



## RTU Course "Mobile Network Architecture"

13105 null

**General data**

Code	RDE711
Course title	Mobile Network Architecture
Course status in the programme	Compulsory/Courses of Limited Choice; Courses of Free Choice
Responsible instructor	Guntis Ancāns
Academic staff	Lilīta Ģeģere
Volume of the course: parts and credits points	1 part, 4.0 Credit Points, 6.0 ECTS credits
Language of instruction	LV, EN
Annotation	The basic task of mobile networks is the real-time transmission of any type of information. The study course is intended to gain knowledge about existing and next-generation mobile communication networks, which will enable students not only to understand the principles of operation of various mobile networks but also to apply this knowledge in the evaluation and design of real mobile communication systems, taking into account their technical capabilities and limitations.
Goals and objectives of the course in terms of competences and skills	The aim of the study course is to give the student an in-depth understanding of the peculiarities of the current and next-generation network structure and the main factors that determine the characteristics of the system. The tasks of the study course: * explain the general principles of operation of mobile networks; * to compare the functionality of mobile network architecture and network elements for current and future generations of mobile networks; * using a modeling tool to determine the performance of mobile technologies and compare different system scenarios depending on the network topology, possible redundancies, and unified system capacity.
Structure and tasks of independent studies	Independent work will be organized within the framework of practical and laboratory classes, where students will have to solve the tasks set by the lecturer, using the knowledge gained in lectures, independent study, and research of scientific literature, as well as modeling tools for mobile network architecture and performance testing.
Recommended literature	Obligātā/Obligatory: 1.Kukushkin. "Introduction to Mobile Network Engineering: GSM, 3G-WCDMA, LTE and the Road to 5G" John Wiley & Sons Ltd, 2018. - 401 p. 2.J. T. J. Penttinen. "The Telecommunications Handbook, Engineering Guidelines for Fixed, Mobile and Satellite Systems" John Wiley & Sons Ltd, 2015. - 1007 p. 3.F. Hillebrand. "GSM and UMTS: The Creation of Global Mobile Communication" John Wiley & Sons Ltd, 2002. - 576 p. Papildu/Additional: 1.H. Holma, A. Toskala, T. Nakamura. "5G Technology: 3GPP New Radio" John Wiley & Sons Ltd, 2020. - 517 p. 2.S. Z. Asif. "5G Mobile Communications: Concepts and Technologies" Taylor & Francis Group, 2019, 354 p. 3.Ch. Cox. "An Introduction to LTE: LTE, LTE-Advanced, SAE and 4G Mobile communications" John Wiley & Sons Ltd, 2012. - 337 p. 4.W. Stallng. "Wireless Communications and Network Second Edition" Pearson Education, Inc, 2005. - 569 p. Citi informācijas resursi/Other information resources: 1. <a href="https://www.3gpp.org/">https://www.3gpp.org/</a> 2. <a href="https://www.etsi.org">https://www.etsi.org</a>
Course prerequisites	In telecommunication theory, telecommunication systems, communication driving systems, transmission systems.

**Course contents**

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Introduction to mobile network development.	2	2	0	0
GSM architecture: Base Station Subsystem, Network Switching Subsystem and Operation Subsystem.	10	10	0	0
GSM numbering: customer numbering, mobile numbers and network numbering.	2	2	0	0
Mobile services.	2	2	0	0
Data services: GPRS elements, architecture and functions.	6	6	0	0
3G (UMTS): infrastructure and architecture.	10	10	0	0
Data service HSDPA.	4	4	0	0
LTE technology: architecture and operating principles.	10	10	0	0
LTE network integration with 2G / 3G.	10	10	0	0

5G network architecture.	10	10	0	0
Possible solutions for xG network.	6	6	0	0
Integration of mobile networks with fixed communication networks.	4	4	0	0
Mobile Network Element Monitoring (NOC).	4	4	0	0
Total:	80	80	0	0

### ***Learning outcomes and assessment***

Learning outcomes	Assessment methods
Knows the architecture of second and third generation of mobile communication systems, their features, main characteristics, and applications.	Report on laboratory and practical work. Test.
Knows the architecture of the fourth generation of mobile communication systems, their features, main characteristics, and applications.	Report on laboratory and practical work. Test.
Knows the architecture of the fifth generation of mobile communication systems, their features, main characteristics, and applications.	Report on laboratory and practical work. Test.
Is able to competently evaluate the generations of mobile communication systems, their features, and their characteristics. Using a modeling tool is able to develop the architecture of combined mobile systems and analyse the achieved results.	Course project report and exam.

### ***Evaluation criteria of study results***

Criterion	%
Tests	40
Laboratory and practical works	20
Course project/Exam	40
Total:	100

### ***Study subject structure***

Part	CP	Hours per Week			Tests			Tests (free choice)		
		Lectures	Practical	Lab.	Test	Exam	Work	Test	Exam	Work
1.	4.0	2.0	1.0	1.0		*			*	