

**Syllabus of the educational discipline**  
**« HARDWARE DESCRIPTION LANGUAGES »**

<b>Cycle of Higher Education</b>	<i>First cycle of higher education (Bachelor's degree)</i>
<b>Field of Study</b>	<i>12 Information Technologies</i>
<b>Specialty</b>	<i>123 Computer engineering</i>
<b>Educational program</b>	<i>Computer systems and networks</i>
<b>Discipline status</b>	<i>Compulsory</i>
<b>Teaching language</b>	<i>English</i>
<b>Year of studies, semester</b>	<i>3 year (6 semester)</i>
<b>Number of credits ECTS</b>	<i>3 credits</i>
<b>Distribution by types of trainings and hours of study</b>	<i>Lectures, Laboratory studies, Independent training</i>
<b>Form of final assessment</b>	<i>Exam</i>
<b>Teacher</b>	<i>Marina K. I., assistant lecturer of the department of computer systems and network</i>
<b>Teacher's contacts</b>	<i>kateryna.marina@uzhnu.edu.ua</i>
<b>Course Schedule</b>	<i>According to the timetable</i>
<p><i>The purpose of the discipline "Hardware description languages" is to acquire theoretical knowledge about modern technologies of designing electronic devices, about languages of project description AHDL, VHDL, studying the basics of MAX + Plus II, study of different approaches to the description of projects, project verification, methods of improving the efficiency of design operations using languages AHDL, VHDL.</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>- purpose, types of support and features of the organization of the main characteristics and architecture of CAD MAX+Plus II;</i></li> <li><i>- routes of designing VLSI using the MAX+Plus II design system and design description languages AHDL, VHDL</i></li> </ul> <p><i>be able to:</i></p> <ul style="list-style-type: none"> <li><i>- develop designs using MAX+ plus II CAD software and hardware description languages AHDL and VHDL; use graphical, text and waveform design when creating a project</i></li> </ul>	
<p><b>Prerequisites for learning</b></p> <p>Computer Logic, Computer Circuitry</p>	
<p><b>Content of the educational discipline</b></p>	
<p><b>Topic 1.</b> Introduction. The history of developing programmable logic integrated circuits, their classification and architecture</p> <p><b>Topic 2.</b> FPGA design system MAX+PLUS II.</p> <p><b>Topic 3.</b> Project input editors of the MAX+plus II design system</p> <p><b>Topic 4.</b> Additional editors of the MAX+plus II system</p> <p><b>Topic 5.</b> Creating and editing project elements</p> <p><b>Topic 6.</b> Modern methodologies for designing digital systems</p> <p><b>Topic 7.</b> AHDL basics</p> <p><b>Topic 8.</b> Structure of a text description in AHDL</p> <p><b>Topic 9.</b> Using AHDL structures</p> <p><b>Topic 10.</b> Description of combinational circuits</p> <p><b>Topic 11.</b> Designing sequential components</p> <p><b>Topic 12.</b> Finite Automata and their description in AHDL</p> <p><b>Topic 13.</b> Designing arithmetic devices</p> <p><b>Topic 14.</b> Designing arithmetic devices using LPM_MULT function</p> <p><b>Topic 15.</b> Designing arithmetic devices using control automata</p>	
<b>Course page on the</b>	<i>Syllabus of the educational discipline, hyperlinks to electronic</i>

<b>Moodle platform (personal training system)</b>	<i>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. <i>Ph.D. Scarpino, Frank A. VHDL and AHDL Digital System Implementation. - Prentice Hall, 1997. - 316.</i></li> <li>2. <i>Charles Henry Gould Programming for a Digital Computer Control System. - Hassell Street Press, 2021. - 108p.</i></li> <li>3. <i>Abraham I Pressman Design of Transistorized Circuits for Digital Computers. - Hassell Street Press, 2021. - 336p</i></li> </ol>			
<b>Assessment system of learning outcomes</b>			
<p><i>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:</i></p>			
<ol style="list-style-type: none"> <li>1. <i>Modular control work (MCW) duration of 2 acad. hours each. The maximum number of points for the MCW is 50 points.</i></li> <li>2. <i>Performance of laboratory works.</i></li> </ol>			
<p><i>During the semester, students perform laboratory works(maximum number of points - 40)</i></p>			
<p><i>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.</i></p>			
<p><i>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.</i></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