SYLLABUS educational component (by the choice of higher education students)

TECHNOLOGIES OF WASTE-FREE PRODUCTION OF BUILDING MATERIALS

Discipline name:	Technologies of waste-free production of building materials
Level of higher education:	second (master's)
Course page in Moodle:	https://dl2022.khadi-kh.com/course/view.php?id=2983
The scope of the educational component	3 кредити (90 годин)
Final control form	Test
Consultations:	on schedule
Name of the department:	Department of Road Construction Materials Tech- nology
Teaching language:	Ukrainian
Course leader:	Serhii Oksak, Ph.D., associate professor
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Brief content of the educational component:

The purpose of the educational component is: formation of skills and competencies of future specialists to ensure effective organization of new modern low-waste and zero-waste technologies in construction, promising technological processes, as well as laying the ground-work for preparing future specialists for a responsible position to participate in the development, improvement, planning of technologies and management in the production of road construction materials, making optimal decisions on this basis, taking into account the achievements of scientific and technical progress and international experience.

Subject: there are laws (principles) of the organization of waste-free and low-waste technologies for the production of road construction materials, and the application of these laws (principles) in professional activity.

The main tasks of studying an academic discipline are:

- formation of a set of knowledge, skills and ideas about the composition, structure, physical and mechanical properties of road construction materials and products obtained from used industrial resources, as well as waste-free and low-waste production technologies of road construction materials;

- formation of a scientific worldview, professional capacity and general outlook regarding the application of waste-free and low-waste technologies for the production of road construction materials;

- formation of directions for improvement and development of ways of using secondary products and industrial waste in the production of road construction materials and products.

Prerequisites for studying the educational component: the study of this educational component is preceded by the disciplines: "Ecology", "Engineering geology", "Construction materials science", "Physico-chemical mechanics of road construction materials".

Competencies acquired by the acquirer:

General competences:

Knowledge and understanding of the subject area and professional activity. **Special (professional) competences:**

The ability to design construction structures, buildings, structures and engineering networks (according to specialization), taking into account engineering and technical and resource-saving methods, legal, social, ecological, technical and economic indicators, scientific and ethical aspects, and modern requirements of regulatory documentation in the field of architecture and construction, environmental protection and labor safety.

Program learning outcomes:

Design and implement technological processes of construction production, using appropriate equipment, materials, tools and methods.

Rational use of modern construction materials, products and structures based on knowledge of their technical characteristics and manufacturing technology.

Design construction structures, buildings, structures, engineering networks and technological processes of construction production, taking into account engineering and technical and resource-saving methods, legal, social, ecological, technical and economic factors, scientific and ethical aspects, and modern requirements of regulatory documentation, time and other restrictions in the field of architecture and construction, environmental protection and labor safety.

No		Number of		
ton-	Name of topics (LC, LW, PW, SC, IW)	hc	ours	
ics		Full-	exter-	
100		time	nal	
1	2	3	4	
	LC. Waste-free production. general principles and provisions.	2		
1	PW. Features and use of industrial waste depending on its chemical and	2		
	aggregate state.	7	11	
	C. Lies of industrial waste in construction	/	11	
	LC. Use of industrial waste in construction.	2	2	
2	their formation	2		
	W. The principle of recovery of industrial waste.	7	9	
	LC. Use of waste from mining enterprises for the production of road con-			
	struction materials.	2		
2	PW. Energy saving in the production technology of precast concrete and			
3	reinforced concrete products for road and bridge construction.	2		
	IW. Basic physico-chemical patterns in the development of low-waste and			
	zero-waste technological processes.	6	10	
	LC. Use of chemical industry waste for the production of road construction			
	materials.	2		
	PW. Justification of the choice of constituent materials for the production			
4	of cement-concrete mixtures and sources of their production under the			
	conditions of minimum energy consumption.	2		
	IW. Peculiarities of the technology of production of building materials and			
	products using waste from chemical and technological industries.	8	12	
	LC. Mineral binders using production waste.	2		
	PW. Justification of the choice of constituent materials for the production			
5	of cement-concrete mixtures and sources of their production under the			
-	conditions of minimum energy consumption.	2		
	IVV. The use of secondary products and industrial waste in the production		40	
	of heat-insulating building materials.	8	12	

