

Syllabus
educational component

Materials science and technology structural materials

Subjects:	Materials science and technology structural materials
Level of higher education:	first (bachelor)
Course page in Moodle:	https://dl2022.khadi-kh.com/course/view.php?id=1619
The scope of the educational component	3 credits (90 hours)
Final control form	Exam
Consultations:	Provided by the curriculum
Name of the department:	department of metal technology and materials science
Teaching language:	English
Course leader:	Omelchenko Leonid Vitaliyovych, Ph.D., associate professor
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Brief content of the educational component:

the purpose is formation in students totality knowledge, skill and skills for solution tasks with technologies metals and materials science in industry mechanical engineering at the stage of using structural materials with the required complex properties depending from conditions exploitation products with them

Subject : became and technologies processing of steel

The main tasks of studying an academic discipline are:

- considering the regularities of crystallization from the liquid state, as well as plastic deformation and thermal processing;
- consideration regularities formation structures and properties everyone industrial of steel alloys and non-metallic materials;
- consideration technologies welding, processing metals pressure and cutting

Prerequisites for studying the educational component:

Higher mathematician, Physics, Chemistry

Competencies acquired by the acquirer:

General competences:

Ability communicate state language how orally, so and in writing

Ability communicate foreign language

Ability accept substantiated decision.

Skills using informative and communication technologies.

Ability to learn and master modern knowledge

Ability work in team

Ability detect the initiative and entrepreneurship

Awareness equals opportunities and gender problems.

Special (professional) competences:

The ability to analyze the effectiveness of project decisions related to selection operation, improvement, modernization technological equipment and equipment in the field of metrological support for standardization, certification automotive industry and technical regulation;

Ability perform calculations technological processes in sphere metrology, standardization, certification and technical regulation in automotive industry.

Ability to collect, analyze and interpret information (data) in sphere metrology, standardization, certification and technical regulation in automotive industry;

The ability to ensure the quality of education and management of the institution's activities education, in accordance to specialization

Learning outcomes according to the educational program:

Understand specifics communications, interaction and cooperation in international cultural and professional contexts.

Communicate clearly and unambiguously professional knowledge, justification and conclusions to specialists and wide in general state and foreign languages

Analyze and assess risks, problems in professional activity and choose effective ones ways their solution.

Independently plan and organize one's own professional activities and activity acquirers education and subordinates

Search, process, analyze and evaluate information that concerns professional activities, use specialized software provision and modern means storage and processing information

Be able to design and realize educational/developmental projects

Be able to choose and use the necessary equipment, tools and methods for solving typical complex tasks in the field of metrology, standardization, certification and technical regulation in automotive industry.

Thematic plan

Topic No	Name of topics (LC, LR, PR, SZ, SR)	Number of hours
		ocular
1	LK. Quality and properties materials	2
	LR. Research macro and microstructures of metals and alloys	2
	SR. Electric and magnetic properties materials	8
2	LK. Iron carbon alloys	2
	LR. Chart state iron-carbon	2
	SR. Influence carbon and permanent impurity on properties of steel	8
3	LK. Thermal and chemical and thermal processing.	2
	LR. Hardening became	2
	SR. Transformation into steel when heated and cooling Influence speed cooling onstructure and properties of steel	2
	LR. Construction diagrams isothermal transformation austenite	2
	SR. Diffusion metallization	8
4	LK. Alloyed became and colored metals and their alloys	2
	LR. Influence thermal processing on structure and properties aluminum and aluminum alloys	2
	SR. Specifics phases, what are formed alloying elements in alloys on basis of iron	8
5	LK. Structural non-metallic materials: plastics, ceramics, rubber, glass. Compositematerials Powder and anti-friction materials	2

	LR. Anti-frictional materials	2
	SR. Production products with polymeric materials	8
6	LK. Kinds and technologies welding	2
	LR. development technologies manual arc welding	2
	SR. Modern methods welding details	8
7	LK. Theoretical foundations processing metals pressure and cutting	2
	SR. Processing structural materials on metal cutting lathes	8
Together	LC	16
	PR	16
	SR	56

Individual educational and research task (if available): absent

Teaching methods:

- 1) verbal: 1.1 traditional: lectures, explanations, stories, etc.; 1.2 non-traditional: electronic version, remote.
- 2) visual: method of illustrations, method of demonstrations
- 3) practical: 3.1 traditional practical classes 3.2 non-traditional remote

System assessment 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 for 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.

