



RTU Course "Telecommunications Systems"

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General data

Code	RDE708
Course title	Telecommunications Systems
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Sandis Spolītis
Academic staff	Vjačeslavs Bobrovs Ģirts Ivanovs Uģis Seņkāns Inga Vagale Armands Ostrovskis Tamara Sharashidze
Volume of the course: parts and credits points	1 part, 6.0 Credit Points, 9.0 ECTS credits
Language of instruction	LV, EN
Annotation	The telecommunication systems course gives an overview and basic knowledge about different types of wired, wireless, and fiber optical transmission systems and their main elements. The study course examines the history of telecommunication systems development in the world, Latvia, and future development trends. Laboratory and practical works with modern computer-aided design software are also envisaged.
Goals and objectives of the course in terms of competences and skills	The study course aims to provide and develop knowledge about the peculiarities of the structure of telecommunications systems, their functions, and the main parameters characterizing the system. The tasks of the study course: <ul style="list-style-type: none"> • to provide theoretical knowledge about telecommunication systems (TS); • explain TS classification and future development directions; • to compare the performance and application possibilities of different TS, taking into account their advantages and disadvantages; • to explain the application of TS in telecommunication networks, showing their significance in solving various technical problems; • to teach to create technical documentation using computer-aided design software.
Structure and tasks of independent studies	Independent work will be organized as a study of literature and solving practical tasks. As part of their independent work, students must create individual research, using the knowledge gained in lectures and analysing the study and scientific literature. The result of the practical work is prepared in the form of a report and its presentation, and defended.
Recommended literature	<p>Obligātā literatūra / Obligatory literature:</p> <ol style="list-style-type: none"> 1.Colon S. "Wireless Networks and Communications" Wilford Press, 2019. - 229 p. 2.Tysoe J. Knott-Craig A. "Connected: A Brief History of Global Telecommunications" Bookstorm, 2020. - 112 p. 3.Smith K. "Telecommunications Essentials" Clanrye international, 2019. - 234 p. 4.De Fátima F., Domingues M., Radan A. "Optical Fiber Sensors for IoT and Smart Devices" Instituto de Telecomunicações Aveiro, 2017. - 101 p. 5.Rajan G. "Optical Fiber Sensors: Advanced Techniques and Applications" CRC Press, 2015.- 575 p. 6.National Research Council. "Broadband: Bringing Home the Bits" The National Academies Press, 2002. - 336 p. 7.Golio M., Golio J. "RF and Microwave Applications and Systems" CRC Press, 2007. – 690 p. 8.Agrawal G.P. "Fiber-Optic Communications Systems". 4th ed. John Wiley & Sons Ltd, 2010. - 567 p. 9.Binh N. "Photonic Signal Processing. Techniques and Applications" 2nd ed. CRC Press, 2018. – 526 p. 10.Kartalopoulos S.V. "Next Generation Intelligent Optical Networks. From Access to Backbone" Springer, 2008. - 275 p. <p>Papildliteratūra / Additional literature:</p> <ol style="list-style-type: none"> 1.Louis J. Ippolito Jr. "Satellite Communications Systems Engineering: Atmospheric Effects, Satellite Link Design and System Performance", 2nd ed. John Wiley & Sons Ltd, 2017. - 460 p. 2.Ogundele A. "Understanding satellite communications", 2010. - 454 p. 3.Ločmelis J. "Telekomunikāciju vēsture" Lattelekom muzejs, 2000. - 406 lpp. 4.Booth J. "Fiber Optic Telecommunications Networks: Lit Fiber Services" 2nd ed. , 2019. - 373. lpp. 5.Penttinen J. "5G Explained: Security and Deployment of Advanced Mobile Communications" John Wiley & Sons Ltd, 2019. - 328 p. <p>Kursa apgūvē var izmantot arī interneta resursus / Internet resources can also be used to acquire the course:</p> <ol style="list-style-type: none"> 1. https://www.3gpp.org/ 2. https://ieeexplore.ieee.org/
Course prerequisites	Basic knowledge in electrical measurements, mathematics, and physics is required.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
The main stages of telecommunications development in the world (history).	2	2	0	0
The main stages and state of telecommunications development in Latvia.	2	2	0	0
Types of information transmission and the concept of telecommunication system.	4	4	0	0
Audio messaging and telephony basics.	2	2	0	0
Transmission systems, basic concepts, classification.	10	10	0	0
Commutation systems, basic concepts.	6	6	0	0
Telecommunication networks, meaning, main structures.	6	6	0	0
Cable communication lines, basic parameters and constructions.	6	6	0	0
Local communication networks, application, development.	6	6	0	0
Intelligent networks, basic services, situation in Latvia.	6	6	0	0
Microwave communication systems, application, development.	6	6	0	0
Mobile communication systems, development in Latvia.	10	10	0	0
Earth artificial satellite communication systems, application, development.	6	6	0	0
Use of fiber optics in communication systems.	10	10	0	0
Electromagnetic compatibility problems, frequency range control in Latvia.	2	2	0	0
Telecommunication system modelling tools	4	4	0	0
Laboratory works	32	32	0	0
Total:	120	120	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods
The student is be able to identify and analyse the main concepts and parameters of telecommunication system design	Test
The student is be able to identify, analyse and classify the main methods of telecommunication networking according to the requirements of use and services	Test
The student is be able to independently orientate in the field of telecommunication systems, use study, and research literature	Presentation and defence of individual research
The student is be able to develop and design technical documentation of telecommunication systems using computer-aided design (CAD) applications	Report on laboratory work
The student is be able to develop the ability to independently research and analyse the field of telecommunications systems	Exam

Evaluation criteria of study results

Criterion	%
Tests	25
Laboratory works	25
Individual research	25
Exam	25
Total:	100

Study subject structure

Part	CP	Hours per Week			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	6.0	2.0	2.0	2.0		*	