

The syllabus of the discipline

***IoT platforms***

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<b>Field name</b>	<b>Detailed content, comments</b>
Name of the faculty	Faculty of Infocommunications
Level of higher education	First (bachelor's)
Code and name of the specialty	172 Telecommunications and radio engineering
Type and name of educational program	EPP "Information and Network Engineering"
Name of the discipline	IoT platforms
Number of ECTS credits	4
Discipline structure (distribution by types and hours of study)	24 hours - 12 lectures, 4 hours - 2 practical classes, 20 hours - 5 laboratory classes, 8 hours - 4 consultations, 64 hours - homework, <b>type of control:</b> credit
Schedule (terms) of studying the discipline	4th year, VII semester
Prerequisites for studying the discipline	students must have a basic knowledge of higher mathematics
Competences, knowledge, skills, understanding, which is acquired by the applicant in higher education in the learning process	The discipline is used for formation the following competencies: to have a terminological apparatus, basic skills of programming end devices, basic skills in connecting end devices to the network, basic skills in creating a software solution for processing and storing data from using cloud technologies.
The quality of the educational process	Educational-methodical and material-technical resource provision of the educational program, within the framework of which the discipline is studied, meets the licensing requirements and accreditation conditions of the educational activity of the university. Annual monitoring and revision of the curriculum of the discipline in accordance with the requirements and recommendations of the Ministry of Education and Science, state certification of acquired competencies of graduates, standards of cooperation with employers to ensure a competitive level of training. Adherence to the principles of academic integrity ( <a href="https://lib.nure.ua/plagiat">https://lib.nure.ua/plagiat</a> ). Contains public information on the requirements, competencies, level of education within the current educational program

## **Description and content of the discipline**

The purpose of studying the discipline - to study a new concept of communication networks - the Internet of Things, and the implementation of this concept in practice.

The purpose of teaching the discipline is to study a new concept of communication networks - the Internet of Things, and the implementation of this concept in practice. The discipline "IoT Platforms" should provide a foundation for the training of future professionals in the field of fundamentally new communication networks, as well as create the necessary basis for successful mastery of the following special disciplines of the curriculum. It should promote the development of creative abilities of students, the ability to formulate and solve problems to be studied, the ability to creatively apply and improve their knowledge. These goals are achieved through the fundamentalization, intensification and individualization of the learning process through the implementation and effective use of domestic and foreign science in the field of information and communication technologies, widespread use of new standards of the International Telecommunication Union (ITU), European Telecommunications Standardization Institute (ETSI ) Institute of Electrical and Electronics Engineers (IEEE).

### **Content**

#### **Content module 1. General principles of interaction and technological basis**

Topic 1. Introduction. Basic concepts of IoT.

Topic 2. IoT architecture and hardware.

Topic 3. Methods of information transfer in IoT.

Topic 4. Networking protocols.

Topic 5. Data processing in IoT. Semantic Web.

#### **Content module 2. Tools for implementing the Internet of Things**

Topic 1. The main characteristics of Big Data (Big Data).

Topic 2. The use of cloud technologies and service-oriented IoT architectures.

Topic 3. Principles of creating user applications.

Topic 4. IoT services, applications and business models.

Topic 5. Security in IoT.

Topic 6. Practical implementations.

### **Learning outcomes of higher education**

As a result of studying the discipline, students must:

know: the principles of organization and functioning of the Internet of Things, the history of origin and development, the main factors of development, existing technologies in the field, the main trends and directions in the field of the Internet of Things;

be able to: work with microcontrollers and main debug boards (Arduino and Raspberry Pi), understand existing IoT technologies and apply them to specific scenarios, design integrated IoT systems (including end devices, network connection, data exchange, cloud platforms, data analysis).

## Assessment system according to each task for passing the test / exam

To assess the student's work during the semester, the final rating  $Q_{sem}$  is calculated as the sum of grades for different types of classes and control measures.

