familiar with the theoretical analysis of TS and its practical implementation; 2. to develop skills in order to make practical measurements of TS; 3. to promote understanding of major trends in the development of TS in relation to telecommunications networks.
Structure and tasks of independent studies	Extensive reading of technical literature and problem solving activities. Theoretical substantiation for practical measurements performed in the laboratory. Making projects, reports and delivering presentations.
Recommended literature	K. Kaļiņina. Pārraides sistēmas. II daļa. RTU, 2006. J.G. Proakis. Digital communications. 2008. J.G. Proakis, M. Salehi. Fundamentals of communication systems. 2005. S. Haykin. Digital communication systems. 2005.
Course prerequisites	Students are expected to have a basic knowledge of transmission systems.

### Course outline

Theme	Hours				
Development of transmission systems (TS) in context with other technologies.					
Architecture of TS, its evolution. TS as a part of telecommunications network.					
TS as the means of signal transmission. Noise and disturbances, their impact. Thermal noise.	8				
Noise caused by crosstalk in the cable and other external sources of noise.	2				
Evaluation of the total influence of noise in the long-distance trunks.	4				
Regeneration of digital signals (DS). Evaluation of error probability.					
Transmission of DS in band-limited environment.					
Power spectral density of digital signals.					
Line codes designed for baseband.					
Line codes for bandpass environment.					
Clock frequency extraction and timing.					
Channel coding (forward error coding).					
ISDN, HDSL and SHDSL technologies.					
ADSL, ADSL2+ and VDSL technologies.					
Reliability of TS, further development trends.					

### Learning outcomes and assessment

Learning outcomes	Assessment methods
Students are able to use professional literature and conduct elementary research in the field independently.	Problem solving and discussions. Report Term Paper.
Students are able to carry out measurements in the field of transmission systems independently.	Training at the laboratory.
Students are able to demonstrate understanding of transmission system theory at Master level.	Tests, Term Project and exam.

### Study subject structure

Part	СР	ECTS	Hours per Week				Tests	
			Lectures	Practical	Lab.	Test	Exam	Work

1.	4.0	6.0	3.0	0.0	1.0	*	