



RTU Course "Fundamentals of Communication Systems"

15E02 Avionikas katedra

General data

Code	TAA107
Course title	Fundamentals of Communication Systems
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Undergraduate Studies
Course type	Professional
Field of study	Transport
Responsible instructor	Smirnovs Igors
Academic staff	Tretjakovs Sergejs
Volume of the course: parts and credits points	1 part, 2.0 Credit Points, 3.0 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Abstract	Course "Fundamentals of Communication Systems" is based on learning the communication system structure and its components. The subject covers such issues as: classification of aviation communication system tasks and communications, signal classification characteristics and displaying techniques, signal modulation and filtering, as well as information and coding theory of the signal.
Goals and objectives of the course in terms of competences and skills	Gain knowledge about the classification and structure of the aviation communication system tasks. To introduce the signal classification and characteristics, to acquire practical skills in the signal spectral displaying. To introduce foundations of information theory and coding theory of signal, to be able to evaluate signal and channel parameters, the throughput of communication systems, interference effects on the communication channel.
Structure and tasks of independent studies	Independent work with literature and technical documentation. Independent work on the theme: "Communication coding. Error detection methods. Compression of information."
Recommended literature	1. Proakis, John G., Fundamentals of communication systems: Pearson/Prentice Hall, 2005, 858 p. 2. R. Read. The essence of Communications Theory. Prentice Hall Europe, 2005, 285 p. 3. D.S. Stacey. Aeronautical Radio Communication Systems and Networks illustrated edition: Wiley-Blackwell, 2008, 350p. 4. Future Aeronautical Communications. Edited by S.Plass. Janeza Trdine 9, 51000 Rijeka, Croatia, 2011, 377 p.
Course prerequisites	Prior knowledge in mathematics, physics, electronics.

Course outline

Theme	Hours
Aviation communication tasks. Communication system classification.	2
Communication system overall structure. Communication system components.	2
Signals. Signal classification. Signal parameters.	2
Harmonic signal displaying techniques. The signal frequency spectrum.	2
Periodic signal frequency spectra.	4
Non-periodic signal frequency spectra.	4
Signal modulation. Signal filtering.	2
Definition of information. Information numerical evaluation.	2
Notification. Notification forms and parameters.	2
Physical characteristics of the signal, the signal and the channel capacity.	2
Signal capacity and the amount of information.	4
Communication system throughput.	2
Digital communication channel capacity. Disturbances in communication channels.	2

Learning outcomes and assessment

Learning outcomes	Assessment methods
The student knows and is able to describe the role, classification and structure of aviation communications systems.	Exam.
The student knows and is able to describe the signal classification, characterization and displaying techniques.	Exam.
The student is able to analyze the periodic signal frequency spectra using the projection in Fourier series.	Laboratory test question. Exam.
The student is able to analyze non-periodic signal frequency spectra using the Fourier transform.	Laboratory test question. Exam.
The student is able to convert the signal spectral representation in the time display.	Laboratory test question. Exam.

The student knows the information numerical evaluation methods and is able to evaluate the amount of information in the notification.	Practical work. Exam.
The student knows the signal and channel parameters and is able to evaluate the channel throughput.	
The student is able to evaluate the impact of interference on the information transmission process in the communication channel.	
The student knows and is able to describe the basics of information coding, error location and data compression techniques.	

Study subject structure

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