Type of lesson / control measure	Rating
Lc №1-6	$(1...2) \times 6 = 6...12$
Lb №1-2	$(8...12) \times 2 = 16...24$
<b>Control point 1</b>	<b>22...36</b>
Lc №7-12	$(1...2) \times 6 = 6...12$
Lb №3-5	$(8...12) \times 3 = 24...36$
Control test	8...16
<b>Control point 2</b>	<b>38...64</b>
Total for the semester	<b>60...100</b>

Each laboratory work is evaluated at 12 points (2 points for work, 2 points for preparation for the lesson, 8 points for defense). As a type of control, individual classroom control work is provided, which is evaluated at 16 points. Maximum rating during the semester - 100 points. As a form of final control in the discipline "IoT Platforms" is used offset.

## Qualitative evaluation criteria in the national scale and ECTS

**Satisfactory, D, E (60-74).** Show the required minimum of theoretical knowledge. Know the ways and methods of solving practical problems and be able to use them in practice.

**Well, C (75-89).** Firmly know a minimum of theoretical knowledge. Demonstrate the ability to solve a practical problem and justify all stages of the proposed solution.

**Excellent, A, B (90-100).** Show complete knowledge of basic and additional theoretical material. Unmistakably solve a practical problem, explain and justify the chosen method of solution. Criteria for assessing the knowledge and skills of the student in the combined exam.

## Assessment scale: national and ECTS

The sum of points for all types of educational activities	ECTS assessment	Score on a national scale	
		for exam, course project(work), practice	for offset
90 – 100	<b>A</b>	perfectly	credited
82-89	<b>B</b>	fine	
74-81	<b>C</b>	satisfactorily	
64-73	<b>D</b>		
60-63	<b>E</b>		
35-59	<b>FX</b>	unsatisfactory with the possibility of reassembly	not credited with the possibility of re-assembly
0-34	<b>F</b>	unsatisfactory with the possibility of the re-examination	not credited with compulsory re-study of the discipline

## Methodical support

### Basic literature

1. Rosliakov, A.V. Ynternet veshchei: uchebnoe posobyе/  
A.V. Rosliakov, S.V. Vaniashyn, A.Iu. Hrebeshkov. – Samara: PHUTY, 2015. – 200 s.
2. Kucheriavyi A.E., Prokopev A.V., Kucheriavyi E.A. Samoorhanyzuiushchyesia sety: uchebnoe posobyе. – SPb.: Liubavych, 2011. – 309 s.
3. Holdstein B.S., Sokolov N.A., Yanovskiy H.H. Sety sviazy: uchebnyk dlia vuzov. – SPb.: BKhV, 2010.
4. Ynternet veshchei. Yssledovaniya y oblast pryomeneniya: monohrafiya/  
E.P. Zaramenskykh, Y.E. Artemev. – M.: NYT's YNFRA-M, 2015. – 200 s

### Supporting literature

1. Kucheriavyi A. E. Ynternet Veshchei// Elektrosviaz. – 2013. – № 1.
2. Bohorodytskaia Y.A. M2M – novye vozmozhnosti dlia razvytiya sotovoho byznesa/  
Y.A. Bohorodytskaia // Elektrosviaz. – 2012. – №1. – S. 38-39.
3. Holdstein, B.S. Sety sviazy post-NGN / B.S. Holdstein, A.E.Kucheriavyi. – SPb.: BKhV-Peterburh, 2013. – 160 s.
4. Rekomendatsiia MSЭ-T Y.3001. Budushchye sety: tselevye ustanovky y tsely proektyrovaniya, 2011 [Elektronnyi resurs]. – 26 s.
5. ETSI TS 102 690 «Machine-to-Machine communications (M2M); Functional architecture» [Elektronnyi resurs], V1.1.1. – 2011. – 280 r.
6. ISO/IEC 18092:2004. Information technology – Telecommunications and information exchange between systems – Near Field Communication – Interface and Protocol (NFCIP-1)

### Methodical instructions for different classes

7. Metodychni vkazivky do laboratornykh robit z dystsypliny «Platformy IoT» dlia studentiv usikh form navchannia spetsialnosti 172 «Telekomunikatsii ta radiotekhnika», spetsializatsiia: Informatsiini merezhi zviazku/  
Uporiad. V.O. Vlasova. – Kharkiv: KhNURE, 2017. [Elektronne vydannia]

### Information support

1. Cisco Packet Tracer 7 software.
2. Arduino Software Development Environment (IDE).