Thematic plan

	LC. Use of secondary products and industrial waste in the production of cement-concrete mixtures, concrete and reinforced concrete products. PW. The selection of types of cement-concrete mixtures for the arrange-	2	2
6	ment of road bases and pavements, taking into account the minimum en- ergy consumption during their production. IW. Determining the possibility of using industrial waste depending on its	2	2
	dangerousness.	6	6
	LC. Road organic binders from oil industry waste.	2	
7	PW. Selection of types of asphalt concrete mixtures taking into account the minimum energy consumption for their laying and compaction. W. Ways of improving the properties of organic binders obtained from in-	2	2
	dustrial waste.	8	10
	LC. Use of secondary products and industrial waste in the production of asphalt concrete mixtures.	2	2
8	the minimum energy consumption for their laying and compaction. W. The use of old pavement material in the production of asphalt concrete	2	
	mixtures.	8	10
т.	LC	16	6
tal	PW	16	4
lai	IW	58	80

Teaching methods:

1) verbal: 1.1 traditional: lectures, explanations, stories, etc;

- 1.2 interactive (non-traditional): problem lectures, discussions, etc;
- 2) visual: the method of illustrations, the method of demonstrations

3) practical: 3.1 traditional: practical classes, seminars.

Evaluation system and requirements:

Current performance

1 The current success of applicants for the performance of educational types of work in training sessions and for the performance of independent work tasks is evaluated using a four-point rating scale with subsequent transfer to a 100-point scale. During the evaluation of the current academic performance, all types of work provided by the educational program are taken into account.

1.1 Lecture classes are evaluated by determining the quality of performance of specified tasks.

1.2 Practical classes are evaluated by the quality of performance of a control or individual task, performance and design of practical work.

2 The current performance of higher education applicants is assessed at each practical session (laboratory or seminar) on a four-point scale («5», «4», «3», «2») and entered in the journal of academic performance.

 – «excellent»: the applicant mastered the theoretical material flawlessly, demonstrates in-depth knowledge of the relevant topic or academic discipline, the main provisions;

– «good»: the applicant has mastered the theoretical material well, possesses the main aspects from primary sources and recommended literature, presents it in a reasoned manner; has practical skills, expresses his thoughts on certain problems, but certain inaccuracies and errors are assumed in the logic of the presentation of theoretical content or in the analysis of practical;

- «satisfactory»: the applicant has basically mastered the theoretical knowledge of the educational topic or discipline, orients himself in primary sources and recommended

literature, but answers unconvincingly, confuses concepts, answers additional questions uncertainly, does not have stable knowledge; when answering questions of a practical nature, reveals inaccuracy in knowledge, does not know how to evaluate facts and phenomena, connect them with the future profession;

– «unsatisfactory»: the applicant has not mastered the educational material of the topic (discipline), does not know scientific facts, definitions, hardly orients himself in primary sources and recommended literature, lacks scientific thinking, practical skills are not formed.
 3 The final score for the current activity is recognized as the arithmetic mean sum of points for each lesson, for individual work, current control works according to the formula:

$$K^{current} = \frac{K_{1+K_{2+\ldots}+K_{n}}}{n},$$

where $K^{current}$ – final assessment of success based on the results of current control;

 $K1, K2, \dots, Kn$ – assessment of the success of the n-th measure of current control;

n – number of ongoing control measures.

Grades are converted into points according to the calculation scale (table 1).

