Syllabus
of the educational component

Resource saving in production and safety of materials based on mineral binders

Discipline name:	**Resource saving in production and safety of materials based on mineral binders**
Level of higher education:	**second (master's)**
Course page in Moodle:	**https://dl.khadi.kharkov.ua/course/view.php?id=2909**
The scope of the educational component:	**3 credits (90 hours)**
Final control form:	**credit**
Consultations:	**on schedule**
Name of the department:	**Department of Chemistry and Chemical Technology**
Language of teaching:	**Ukrainian**
Head of the course:	**Khobotova Elina Borysivna, Dr. Chem. Sc., professor**
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Brief content of the educational component:

The goal of studying the academic discipline is to prepare masters in the field of technology for the production of building and road building materials and products, the possibility of using the acquired knowledge in future professional activities.

The subject of studying the discipline is a pedagogically adapted system of concepts about the requirements for handling wastes of different composition, determining their value as raw materials and the main technologies for the utilization of various industrial wastes for the manufacture of building materials.

The main tasks of the discipline are finding ways to save resources in the production of building materials based on mineral binders in specific regional conditions; determination of the degree of environmental safety of building materials when using industrial waste; use of the regulatory framework in the field of environmental protection and rational use of natural resources; application of the theoretical foundations of the discipline and experimental skills in the study of other special disciplines.

Teaching methods:

1) verbal: lectures, explanations, stories, etc.;
2) visual: method of illustrations, method of demonstrations
3) practical: problem solving and task completion.

Thematic plan

№	Name of topics (LC, PR, IW)	Number of hours
1	LC: Evaluation and classification of industrial waste.	2
	PR: Determination of the waste hazard class by calculation.	4
	IW: Varieties of waste classifications. Storage of moderate and low hazardous waste.	8
2	LC: Classification of toxic substances and the main elements of toxicometry.	2
	PR: Calculation of quantitative criteria of toxicity and danger of compounds in the composition of industrial poisons.	2
	IW: General and specific in the action of industrial poisons. The main types of acute and chronic poisoning at work.	8
3	LC: Connection of the composition, structure and properties of compounds with indicators of toxic action.	2
	PR: Calculation of indicators of toxicity and MPC of harmful compounds.	2
	IW: Communication of toxicity of inorganic compounds with their structure and physicochemical properties.	8
4	LC: Dust pollution.	2
	PR: Calculation of dust pollution hazard characteristics.	2
	IW: Aerosols of fibrogenic action.	8
5	LC: Use of by-products containing gypsum in the production of binders.	2
	PR: Determination of the quality of phosphogypsum waste as a raw material for the production of binders.	2
	IW: Varieties of burning and non-burning technologies using phosphogypsum.	8
6	LC: Aluminosilicate by-products of complex composition production.	2
	PR: Aluminosilicate by-products of complex composition production.	4
	IW: Types of decomposition of metallurgical slags. The use of ash and slag waste from thermal power plants in the production of building materials.	6
7	LC: Physico-chemical bases for the use of industrial waste in the production of mineral binders.	2
	IW: Activation of slags depending on their basicity and process conditions.	5
8	LC: Use of industrial waste in the production of binders.	2
	IW: Liquid and soluble glass. Types of slag-alkaline binders.	5
Total	LC	16
	PR	16
	IW	56

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 tasks of independent work is assessed using a four-point rating scale, followed by transfer to a 100-point scale. When assessing the current performance, all types of work provided for by the curriculum are taken into account.

1.1 Lectures are evaluated in determining the quality of the performance of specific tasks and tests.

1.2 Laboratory classes are evaluated by the quality of the reports on the implementation of laboratory work.

2 The assessment of the current performance of applicants for higher education is carried out on each laboratory work on a four-point scale (“5”, “4”, “3”, “2”), the grades are recorded in the academic record book.

– "excellent": the applicant perfectly mastered the theoretical material, demonstrates deep knowledge of the relevant topic or academic discipline;

– "good": the applicant has mastered the theoretical material well, has the main aspects from the primary sources and recommended literature, and argues it; has practical skills, expresses his views on certain problems, but allows certain inaccuracies and errors in the logic of the presentation of theoretical content or in the analysis of practical material;

– "satisfactory": the applicant has basically mastered the theoretical knowledge of the educational topic or discipline, is guided by primary sources and recommended literature, but answers unconvincingly, confuses concepts, uncertainly answers additional questions, does not have stable knowledge; answering questions of a practical nature, reveals inaccuracies in knowledge, does not know how to evaluate facts and phenomena, to connect them with a future profession;

– "unsatisfactory": the applicant has not mastered the educational material of the topic (discipline), does not know scientific facts, definitions, almost does not orient himself in primary sources and recommended literature, there is no scientific thinking, practical skills are not formed.

3 The final score for the current activity is recognized as the arithmetic mean of the scores for each lesson, current tests according to the formula:

$$C^{current} = \frac{C_1 + C_2 + ... + C_n}{n},$$

where: $C^{current}$ – final assessment of academic performance based on the results of current control;

C_1, C_2, C_n – assessment of academic performance of the n-th activity of the current control;

n – number of monitoring measures.

Grades are converted to points on a conversion scale (Table 1).

Table 1 – Recalculation of the average score for current activities on a multi-point scale

4 point scale	100 point scale	4 point scale	100 point scale	4 point scale	100 point scale	4 point scale	100 point 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
4,6	92	4,05	81	3,5	70	from 1,78 to 2,99	from 35 to 59
re-taking							
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 training	

Final grade

1 The applicant for higher education receives a credit at the last lesson in the discipline based on the results of the current assessment. The average rating for current activities is converted into points on a 100-point scale, according to the recalculation table (Table 1).

