



RTU Course "Transmission Systems"

13105 Pārtraides sistēmu katedra

General data

Code	RDE303
Course title	Transmission Systems
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Undergraduate 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	This course deals with transmission systems (TS), their evolution and application in modern telecommunications networks. Topics include signal digitalisation and transmission, regeneration of a digital signal and its conversion back to the analogue form. Formation and multiplexing of digital streams, as well as network synchronisation are examined. The course covers the theory of TS, as well as practical measurements in the laboratory. International standards related to TS interfaces are considered. Students are prepared for professional career and further studies at the Master's level.
Goals and objectives of the course in terms of competences and skills	The goal of the course: to acquire the theoretical knowledge about transmission systems (TS) and to develop practical skills necessary to design TS. Objectives of the course: 1. to develop skills to make measurements of TS; 2. to improve the student's ability to analyse the obtained results and to make relevant conclusions; 3. to recognize the importance of TS in telecommunications networks.
Structure and tasks of independent studies	Independent survey of technical literature, problem solving activities, theoretical justification for practical measurements performed in the laboratory, analysis of the results, making reports and delivering presentations.
Recommended literature	Kaļiņina, K. Pārtraides sistēmas. 1. daļa. RTU, 2002. Flood, J.E. Transmission systems. IEE, 1998. Proakis, J. Digital communication. 1988.
Course prerequisites	Students are expected to have a basic knowledge of signal theory.

Course outline

Theme	Hours
Evolution of transmission systems. (TS) Analogue and digital TS. Amplification and regeneration of signals.	4
Analysis of signals to be transmitted. Formulation of specifications for TS. Examples.	8
Separation methods of transmission directions used in TS.	4
Hybrid system, its principles, implementation and application.	4
Sampling and encoding of analogue signals for transmission in digital TS (source coding).	4
Linear and non-linear encoding. Principles and implementation.	4
Quantising noise, its analysis of different encoding types.	8
Design of E1 primary group (30 channels). T1 systems. Relevant ITU Recommendations.	6
Versions of E1 architecture.	4
Multiplexing of primary (E1) channel groups.	4
Plesiochronous digital hierarchy (PDH).	4
Synchronous digital hierarchy (SDH)	4
Synchronisation of transmission networks.	2
Primary reference clocks (PRC).	2
Further development of transmission systems.	2

Learning outcomes and assessment

Learning outcomes	Assessment methods
Students are able to use relevant literature, including scientific literature, periodicals, etc.	Problem solving and discussions at labs and practical classes. Reports. Are able to demonstrate knowledge of major TS issues.
Students are able to carry out experiments – measurements in the field of transmission systems, as well as to evaluate the results.	Training in the laboratory. Are able to process and analyse the obtained results.
Students are able to demonstrate understanding of the basic theory of transmission systems (TS), to recognize the importance of TS in telecommunications networks.	Tests and exam. Knowledge of TS at the bachelor study program level.

Study subject structure

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