The syllabus of the discipline

Smart House automated control systems

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Field name	**Detailed content, comments**
Name of the faculty	Faculty of Infocommunications
Level of higher education	Second (master'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	Smart House automated control systems
Number of ECTS credits	3
Discipline structure (distribution by types and hours of study)	14 hours - 7 lectures, 8 hours - 2 laboratory classes, 6 hours - 3 consultations, 54 hours - homework, **type of control**: credit
Schedule (terms) of studying the discipline	1st year, I, II semester 2nd year, III semester
Prerequisites for studying the discipline	students must have an idea of the principle of operation of complex engineering systems, have programming skills.
Competences, knowledge, skills, understanding, which is acquired by the applicant in higher education in the learning process	The discipline is used to form the following competencies: FC-6. Ability to use information technology, methods of intellectualization and visualization, artificial intelligence, cloud computing for research and analysis of processes in information communication networks. FC-8. Ability to demonstrate and use knowledge of modern computer and information technologies and tools of engineering and research, calculations, data processing and analysis, evaluation of systems efficiency and methods of quality assessment, modeling and optimization of communication information networks. FC-11. Ability to use standard and develop their own software products, focused on solving problems of design, calculation and ensuring the efficient operation of information networks and components of their infrastructure. FC-12. Ability to analyze, develop and improve scientific, design, technological, metrological and organizational and management documentation. FC-14. Ability to assess problem situations and shortcomings in the design, installation, configuration, operation and operation of information networks, to formulate proposals for solving problems

	and eliminating shortcomings.
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 (https://lib.nure.ua/plagiat). Contains public information on the requirements, competencies, level of education within the current educational program.

Description and content of the discipline

The purpose of the discipline is to create a holistic view of the principles of automation of engineering systems and high-tech devices for modern residential buildings.

Content

Topic 1. Introduction to Smart House technology. Basic concepts.
Topic 2. Features of designing a smart home system.
Topic 3. Typical solutions for a smart home.
Topic 4. Home security: video surveillance, access control and fire alarm.
Topic 5. Climate systems.
Topic 6. Water supply and water heating systems.
Topic 7. Lighting systems and control of electrical appliances.
Topic 8. Multiroom - multimedia systems.
Topic 9. Central control systems.

Learning outcomes of higher education

As a result of studying the discipline, students must:

know: regulatory documents and other information that are the source data for the design of automation of engineering systems for residential smart homes;

be able to: perform design and configuration of an automated smart home management system;

to own (list of formed competencies): PRN1. Be able to analyze the current state of information networks in order to develop scenarios for the development, modernization of existing or design of new information networks of any scale and for various purposes. PRN2. Be able to use modern software to manage information

networks at all levels of the hierarchical model. PRN4. Be able to deploy network infrastructure based on modern technologies, protocols and operating systems. PRN5. Be able to use virtualization tools and cloud services. PRN8. Be able to ensure reliable continuous operation of network infrastructure and software applications.

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

To evaluate the student's work during the semester, the final rating is calculated as the sum of grades for different types of classes and grades for control activities.

Each lecture is evaluated in 2 points (1 point for attendance, 1 point for activity). Each laboratory work is evaluated in a maximum of 14 points (2 points for attendance, 2 points for training, 10 points for defense). Home control work DKR - 30 points. The maximum rating during the semester is 100 points.

Type of lesson / control measure	Rating
Lk №1-7	(1…2)×7=7…14
Lb №1-4	(11…15)×4=44…60
DKR	9…26
Total for the semester	**60…100**

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.

Good, 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.

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	**A**	perfectly	credited
82-89	**B**	fine	
74-81	**C**		
64-73	**D**	satisfactorily	
60-63	**E**		
35-59	**FX**	unsatisfactory with the possibility of reassembly	not credited with the possibility of re-assembly
0-34	**F**	unsatisfactory with mandatory re-examination	not credited with compulsory re-study of the discipline

Methodical support

Basic literature

1. Vlasova V.O. Informacijno-merezhni tehnologiyi v sistemah upravlinnya «Rozumnij budinok»: Navch. posibnik. Harkiv: HNURE, 2019. 122 s.

2. Mark E.S. Prakticheskie sovety i resheniya po sozdaniyu "Umnogo doma" [Tekst]/ E.S. Mark. - M.: NT Press, 2007 g. – 432 c.

3. Petin V. Proekty s ispolzovaniem kontrollera Arduino [Tekst]: 2-e izd./ V.Petin. - SPb.: BHV-Peterburg, 2014. - 464 s.: il. - (Elektronika). -ISBN 978-5-9775-3337-9.

4. Buharkin E.N. Inzhenernye seti, oborudovanie zdanij i sooruzhenij [Tekst]: uchebnik dlya vuzov/ E.N. Buharkin, V.V. Kushniryuk. - M.: Vysshaya shkola, 2001. - 416 s. - ISBN: 5-06-003827-0

Supporting literature

5. Teslya E.V. «Umnyj dom» svoimi rukami. Stroim intellektualnuyu cifrovuyu sistemu v svoej kvartire (+CD) [Tekst]/ E.V. Teslya, SPb: PITER, 2008. – 224 s.

6. Robert K. Elsenpiter, Tobi Dzh. Velt Umnyj Dom stroim sami [Tekst]: Per. s angl. / K. Robert, P. Elsen, Dzh. Velt Tobi. - Kudic-Obraz, 2004. - 362 s. - ISBN: 5957900370

7. Harke V. Umnyj dom. Obedinenie v set bytovoj tehniki i sistemy kommunikacij v zhilishnom stroitelstve [Tekst]/ V. Harke. -Tehnosfera, 2006 g. – 290 s.

8. Shishmarev V.Yu. Avtomatika [Tekst]/: uchebnik dlya sred. prof. obrazovaniya/ V.Yu. Shishmarev, T.I. Kaspina. - M.: Izdatelskij centr "Akademiya", 2004. - 350 s.
9. Gololobov V. N. «Umnyj dom» svoimi rukami [Tekst]/ V.N. Gololobov. - M.: NT Press, 2007. - 416 s.

Methodical instructions for different types of classes

10. Metodichni vkazivki do laboratornih robit z disciplini «Avtomatizovani sistemi upravlinnya Smart House» dlya studentiv usih form navchannya specialnosti 172 «Telekomunikaciyi ta radiotehnika», specializaciya: Informacijni merezhi zv'yazku [Tekst]/ Uporyad. V.O. Vlasova. – Harkiv: HNURE, 2017. – 22 s.

Information support

1. Arduino IDE software.
2. AnyLogic software.
3. Cisco Packet Tracer - a data network simulator manufactured by Cisco Systems.