



Syllabus of the academic discipline
«FUNDAMENTALS OF SEMICONDUCTOR MATERIALS AND DEVICES»
 Educational-professional programs:
 «Electronic systems»
 «Electronic technologies of the Internet of Things»
 «Computerized Means of Monitoring Tools of Frequency Resource»
 Specialty: 171 Electronics
 Field of knowledge: 17 Electronics and telecommunications

Higher education level	Bachelor
Discipline status	Academic discipline of the professional component of Educational
Course	1 (first)
Semester	odd
The scope of discipline, ECTS credits / hours	5,5credits/165hours
Teaching language	Ukrainian,English
What will be studied (subject of study)	Physical principles of operation of semiconductor structures and their application in the construction of a semiconductor element base of electronics. Research of processes occurring in semiconductor structures. Study methods of semiconductor devices construction on the basis of semiconductor materials. Research parameters and characteristics of semiconductor devices.
Why it is interesting/necessary to study (goal)	Semiconductor materials and devices are the basis of the element base in all areas of electronics. Semiconductor structures are the main element for the construction and manufacture of digital, analog and discrete electronic components. The principles of operation of all, without exception, semiconductor elements are based on the physical basis of semiconductor materials. Therefore, the aim of the discipline is to highlight the physical foundations of semiconductor materials, principles and construction methods of semiconductor devices.
What can be learned (learning outcomes)	Students acquire knowledge of the principles of semiconductor devices for the successful selection of electronic components in the design of digital and analog components of electronic devices, assessing the compliance of devices in operation, the current state of the element base. Be able to work with measuring instruments during measuring basic electrical parameters.

How can you use the acquired knowledge and skills (competences)	The competency approach of the discipline focuses on the end result of the educational process, aimed at forming the future specialist's willingness to effectively use the acquired knowledge to solve problems of analysis and design of electronic devices, as well as their use in solving many engineering problems.
Educational logistics	<p>Course content: The main types of semiconductor devices. Graphic symbols of semiconductor devices. Electron-hole transition. Contact potential difference. Diffusion capacitance of the p-n junction. Transients in the p-n junction. Designs of bipolar transistors. Circuit diagrams of bipolar transistors and their transmission characteristics. Features of semiconductor structures of field-effect transistors, design. Volt-ampere characteristics of field-effect transistors.</p> <p>Activities: Lectures, laboratory work, module tests.</p> <p>Teaching methods: Educational research based on discussion, computer modeling, laboratory work and online work.</p> <p>Forms of training: group, individual, frontal, collective, classroom and extracurricular.</p>
Prerequisites	"Higher Mathematics", "Physics", "Theory of Electric Circuits".
Requisites	It is the basis of such disciplines as: "Electronic systems", "Fundamentals of digital systems", "Fundamentals of analog electronics", "Power electronics". Mastering the principles of semiconductor devices is one of the main criteria for studying the disciplines of electronic direction.
Information support from the repository and fund of NTB NAU	http://er.nau.edu.ua/ http://www.lib.nau.edu.ua/main/ ntb@nau.edu.ua
Location and logistics	Training sessions are held in a specialized classroom equipped with computer and projection equipment. Students are provided with electronic teaching aids, laboratory practice, programs, laboratory digital equipment.