00010							
4-point	100- point	4- point	100- point	4- point	100- point	4- point	100- point
scale	scale	scale	scale	scale	scale	scale	scale
5	100	4,45	89	3,90	78	3,35	67
4,95	99	4,4	88	3,85	77	3,3	66
4,9	98	4,35	87	3,80	76	3,25	65
4,85	97	4,3	86	3,75	75	3,2	64
4,8	96	4,25	85	3,7	74	3,15	63
4,75	95	4,20	84	3,65	73	3,1	62
4,7	94	4,15	83	3,60	72	3,05	61
4,65	93	4,10	82	3,55	71	3	60
1.0	00	4 OF	01	<u>о г</u>	70	from 1,78 to 2,99	from 35 to 59
4,0	92	4,05	01	3,5	70	reasser	mbly
4,55	91	4,00	80	3,45	69	from 0 to 1,77	from 0 to 34
4,5	90	3,95	79	3,4	68	repeated	study

 Table 1 – Recalculation of the average grade for the current activity into a multi-point scale

Final assessment

1 A student of higher education receives a credit in the last lesson in the discipline based on the results of the current assessment. The average score for the current activity is converted into points on a 100-point scale, according to the conversion table (table 1).

Applicants of higher education who have an average current score in the discipline lower than "3" (60 points) can increase their current score in the last session by taking tests in the discipline.

Assessment of knowledge of applicants by means of testing is carried out according to a scale:

- «Excellent»: at least 90% of correct answers;
- «Very good»: from 82% to 89% of correct answers;
- «Good»: from 74% to 81% of correct answers;
- «Satisfactory»: from 67% to 73% of correct answers;
- «Satisfactory enough»: from 60% to 66% of correct answers;
- «Unsatisfactory»: less than 60% of correct answers.

2 The condition for obtaining credit is:

- making up for all missed classes;

- average current grade in the discipline not lower than «3» (60 points).

3 For performing individual independent work and participating in scientific events, winners are awarded additional points.

3.1 Additional points are added to the sum of points scored by the student of higher education for the current educational activity (for disciplines for which the final form of control is a test), or to the final grade in the discipline for which the final form of control is an exam.

3.2 The number of additional points awarded for different types of individual tasks depends on their volume and importance:

- prizes in the discipline at the international / all-Ukrainian competition of scientific student works - 20 points;

- prize places in the discipline at the All-Ukrainian Olympiads - 20 points;

- participation in the international / all-Ukrainian competition of scientific student works - 15 points

- participation in international / all-Ukrainian scientific conferences of students and young scientists - 12 points;

- participation in all-Ukrainian Olympiads in the discipline - 10 points

- participation in Olympiads and scientific conferences of the KhNAHU in the discipline - 5 points;

- performance of individual research (educational and research) tasks of increased complexity - 5 points.

3.3 The number of additional points cannot exceed 20 points.

4 The learning result is evaluated (select is required):

- on a two-point scale (passed/failed) according to table 2;

– on a 100-point scale (for differentiated assessment) according to table 3.

The final grade together with additional points cannot exceed 100 points.

Table 2 – Scale for transferring points to the national evaluation sys	stem
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100-points scale	National scale
From 60 points to 100 points	Passed
Less then 60 points	Failed

Table 3 – The scale for evaluating the knowledge of students based on the results of the final control of the academic discipline

Score in	core in National scale			Mark in ECTS scale
points	exam	test	Mark	Criteria
90-100	Perfectly	Passed	A	The theoretical content of the course has been mas- tered in its entirety, without gaps, the necessary practi- cal skills for working with the mastered material have been formed, all educational tasks provided for in the training program have been completed, the quality of their performance has been assessed with a number of points close to the maximum
80–89	Fine	Passed	В	The theoretical content of the course has been mas- tered in its entirety, without gaps, the necessary practi- cal skills for working with the mastered material have mainly been formed, all educational tasks provided for by the training program have been completed, the qual- ity of most of them has been assessed with a number of points close to the maximum

