

## Syllabus of the educational discipline «SYSTEM PROGRAMMING »

<i>Cycle of Higher Education</i>	<i>First cycle of higher education (Bachelor's degree)</i>
<i>Field of Study</i>	<i>12 Information Technologies</i>
<i>Specialty</i>	<i>123 Computer engineering</i>
<i>Educational program</i>	<i>Computer systems and networks</i>
<i>Discipline status</i>	<i>Normative</i>
<i>Teaching language</i>	<i>English</i>
<i>Year of studies, semester</i>	<i>2 year (3 semester, 4 semester)</i>
<i>Number of credits ECTS</i>	<i>6,5 credits</i>
<i>Distribution by types of trainings and hours of study</i>	<i>Lectures, Laboratory studies, Independent training</i>
<i>Form of final assessment</i>	<i>Exam, exam</i>
<i>Teacher</i>	<i>Mulesa O.Yu., Doctor of technical sciences, Professor of the department of computer systems and networks</i>
<i>Teacher's contacts</i>	<i>oksana.mulesa@uzhnu.edu.ua</i>
<i>Course Schedule</i>	<i>According to the timetable</i>
<p><i>The purpose of the discipline "System programming" is to study the fundamentals of modern processor architecture and Assembler programming techniques, to familiarize students with the problems facing system programming and the main directions of their solutions.</i></p> <p><i>As a result of studying the discipline the student must:</i></p> <p><i>know:</i></p> <ul style="list-style-type: none"> <li><i>- fundamentals of modern processor architecture at the level of programmable elements, Assembler syntax, directive semantics and machine instructions.</i></li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li><i>- use system commands and system data of different microprocessor modes, features of coprocessor programming</i></li> </ul>	
<p><b>Prerequisites for learning</b> Mathematical Analysis, Linear Algebra and Analytic Geometry</p>	
<p><b>Content of the educational discipline</b></p>	
<p><b>Module 1.</b></p> <p><b>Topic 1.</b> Fundamentals of microprocessor architecture x86-x64</p> <p><b>Topic 2.</b> Processor modes</p> <p><b>Topic 3.</b> Basic Assembler Directives and Operands</p> <p><b>Topic 4.</b> Stages of creating programs in Assembler language</p> <p><b>Topic 5.</b> Data transfer operations</p> <p><b>Topic 6.</b> Basic arithmetic operations</p> <p><b>Topic 7.</b> BCD and ASCII numbers</p> <p><b>Module 2.</b></p> <p><b>Topic 1.</b> Logic and shift commands</p> <p><b>Topic 2.</b> Control transfer commands</p> <p><b>Topic 3.</b> Programming using procedures</p> <p><b>Topic 4.</b> String operations</p> <p><b>Topic 5.</b> Structures</p> <p><b>Topic 6.</b> Protected Mode</p> <p><b>Topic 7.</b> Multitasking</p> <p><b>Module 3.</b></p> <p><b>Topic 1.</b> Macrodefinition</p> <p><b>Topic 2.</b> Co-processor data types</p> <p><b>Topic 3.</b> Software model of the coprocessor</p> <p><b>Topic 4.</b> Coprocessor command system</p> <p><b>Topic 5.</b> Computer formats of coprocessor commands</p>	

<b>Module 4.</b> <b>Topic 1.</b> Long mode <b>Topic 2.</b> Command encoding in mode IA-32e <b>Topic 3.</b> Programming for Win32 <b>Topic 4.</b> Win64 basics <b>Topic 5.</b> Assemblers			
<b>Course page on the Moodle platform (personal training system)</b>		<i>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. <a href="https://moodle.uzhnu.edu.ua">https://moodle.uzhnu.edu.ua</a></i>	
<b>Recommended literature</b>			
<ol style="list-style-type: none"> <li>1. Intel® 64 and IA-32 Architectures Software Developer's Manual. Volume 1, 2a, 2b, 2c, 2d</li> <li>2. Adam Hoover, System Programming with C and Unix 1st Edition. - Pearson, 2019. - 379p.</li> <li>3. Dr. Rian Quinn, Hands-On System Programming with C++: Build performant and concurrent Unix and Linux systems with C++17. - Packt Publishing, 2018. - 552p</li> </ol>			
<b>Assessment system of learning outcomes</b>			
<p>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:</p> <ol style="list-style-type: none"> <li>1. Modular control work (MCW) duration of 2 acad. hours each. The maximum number of points for the MCW is 50 points.</li> <li>2. Performance of laboratory works.</li> </ol> <p>During an academic semester students perform laboratory work, which are rated a maximum of 40 points.</p> <p>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.</p> <p>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.</p>			
<b>ECTS and national grading scale</b>			
Mark scale	ECTS	Exam	Test
90 - 100	A	Excellent	Satisfied
82 - 89	B	Good	
74 - 81	C		
64 - 73	D	Satisfactory	
60 - 63	E		
35 - 59	FX	“Unsatisfactory” with possibility to pass the exam again	“Not satisfied” with possibility to pass the exam again
1 - 34	F	“Unsatisfactory” with obligatory repeated study of the discipline	“Not satisfied” with obligatory repeated study of the discipline