

## RTU Course "Microwave Telecommunications Systems"

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**General data**

Code	RDE703
Course title	Microwave Telecommunications Systems
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Guntis Ancāns
Academic staff	Vjačeslavs Bobrovs
Volume of the course: parts and credits points	1 part, 5.0 Credit Points, 7.5 ECTS credits
Language of instruction	LV, EN
Annotation	Topics covered by the course include microwave propagation, radio communication, attenuation factor, radio link components: antennae, feeder, receiver and transmitter; analogue and digital radio systems, noise immunity, communication stability and grade of service, satellite and mobile systems, short range radio systems for telephone communication.
Goals and objectives of the course in terms of competences and skills	The goal of the course is to acquire theoretical knowledge about microwave systems and get familiar with basic calculations necessary to design a microwave trunk. The objectives are the following: to develop skills necessary to evaluate ITU-R recommendations; to enable students to enhance understanding of microwave technologies and to forecast development trends.
Structure and tasks of independent studies	Independent survey of technical literature, theoretical and practical problem solving. Theoretical substantiation for practical measurements performed in the laboratory. Making reports and delivering presentations.
Recommended literature	1. Farooq Khan. LTE for 4G Mobile Broadband. Cambridge University Press, 2009. 2. Azzedine Boukerche. Algorithms and Protocols for Wireless and Mobile Ad Hoc Networks. 2009. 3. Mohamed Ibnkahla. Adaptation and cross layer design in Wireless networks. 2009. 4. Mike Golio, Janet Golio. RF and Microwave circuits, measurement and modeling. 2008. 5. Amitabh Kumar. Mobile Broadcasting with WiMAX. 2008. 6. Klaus David. Technologies for the Wireless future. 2008. 7. Zoubir Mammeri. Wireless and Mobile Networking. 2008. 8. Gerard Barue. Microwave engineering land&space radiocommunications. 2008.
Course prerequisites	RDE201 Telecommunication systems, RDE303 Transmission systems, RDE301 Communication theory

**Course contents**

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Radio line equation.	8	0	0	0
Refraction of radio waves propagating in the atmosphere.	8	0	0	0
The effect of several ways of propagation.	8	0	0	0
The role of K-factor and its variability.	8	0	0	0
Reflection from the ground.	8	0	0	0
Atmosphere and rain attenuation.	8	0	0	0
ITU-R recommended frequency plans.	8	0	0	0
ITU-R quality calculation.	8	0	0	0
Course Project (Electromagnetical compatibility assessment between different types of microwave telecommunications solutions)	16	0	0	0
<b>Total:</b>	<b>80</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Learning outcomes and assessment**

Learning outcomes	Assessment methods
Students are able to develop and solve radio line equations, taking into consideration several factors.	Discussions at the practical classes. Test.
Students are able to analyse radio wave refraction in the atmosphere and to plan stages of microwave design independently.	Practical classes. Test.
Students are able to evaluate propagation, occurrence and idle time of various beams.	Discussions at practical classes. Test.
Students are able to analyse spatial differences in case of reflection.	Practical classes. Test.
Students are able to project a microwave trunk and to analyse the obtained results.	Simulation-based practical classes. Test.
Able to independently analyze and solve microwave telecommunication systems electromagnetic compatibility problems.	Course project.
Students are able to analyse ITU-R recommendations and to develop a frequency plan.	Discussions at practical classes. Report presentation. Exam.

**Study subject structure**

Part	CP	Hours per Week			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	5.0	4.0	1.0	0.0		*	