1.3 Laboratory classes are evaluated by the quality of reports on the performance of laboratory work.

1.4 Seminar classes are evaluated by the quality of individual assignment/abstract.

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 winner mastered the theoretical material flawlessly, demonstrates deep knowledge of the relevant topic or academic discipline, the main provisions;

– "good": the applicant has mastered the theoretical material well, has the main aspects from primary sources and recommended literature, presents it in an argumentative 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 ones;

– "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 test works according to the formula:

$$K^{nomou} = \frac{K1 + K2 + \dots + Kn}{n},$$

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

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

n – number of ongoing control measures.

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

Table 1 – Conversion of the average score for the current activity into a multi-point scale

4-point scale	100 points scale	4-ball scale	100 points scale	4-ball scale	100 points scale	4-ball scale	100 points 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
						reassembly	
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	

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 for higher education who have a current grade point average in the discipline lower than "3" (60 points) can increase their current grade by taking tests in the discipline in the last session.

Assessment of the knowledge of applicants through testing is carried out according to the following scale:

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

2 The condition for obtaining credit is:

- making up for all missed classes;

– the average current grade in the discipline is not lower than "3" (60 points).

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

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 Khnadu in the discipline - 5 points;

– performance of individual scientific and 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 the required one*) :

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

– for 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 system

On a 100-point scale	On a national scale
from 60 points to 100 points	counted
less than 60 points	not counted

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

Score in points	Evaluation on a national scale		Evaluation according to the ECTS scale	
	examination	test	Rating	Criteria
90-100	Perfectly	Enrolled	A	The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical 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

Score in points	Evaluation on a national scale		Evaluation according to the ECTS scale	
	examination	test	Rating	Criteria
80–89	Okay	Enrolled	B	The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical skills for working with the mastered material have mainly been formed, all educational tasks provided for by the training program have been completed, the quality of most of them has been assessed with a number of points close to the maximum
75-79			C	The theoretical content of the course has been mastered 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 number of points, some types of tasks have been completed with errors
67-74	Satisfactorily		D	The theoretical content of the course is partially mastered, 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 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 educational tasks provided 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	Unsatisfactorily	Not counted	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 mastered, the necessary practical work skills have not been formed, all completed educational tasks contain gross errors, additional independent work on the course material 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 valid reason, he presents the completed tasks during independent preparation and consultation of the teacher;
- while studying the course, students of higher education must comply with the rules of academic integrity set forth in the following documents: "Rules of academic integrity of participants in the educational process of the Khnadu" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf), "Academic integrity. Checking the text of completed scientific and works for plagiarism" (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 Khnadu" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf).
- in case detection the fact plagiarism getter receives by task 0 points and must repeat the tasks provided for in the syllabus ;
- writing off lectures or practical works, using other people's educational materials (including using mobile devices) is prohibited. Mobile devices are allowed to be used only during online checking of practical task results, additional testing.

Recommended Books:

1. Basic literature

1. Dyachenko S.S., Doshchekina I.V., Movlyan A.O., Pleshakova E.Sh. Materials science: Textbook/Pro Ed. Prof. S.S. Dyachenko. – Kharkiv: LOOKING FOR 2007.- 440 p.
2. Alloy steels and alloys: teaching. manual / L. F. Rudenko, T. P. Govorun. – Amounts: Sumy state university, 2012. – 171 with
3. Construction worker A.F., Yuskaev V.B., Construction worker O.A. Non-metallic materials in modern society: Educational manual.- Sumy: Kind-in Sumy State University, 2008. -222 p
4. Kvasnytskyi V.V. Special methods welding: Educational manual .- Mykolaiv: UDMTU, 2003.- 437 p

2. Supporting literature:

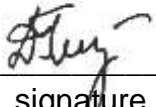
- 1 <http://forca.ru/spravka/spravka/provodnikovye-materialy.html>
- 2 <http://sermir.narod.ru/lec/lect1.htm>

Developer(s)
syllabus of the educational
discipline


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