



## RTU Course "Transmission Media"

13105 Pārāides sistēmu katedra

### General data

Code	RDE302
Course title	Transmission Media
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	Ģirts Ivanovs
Academic staff	Vjačeslavs Bobrovs Jurgis Poriņš
Volume of the course: parts and credits points	2 parts, 6.0 Credit Points, 9.0 ECTS credits
Language of instruction	LV, EN, RU, DE
Possibility of distance learning	Not planned
Abstract	Communication line design. Classification of cable, insulating materials, protective covers. Electromagnetic processes in symmetrical, coaxial cable, waveguides. Design optimization. Electromagnetic compatibility. Mutual influence, rationing, protection. Shielding theory. Corrosion. Line construction, design, operation. The course includes both theory and communication lines measurements in the laboratory study. The international standards relating to the use of communication lines have been dealt with. Students are prepared both for practical work with lines of communication, and further studies in Master Course.
Goals and objectives of the course in terms of competences and skills	Acquire theoretical knowledge of the lines of communications and practical skills in carrying out the calculations for the design of communication lines. Students will be able to measure the communication lines and to assess the results and draw conclusions competently. To navigate communication line applications in telecommunications networks, demonstrating their importance in solving various technical problems.
Structure and tasks of independent studies	Independent learning of study literature and solving practical problems. The theoretical foundation preparation for each laboratory work, laboratory work results preparation and reports. Course project preparation and protection. The course project is composed of workshops, (1 hr. per week) and independent work (4 hr. per week).
Recommended literature	1. В. А. Андреев. Направляющие системы электросвязи. Москва. 2009. 412 с. (Mācību līdzeklis augstskolām) 2. John R.Vacca. Cabling handbook. 2nd ed. Prentice Hall PTR, 2001. 620 p. (ISBN 0-13-088317-4) 3. John Crisp. Introduction to Copper Cabling. Application for telecommunications, data communications and networking. Oxford, 2006. 211 p. (ISBN 0 7506 5555 0) 4. Laboratorijas darbu apraksti. RTU, TI, 2010. 25 lpp. 5. Ģ. Ivanovs. Izdales materiāli un kursa projekts sakaru līnijās. RTU TI, 2010. 89 lpp.
Course prerequisites	Necessary knowledge in the electrical circuit theory and measurements, as well as knowledge of measurement errors, confidence intervals, and measurement uncertainty in the assessment of mathematics and physics at bachelor course level.

### Course outline

Theme	Hours
1. Communications line role in transmission systems 1.1. Brief history of communication line development. 1.2. The course co	2
2. Communications line structures and characteristics. 2.1. Communications cables and their classification. 2.2. Conduc	10
3. Quasistationary processes in communications line. 3.1. Equations of long communications line. 3.2. Primary and seco	8
4. Basics of electrostatics for communications line. 4.1. Electromagnetic field theory of communication cables	12
5. Theory of cross-impact for communications lines. 5.1. Electromagnetic compatibility problems in communications lines	16
6. Communication cable shielding. 6.1. Shield principles for wide range of frequencies. 6.2. Electro-static shielding	6
7. Communication line protection against external electromagnetic influences. 7.1. The causes and parameters of impact	6
8. Cable sheathing and communications line corrosion. 8.1. Types and causes of corrosion. 8.2. Soil Corrosion. 8.3. E	4
9. Laboratory work	16
10. Course project	16

### Learning outcomes and assessment

Learning outcomes	Assessment methods
Being able to solve all their assigned tasks independently, using their knowledge, identify principle of operation and construction for communication lines, as well as being able to carry out the measurement in communication lines. The ability to orient themselves in the scientific literature of co	Solving of practical problems - tests, laboratory work, course project. Exam. The ability to carry out experiments – measurements in communications, to process the results.

Criteria: able to navigate between the steering system of communication issues freely.

Able to navigate in the field of direct transmission systems competently, and their application, place and importance of communication lines in telecommunications networks.

***Study subject structure***

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	2.0	3.0	3.0	0.0	0.0		*	
2.	4.0	6.0	1.0	0.5	1.5		*	