

**Syllabus**  
**educational component**

**Modern methods in welding and related technologies**

Name disciplines:	<b>Modern methods in welding and related technologies</b>
Level higher Education:	<b>the first (bachelor's)</b>
Page course in Moodle:	<a href="https://dl.khadi.kharkov.ua/enrol/index.php?id=1560">https://dl.khadi.kharkov.ua/enrol/index.php?id=1560</a>
Amount educational component	<b>3 loans (90 hours)</b>
Form final control	<b>Test</b>
Consultations:	<b>by schedule</b>
Name departments:	<b>chair technologies metals and materials science</b>
Language teaching:	<b>English</b>
Head course:	<b>Valery Anatoliyovych Bagrov, Ph.D., Assoc.</b>
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**Short content educational component:**

**The goal is to** study ways to achieve phase and structural equilibrium of alloys and mechanisms of their implementation; study of experimental methods of structural research many, physical and mechanical, electrophysical, magnetic, optical and technological properties materials..

**Subject:** theoretical and methodological foundations, methodical position scientific directions welding on modern stage

**Expected the results teaching with disciplines**

Know:

- theoretical foundations welding melting ;
- the main ones directions and prospects development welding melting;
- methods calculation and experimental definition technological parameters process at application different ways welding melting;
- methods of choosing an effective method of welding based on features welded materials and operational requirements to inseparable connection;able to :
- be able conduct analysis and development basics technologies from application welding melting ;
- be able determine calculated by and experimentally the main onesmode parameters fusion welding.

**Prerequisites for study educational component:**

Physics. Chemistry. Technology structural materials andmaterial science. Materials science

**Competencies, whose acquires getter:**

**General competences :**

Ability to oral and written communication native language

Ability act on based on legal and ethical judgment

Ability find and use information with domestic and otherearthly sources

Knowledge and understanding own specialty

**Special (professional) competences:**

Ability use modern informative communication technologies inprofessional activity in the field of materials science and technologies materials

Skill perform literary search sources, in so number of foreign, inprofessional sphere and use their in own professional activity

Knowledge regularities phase transformations in metals and alloys  
 Knowledge basic groups materials and ability justified carry out their choice for specific conditions operation

**The results teaching according to educational programs:**

Know foundations elements theoretical and experimental so far jinn in professional activity  
 Be able use achievement modern information technologies, draw up programs.

Know the main groups of materials and reasonably make their selection for specific conditions operation

Use experimental methods research structural, physical and mechanical, electrophysical, magnetic, optical and technological powerstevia materials

**Thematic plan**

No topics	Name topics (LK, LR, PR, NW, SR)	Number hours
		ocular
1	LK Topic 1. Classification basic ways welding melting	2
	PR (LR, NW) -	-
	SRS: 1. processing synopsis lectures and recommended literature	2
2	LK Topic 2. Types welded seams and connections, guests, what regulate preparation edges and dimensions seams	2
	PR. software 1: P Specifics preparation edges in dependencies from welded connections	2
	SRS: 1. Processing synopsis lectures and recommended literature 2. Preparation reports	4
3	LK Topic 3. Classification and characteristic welding materials	2
	software – 2: Production and technological trial covered electrodes	2
	SRS: 1. Processing synopsis lectures and recommended literature 2. Preparation reports	2
4	LK Topic 4. Machinery and technology various ways welding	2
	software – 2: Production and technological trial covered electrodes depth boiling water	2
	SR Modern equipment for growing metal single crystals.	6
5	LC Topic 5. Electrical equipment welding surfacing	2
	software – 3: Fraction the main metal in metals seam and uniform energy	2
	SRS: 1. processing synopsis lectures and recommended literature	6
6	LK Topic 6. Equipment for gas welding.	2
	software – 4: Coefficient melting, surfacing, losses on burn out and robbing, productivity welding.	2
	SRS: 1. Processing synopsis lectures and recommended literature 2. Preparation reports	6
7	Topic 7. Weldability metals	2
	software -5: Gas communication and equipment gas posts	2
	SR Amorphous materials with special properties	4

