Syllabus of the educational discipline
« COMPUTER TOOLS FOR SIGNAL PROCESSING»

Cycle of Higher Education	*First cycle of higher education (Bachelor's degree)*
Field of Study	*12 Information Technologies*
Specialty	*123 Computer engineering*
Educational program	*Computer systems and networks*
Discipline status	*Normative*
Teaching language	*English*
Year of studies, semester	*3 year, 4 year (6 semester, 7 semester)*
Number of credits ECTS	*7 credits*
Distribution by types of trainings and hours of study	*Lectures, Laboratory studies, Independent training*
Form of final assessment	*Test, test*
Teacher	*Voitovich B. V., assistant lecturer of department of computer systems and networks*
Teacher's contacts	*bohdan.voitovych@uzhnu.edu.ua*
Course Schedule	*According to the timetable*

The purpose of teaching the discipline "Computer Tools for Signal Processing" is to the study of:

- basic mathematical software used in the development of computer tools for registration, processing and display of digital signals and images;

- basic methods of building fast algorithms for digital signal processing and images (DSP) and study of computational complexity (complexity of implementation) of algorithms;

- the basic principles of building programmable problem-oriented single-chip DSP computers;

- the basic principles of construction of specialized large integrated circuits of DSP;

- principles and structural solutions for the construction of hardware-software DSP complexes

As a result of studying the discipline the student must:

know:

- theoretical foundations of image compression;

- principles of modern speech recognition systems;

- methods, principles of construction and functioning of systems and processors of signal and image processing;

- tools for computer-aided design and analysis of the characteristics of DSP nodes

be able to:

- develop optimal algorithms and procedures for signal and image processing, design appropriate systems and individual functional units on a different element base; operate, repair and maintenance of existing systems and DSP processors

Prerequisites for learning

Programming, Discrete Mathematics, Theoretical Foundations of Digital Signal Processing.

Content of the educational discipline

Topic 1. Peculiarities of computer signal processing tools
Topic 2. Speech signal processing
Topic 3. Image processing
Topic 4. Designing nodes on signal processors
Topic 5. Designing signal processors based on Programmable integrated circuits and neural elements
Topic 6. Diagnostics and control of signal and image processing systems and nodes

Course page on the Moodle platform (personal training system)	*Syllabus of the educational discipline, hyperlinks to electronic publications of the discipline, recommended literature, students' attendance, lecture materials, presentations, questions for self-control, methodical materials for laboratory works, tests, tasks for*

	checking students' knowledge. https://moodle.uzhnu.edu.ua

Recommended literature

1. *Emmanuel C. Ifeachor. Digital Signal Processing: A Practical Approach. - Prentice Hall; 2nd edition, 2001, 933p.*
2. *Nasser Kehtarnavaz. Digital Signal Processing System-Level Design Using LabVIEW: LabVIEW-Based Hybrid Programming. - Newnes; Pap/Cdr edition, 2005. - 304p.*
3. *Steven Smith Digital Signal Processing: A Practical Guide for Engineers and Scientists. - Newnes; 1st edition, 2002. - 650p..*

Assessment system of learning outcomes

The ECTS grade that a student receives after studying a credit module of a discipline is determined according to the student's rating. A student's credit module rating consists of the points the student receives during the semester for the following types of work:

1. Modular control work (MCW) duration of 2 acad. hours each. The maximum number of points for the MCW is 50 points.

2. Performance of laboratory works.

During the semester, students complete 5 laboratory works - maximum number of points - 40

Scores on individual and independent work of students are awarded for: preparation of essays, modernization of tasks, creative approach to task performance, performance of tasks to improve didactic materials on the discipline: 0-10 points for each module.

Each module is assessed a maximum of 100 points. At the end of the discipline a rating score is derived as the arithmetic average of the points from the two modules.

ECTS and national grading scale

<table>
<tr><th>Mark scale</th><th>ECTS</th><th>Exam</th><th>Test</th></tr>
<tr><td>90 - 100</td><td>A</td><td>Excellent</td><td rowspan="5">Satisfied</td></tr>
<tr><td>82 - 89</td><td>B</td><td rowspan="2">Good</td></tr>
<tr><td>74 - 81</td><td>C</td></tr>
<tr><td>64 - 73</td><td>D</td><td rowspan="2">Satisfactory</td></tr>
<tr><td>60 - 63</td><td>E</td></tr>
<tr><td>35 - 59</td><td>FX</td><td>“Unsatisfactory” with possibility to pass the exam again</td><td>“Not satisfied” with possibility to pass the exam again</td></tr>
<tr><td>1 - 34</td><td>F</td><td>“Unsatisfactory” with obligatory repeated study of the discipline</td><td>“Not satisfied” with obligatory repeated study of the discipline</td></tr>
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