Applicants for higher education who have an average current grade in the discipline below “3” (60 points) can increase their current score at the last lesson by passing tests in the discipline.

Assessment of applicants' knowledge by testing is carried out on a scale:

- “Excellent”: at least 90% of correct answers;
- “Very good”: from 82% to 89% 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% correct answers.

The condition for receiving a credit is:

- working off all missed classes;
- the average current grade of the discipline is not lower than “3” (60 points).

2 For the performance of individual independent work and for participation in scientific events, applicants are awarded additional points.

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

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

– prize-winning 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 the All-Ukrainian Olympiads in discipline – 10 points;

– participation in olympiads and scientific conferences of KhNAHU in the discipline – 5 points;

– performance of individual research (training and research) tasks of increased complexity – 5 points.

2.2 The number of additional points cannot exceed 20 points.

3 The learning outcome is assessed (select one):

– on a two-point scale (passed/failed);

– on a 100-point scale (for a differentiated test) according to Table 3.

The final score, together with additional points, cannot exceed 100 points.

Table 2 - Scale for transferring points to the national assessment system

On a 100-point scale	On a national scale
from 60 points to 100 points	passed
less than 60 points	failed

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

Score in points	National scale score		ECTS score	
			Grade	Criteria
	exam	credit		
90-100	**Excellent**	**Passed**	**A**	The theoretical meaning of the course has been mastered completely, without gaps, the necessary practical skills for working with the mastered material have been formed, all the training tasks provided for by the training program have been completed, the quality of their implementation has been assessed by a number of points close to the maximum
80–89	**Good**	**Passed**	**B**	The theoretical meaning of the course is mastered completely, without gaps, practical skills of working with the mastered material are basically formed, all training tasks provided for by the training program are completed, the quality of most of them is estimated by a number of points close to the maximum
75-79			**C**	The theoretical content of the course has been mastered completely, without gaps, some practical skills in working with the mastered material are not sufficiently formed, all the training tasks provided for by the training program have been completed, the quality of none of them has been assessed with a minimum number of points, some types of tasks have been completed with errors
67-74	**Satisfactory**		**D**	The theoretical content of the course has been partially mastered, but the gaps are not significant, practical skills are needed to work with the mastered material, basically formed, most of the training tasks provided for by the training program have been completed, some of the completed tasks may contain errors
60–66			**E**	The theoretical content of the course has been partially mastered, some practical work skills have not been formed, many training tasks provided for by the training program have not been completed, or the quality of some of them has been assessed with a number of points close to the minimum
35–59	**Unsatisfactory**	**Failed**	**FX**	The theoretical content of the course has been partially mastered, the necessary practical work skills have not been formed, most of the provided training programs for training 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 implementation of training tasks (with the possibility of re-composing)
0–34	**Unacceptably**		**F**	The theoretical content of the course has not been mastered, the necessary practical work skills have not been developed, all completed training tasks contain gross errors, additional independent work on the course material will not lead to any significant improvement in the quality of the training tasks (with a mandatory re-course)

Course policy:

– the course provides for teamwork, the environment in the classroom is friendly, creative, open to constructive criticism;

– the development of the discipline involves the mandatory attendance of lectures and practical classes, as well as independent work;

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

– all tasks stipulated by the program must be completed on time;

– if the applicant for higher education is absent from classes for a good reason, he presents completed assignments during self-study and consultation with the teacher;

− when studying the course, applicants for higher education must comply with the rules of academic virtue set forth in the following documents: “Rules of academic virtue for participants in the educational process of KhNAHU” (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf), “Academic integrity. Checking the text of academic, scientific and qualifying works for plagiarism» (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_85_1_01.pdf), "Moral code of participants in the educational process of KHNADU" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf).

− in case of detection of the fact of plagiarism, the applicant receives 0 points for the task and must re-perform the task provided for in the syllabus;

− cheating during tests and exams is prohibited (including using mobile devices). Mobile devices are only allowed to be used for online testing.

Recommended literature

1. Khobotova E.B. Fundamentals of ecological toxicology: a training manual / E. B. Khobotova, M. I. Ukhanyova, O. M. Kraynyukov. - Kharkiv: KhNAHU, 2012. − 280 p. [in Ukrainian]

2. Technologies of waste disposal and recycling. Guidelines for the implementation of course work for students of specialties 101 "Ecology" and 183 "Technology of environmental protection" / O.O. Borysovska; NTU "Dnipro Polytechnic". – Dnipro: NTU "DP", 2019. − 44 p. [in Ukrainian]

3. Khobotova E.B., Ukhanyova M.I. Human ecology (section "Influence of physical factors on human health"): Lecture notes. − Kharkiv: KhNAHU, 2009. − 72 p. [in Ukrainian]

4. Waste management and handling. Part 2. Solid household waste / V. G. Petruk, I. V. Vasylkivskyi, S. M. Kvaterniuk [and others]. Vinnytsia: VNTU, 2015. − 100 p. [in Ukrainian]

5. Management and waste management: Textbook / T.P. Shanina, O.R. Gubanova, M.O. Klymenko, T.A. Safranov, V.Yu. Korinevska, O.O. Bedunkova, A.I. Volkov. Edited by T.A. Safranov, M.O. Klymenko. Odesa: 2019. − 258 p. [in Ukrainian]

4. Ecology and balanced nature management: textbook / Malovaniy M.S., Leskiv G.Z. Kherson: Oldi Plus, 2019. − 314 p. [in Ukrainian]

Additional sources

1. Course-resource of the discipline " Resource saving in production and safety of materials based on mineral binders" https://dl.khadi.kharkov.ua/course/view.php?id=2909

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