8	Topic 8. Welding carbon, low- and medium-alloyed of steel what are hardened	2
	PZ	-
	SR Practical cases deviation from classical laws diffusion	2
9	LK Topic 9. Welding high chrome martensitic, martensitic-ferritic and ferritic of steel	2
	PZ – 6: Determination of technical and economic indicators welding ways manual arc welding different species superficial processing	2
	SRS: 1. processing synopsis lectures and recommended literature 2. Preparation reports	2
10	LK Topic 10. Welding highly alloyed austenitic of steel and alloys	2
	PR	-
	SRS: 1. Processing synopsis lectures and recommended literature 2. Preparation reports	2
11	LK Topic 11. Welding heterogeneous of steel	4
	software – 8: Calculations and audit modes automatic welding under layer by layer flux on given depth boiling water	2
	SRS: 1. Processing synopsis lectures and recommended literature 2. Preparation reports	-
12	LK Topic 12. Technology welding cast iron	4
	PR	-
	SRS: 1. processing synopsis lectures and recommended literature 2. Preparation reports	2
13	LK Topic thirteen. Technology welding colored metals and alloys General characteristic, classification, region application. Specifics technologies welding.	6
	PR	-
	SRS: 1. Processing synopsis lectures and recommended literature 2. Preparation reports	2
<b>Toget her</b>	LK	32
	PR (LR, NW)	16
	SR	42

**Individual educational and research task** (if available):

#### **Teaching methods:**

- 1) verbal: 1.1 traditional: lectures, explanations, stories, etc.;
- 1.2 interactive (non-traditional): problem lectures, discussions, etc.;
- 2) visual: method of illustrations, method of demonstrations
- 3) practical: 3.1 traditional: practical classes, seminars;
- 3.2 interactive (non-traditional): business and role-playing games, trainings, seminars-discussions, "round table", brainstorming method.

#### **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
<b>90-100</b>	<b>Perfectly</b>	<b>Enrolled</b>	<b>A</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 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
<b>80-89</b>	<b>Okay</b>	<b>Enrolled</b>	<b>B</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
<b>75-79</b>			<b>C</b>	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

Score in points	Evaluation on a national scale		Evaluation according to the ECTS scale	
	examination	test	Rating	Criteria
<b>67-74</b>	<b>Satisfactorily</b>		<b>D</b>	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
<b>60-66</b>			<b>E</b>	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.
<b>35-59</b>	<b>Unsatisfactorily</b>	<b>Not counted</b>	<b>FX</b>	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)
<b>0-34</b>	<b>Unacceptable</b>		<b>F</b>	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 of 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;
- the coursework must be protected no later than a week before the beginning of the examination session (indicated if available);
- 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 Khnadu" ([https://www.khadi.kharkov.ua/fileadmin/P\\_Standart/pologeniya/stvnz\\_67\\_01\\_dobroch\\_1.pdf](https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf)), "Academic integrity. Checking the text of academic, scientific and qualification works for plagiarism"

([https://www.khadi.kharkov.ua/fileadmin/P\\_Standart/pologeniya/stvnz\\_85\\_1\\_01.pdf](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](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 literature:** (*literature not later 10 years, besides 1 fundamental classical textbook or monographs*)

### 1. Basic literature

1.1 G. I. Lashchenko. Contemporary welding technologies production / K.: "Ecotechnology", 2017. — 720 with..

1.2. Dyachenko S.S. Materials science : textbook / WITH. WITH. Dyachenko, AND. IN. Doshchekin, AND. AT. Movlyan, IS. AND. Pleshakov. — Kharkiv : Kind-in LOOKING FOR 2007. — 440 with.

### 2. Auxiliary literature

2.1. Lebedev V.G. Materials science and heat treatment of welded joints: synopsis lectures for students of special 7.092303 / V.G. Lebedev, O.G. Derevyanchenko, O.V. Koss, N.M. Klymenko; Odessa national polytechnic university Odesa : Science and machinery, 2007.— 136 with.

### Additional sources:

3.1. <http://files.khadi.kharkov.ua>; mechanical faculty, chair technologiesmetals and materials science

3.2. [www.osvarke.com/osaite.html](http://www.osvarke.com/osaite.html) – informative project, dedicatedquarrel sharp surfacing and the second relatives processes.

3.3 <http://weldingsite.com.ua/osobenosti.html>-Svarka of steel and splavov, features

3.1 <http://osvarke.info/88-uchenye-filmy.html>- "AT quarrel" informative sitefor masters p/o teachers special discipline

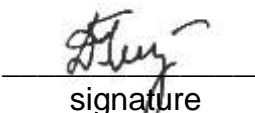
3.2 [http://www.gost-svarka.ru/konspekt/0\\_konspekt.htm](http://www.gost-svarka.ru/konspekt/0_konspekt.htm)- guests on a quarrel

Developer(s)  
syllabus of the educational  
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