Syllabus Form of Academic Discipline

№	Field name	Detailed content, comments
1.	Name of the faculty	Faculty of Automatics and Computerized Technologies
2.	The level of higher education	Bachelor's
3.	Code and title of specialty	173 – Avionics
4.	The type and title of the educational program	Educational Program of Embedded System in Avionics
5.	Code and title of the discipline	Designing devices on microcontrollers and FPGAs. FPGA
6.	Number of ECTS credits	4
7.	The structure of the course (distribution by type and hours of training)	4 ECTS credits: 12 h. – 6 lecture, 36 h. – 9 laboratory works, 8 h. – 4 consultations, 64 h. – independent work, type of control: exam.
8.	Schedule (terms) of study of the subject	3 Course, 6 semester of study (2 Course, 4 semester of study for a shortened form of study)
9.	Prerequisites for learning the discipline	Disciplines that must be studied before: Higher Mathematics, Programming, Basics of Circuitry, Designing devices on microcontrollers and FPGAs. Modeling of digital signals by means of MATLAB and VHDL, Designing devices on microcontrollers and FPGAs. Microcontrollers
10.	Abstract (content) of the discipline	Mandatory discipline of basic (professional) training, contains the following content modules: Basics of VHDL language. Description of digital system in VHDL language. Description of devices in VHDL language. Programming of modern FPGA Artix 7 manufactured by Xilinx in VHDL language. Study of methods and means of debugging and simulation of projects using Xilinx Vivado CAD.
11.	Competencies, knowledge, skills, understanding that a higher education acquirer has in the learning process	- the ability to competently choose the elements of systems: sensors, actuators, digital controllers and to create software; - be able to justify the choice of technical structure and to develop the application software for microprocessor control systems based on local automation tools, industrial controllers, programmable logic matrices and FPGA.
12.	Learning outcomes of a Higher Education applicant	- to solve at the hardware and software level the task of building specialized hardware; - create models of digital systems at different levels of description: abstract, schematic and software; - to master the methods of decomposition of the system, which are implemented in hardware and software; - implement a description of logic (program) of medium complexity in VHDL; - to develop embedded microprocessor systems based on FPGA.
13.	Assessment system in accordance with each	To get a positive grade in the discipline PPMP.PLIS students must know the basics of programming systems for digital systems in

	task for taking tests/exams	HDL, the basics of synthesis and analysis of logic circuits, FPGA circuitry Artix-7, be able to write programs of medium complexity in VHDL, know methods and tools for debugging Vivado CAD software. Students must complete and defend laboratory work. The credit is assessed by a rating, which is defined as the number of points obtained by the student during the semester on a 100-point scale.
14.	The quality of the educational process	Adherence to the principles of academic integrity (http://lib.nure.ua/plagiat). Update of the work program of the discipline - 2020. The laboratory workshop is equipped with modern laboratory layouts Nexys 4 DDR Artix-7 FPGA Trainer Board and uses modern software: MatLab, Vivado Design Suite from Xilinx.
15.	Methodological support	Complex of educational and methodical support of educational discipline «Designing devices on microcontrollers and FPGAs. Modeling of digital signals by means of MATLAB and VHDL. Microcontrollers. FPGA» for students of all forms of specialties: 125 – «Cybersecurity» (STPI), 151 – «Automation and computer-integrated technologies», 152 – «Metrology and Information-Measuring Technique», 163 – «Biomedical Engineering», 171 – «Electronics», 172 – «Telecommunications and radio engineering», 173 – «Avionics» / [Electronic resource] Authors.: I. Svyd, I. Obod, O.Vorgul, L. Saikivska, O. Zubkov. – Kharkiv, 2020. – 380 p. http://catalogue.nure.ua/knmz. 2. Methodical instructions to laboratory works on discipline «Designing devices on microcontrollers and FPGAs.FPGA» for students of all forms of specialties: 125 – «Cybersecurity» (STPI), 151 – «Automation and computer-integrated technologies», 152 – «Metrology and Information-Measuring Technique», 163 – «Biomedical Engineering», 171 – «Electronics», 172 – «Telecommunications and radio engineering», 173 – «Avionics» / [Electronic resource] Authors.: I. Svyd, I. Obod, O.Vorgul, L. Saikivska, O. Zubkov. – Kharkiv: NURE, 2020. – 95 c. – pdf 2,1 Mb.
16.	The developer of the Syllabus	Svyd Iryna, Head of Department of MTS, Candidate of Technical Sciences, Associate Professor iryna.svyd@nure.ua Obod Ivan, Professor the Department of Microprocessor Technologies and Systems, Doctor of Technical Sciences, Professor ivan.obod@nure.ua Vorgul Oleksander, Assosiate Professor of the Department of MTS, Candidate of Technical Sciences, Associate Professor oleksandr.vorgul@nure.ua Zubkov Oleh, Assosiate Professor of the Department of MTS, Candidate of Technical Sciences, Associate Professor oleh.zubkov@nure.ua Saikivska Liliia, Assosiate Professor of the Department of MTS, Candidate of Technical Sciences, Associate Professor liliia.saikivska@nure.ua