



RTU Course "Digital Signals Processing in Avionics Equipment"

15E02 Avionikas katedra

General data

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| 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 | | * | |