



RTU Course "Digital Signals Processing in Avionics Equipment"

15E02 Avionikas katedra

General data

Code	TAA542
Course title	Digital Signals Processing in Avionics Equipment
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Professional
Field of study	Transport
Responsible instructor	Smirnovs Igors
Volume of the course: parts and credits points	1 part, 3.0 Credit Points, 4.5 ECTS credits
Language of instruction	LV, RU
Possibility of distance learning	Not planned
Abstract	The subject's "Digital Processing of Signals avionic devices" purpose is to introduce students to digital signal processing key trends and theoretical foundations. The subject discusses application of digital processing algorithms to aircraft navigation and radiolocation systems.
Goals and objectives of the course in terms of competences and skills	To acquire digital signal processing theoretical foundations. To be able to apply theoretical knowledge in solving practical tasks, including learning of modern aircraft Electronics Equipment operating principles. To be able to apply their knowledge in other subject learning process.
Structure and tasks of independent studies	Independent work on themes: "The overhang Fourier series", "A coherent implementation of the filter radar receivers".
Recommended literature	1. The Esence of Communication Theory. R. Read, Prentice Hall Europe, 1998, 294 p.; 2. Aircraft Digital Electronic and Computer Systems: Principles, Operation and Maintenance. Linacre House, Jordan Hill, Oxford OX2 8DP, UK, 2007, 198 p.; 3. Основы цифровой обработки сигналов. А. Солонина, Санкт-Петербург, БХВ – Петербург, 2005, 753 стр.; 4. Цифровая обработка сигналов. А. Сергиенко, Санкт-Петербург, Питер, 2002, 372 стр.; 5. Выделение сигналов из помех численными методами. В. Зверев, А. Стромков. Н. Новгород, ИПФ РАН, 2001, 188 стр.
Course prerequisites	Mathematics, electronics, digital appliances, aviation radio navigation and radiolocation.

Course outline

Theme	Hours
Digital signal processing main concepts.	2
Correlation function.	4
Discrete Fourier transformation.	8
Signal convolution.	4
Digital signal processing generalized scheme.	4
Digital filters with a final pulse characteristic.	4
Digital filters with infinite impulse characteristic.	4
Digital radio navigation equipment design principles.	6
Information processing algorithms for pulse radiolocation stations.	6
Radiolocation signal finding and the assessment of the parameters of digital techniques.	6

Learning outcomes and assessment

Learning outcomes	Assessment methods
The student knows digital signal processing, the trends and digital processing advantages.	Final examination question.
The student knows mathematical signal processing techniques, is able to use them to solve practical problems.	Independent work, practical work and final examination question.
The student knows digital filter synthesis techniques, is able to display filter circuit and the impulse response of the filter transmission functions.	Practical work and final examination question.
The student knows digital aircraft radio navigation system advantages, is able to analyze a system of functional circuitry.	Practical work and final examination question.
The student knows digital signal processing tasks and methods of radiolocation systems, is able to analyze appropriate system algorithms and signal processing techniques advantages.	Practical work and final examination question.

Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	3.0	4.5	2.5	0.5	0.0		*	