Score in	Nation	al scale	Mark in ECTS scale			
points	exam	test	Mark	Criteria		
75-79			C	The theoretical content of the course has been mas- tered in its entirety, without gaps, some practical skills of working with the mastered material have not been formed enough, all educational tasks provided for by the training program have been completed, the quality of none of them has been assessed with a minimum num- ber of points, some types of tasks have been completed with errors		
67-74	ictorily		D	The theoretical content of the course is partially mas- tered, but the gaps are not of a significant nature, the necessary practical skills for working with the mastered material are basically formed, most of the educational tasks provided by the training program have been com- pleted, some of the completed tasks may contain errors		
60–66	Satisfa		E	The theoretical content of the course has been partially mastered, some practical work skills have not been formed, many educational tasks provided by the training program have not been completed, or the quality of some of them has been evaluated with a number of points close to the minimum.		
35–59	Unsatisfactorily	ailed	FX	The theoretical content of the course has been partially mastered, the necessary practical work skills have not been formed, most of the prescribed training programs of educational tasks have not been completed, or the quality of their implementation has been assessed with a number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of the performance of educational tasks (with the possibility of retaking)		
0–34	Unacceptable		F	The theoretical content of the course has not been mas- tered, the necessary practical work skills have not been formed, all completed educational tasks contain gross errors, additional independent work on the course ma- terial will not lead to any significant improvement in the quality of the performance of educational tasks (with a mandatory repeat course).		

Course policy:

- the course involves working in a team, the environment in the classroom is friendly, creative, open to constructive criticism;

 mastering the discipline involves mandatory attendance at lectures and practical classes, as well as independent work;

- independent work involves the study of individual topics of the academic discipline, which are presented in accordance with the program for independent study, or were considered briefly;

- all tasks provided by the program must be completed within the set time;

- if the student of higher education is absent from classes for a good reason, he presents the completed tasks during independent preparation and consultation of the teacher;

- while studying the course, students of higher education must adhere to the rules of academic integrity set forth in the following documents: «Rules of academic integrity of participants in the educational process of the KhNAHU» (https://www.khadi.kharkov.ua/fileadmin/P Standart/pologeniva/stvnz 67_01_dobroch_1.pdf), «Academic integrity. Checking text scientific the academic. and qualification works for plagiarism» of (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_85_1_01.pdf), «Moral and ethical code of participants in the educational process of the KhNAHU» (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf). - in case of detection of plagiarism, the applicant receives 0 points for the task and must repeat the tasks provided for in the syllabus;

- writing off during tests and exams is prohibited (including using mobile devices). Mobile devices are allowed to be used only during online testing.

Recommended Books

1. «Про схвалення Національної стратегії управління відходами в Україні до 2030 року» Розпорядження Кабінету Міністрів України № 820-р від 8 листопада 2017 р.

2. Кропівний В. М. Утилізація та рекуперація відходів. Навчальний посібник. – Кропивницький: ЦНТУ, 2020. -440 с.

3. Космін, О. В. Технологія безвідходного виробництва : навч. посібник / О. В. Космін ; Харківський національний автомобільно-дорожній університет. – Харків, 2012. – 255 с. 4. Дворкін Л.Й., Лаповська С.Д. Будівельне матеріалознавство. Підручник. – Рівне : НУВГП, 2016. – 448 с.

5. Караїм О. А. Технологічні основи безвідходних виробництв. – Луцьк: Вежа-Друк, 2014. – 88 c.

6. Дворкін Л.Й., Дворкін О.Л., Пушкарьова К.К., Кочевих М.О., Мохорт М.А., Безсмертний М.П. Використання техногенних продуктів у будівництві / Навчальний посібник. – Рівне. – 2009. – 340 с.

7. Золотарев В.А. Дорожные битумные вяжущие и асфальтобетоны. Часть 1. Дорожные битумные вяжущие: учебник / В.А. Золотарев. – Х.: ХНАДУ, 2014. – 180 с.

8. Золотарев В.А. Дорожные битумные вяжущие и асфальтобетоны. Часть 2. Дорожные асфальтобетоны: учебник / В.А. Золотарев. – Харьков: ХНАДУ, 2016. – 204 с.

Additional resources:

- 1. distance course: https://dl2022.khadi-kh.com/course/view.php?id=2983
- 2. http://www.nbwv.gov.ua
- 3. http://korolenko.kharkov.com
- 4. http://library.univer.kharkov.ua

Developer(s) the syllabus of the academic discipline

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