RTU Course "Microwave Telecommunications Systems"

13105 Pārraides sistēmu katedra

General data

Code	RDE416
Course title	Microwave Telecommunications Systems
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	Vjačeslavs Bobrovs
Academic staff	Jurģis Poriņš
Volume of the course: parts and credits points	1 part, 4.0 Credit Points, 6.0 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Abstract	Topics 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: 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, RAE602 Mobile transmission systems

Course outline

Theme	Hours
Radio line equation.	8
Refraction of radio waves propagating in the atmosphere.	8
The effect of several ways of propagation.	8
The role of K-factor and its variability.	8
Reflection from the ground.	8
Atmosphere and rain attenuation.	8
ITU-R recommended frequency plans.	8
ITU-R quality calculation.	8

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

1.	4.0	6.0	2.0	1.0	1.0		*	