Syllabus educational component

Basics of interchangeability

Discipline name:	Basics of interchangeability
Level of higher education:	first (bachelor's)
Course page in Moodle:	https://dl2022.khadi-kh.com/course/view.php?id=4019
The volume of the educational	4 credits (120 hours)
component	
Form of final control	Passed
Consultations:	on schedule
Name of the department:	Department of Metrology and Life Safety
Language of instruction:	English
Course leader:	Dmytro Petrukovyyh, k. Ph.D., Associate Professor
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Summary of the educational component:

The goal is to familiarize students with the basic principles of ensuring interchangeability in technical engineering and ways of their practical implementation.

Subject: types and methods of interchangeability, the procedure for calculating tolerances and landings of compounds of different types.

The main tasks of studying the discipline are:

- providing an idea of interchangeability, tolerance and landing systems;

 study of the concept in the inclination of the shape and location of the surfaces of parts;

- formation of skills in calculating the parameters of planting smooth cylindrical and conical, threaded, gear, worm, key, slotted, spherical connections, dimensional chains.

Prerequisites for studying:

Introduction to the specialty, Mechanical Engineering, Descriptive Geometry, Engineering and Computer Graphics, Physical Quantities and Measurements.

Competences that the applicant acquires:

General competencies:

Ability to apply professional knowledge and skills in practical situations; Ability to learn and master modern knowledge;

Ability to evaluate and ensure the quality of work performed.

Special (professional) competencies:

Ability to apply standard calculation methods in the design of modules, parts and assemblies of measuring instruments and their computational components and modules.

Learning results:

Be able to organize and conduct measurements, technical control and testing.

Thematic plan

Topic		Number of hours				
numbe r	Title of topics (LK, LR, PR, SZ, WED)	Eye	Corres ponde nce			
	LK1. Basic concepts of interchangeability and systems of tolerances and landings.	2				
1	PR1. Measurement of cylindrical surfaces	2				
	CP1. Deviations of the shape and location of the surfaces of parts	11				
	LK2. Interchangeability of smooth cylindrical connections	2				
2	PR2. Calculation of landing parameters of smooth cylindrical connections					
	CP2. Calibers for controlling smooth cylindrical joints					
	LK3. Interchangeability of smooth conical compounds	2				
3	3 PR3. Calculation of landing parameters of smooth conical joints					
	CP3. Control of angles and cones	11				
	LK4. Interchangeability of threaded connections	2				
4 PR4. Calculation of the parameters of landings of threade connections		2				
	CP4. Methods and means of control of cylindrical threads	11				
	LK5. Interchangeability of gears and worm gears	2				
5	PR5. Calculation of gear and gear landing parameters	2				
	CP5. Methods and means of control of gears and gears					
	LK6. Interchangeability of key and spline connections	2				
6	PR6. Calculation of landing parameters of keyed and spline joints	2				
	CP6. Methods and means of control of keyed and spline joints	11				
	LK7. Interchangeability of spherical connections	2				
7	7 PR7. Calculation of landing parameters of spherical connections					
	CP7. Methods and means of controlling spherical connections	11				
	LK8. Dimensional chains	2				
8	PR8. Calculation of dimensional chains	2				
	CP8. Dimensional chain control methods	11				
Toget	LUX	16				
her	PR (LR, NW)	16				
	WED	88				

Individual educational and research task (if any):

Teaching Methods:

1) verbal: 1.1 traditional: lectures, explanations, narration, 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;

3.2 interactive (non-traditional): business and role-playing games, trainings, discussion seminars, "round table", brainstorming method, case study.

Grading system and requirements:

Current success

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 scale of grades, followed by recalculation into a 100-point scale. During the assessment of current performance, all types of work provided for by the curriculum are taken into account.

1.1 Lectures are evaluated by determining the quality of the specified tasks.

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

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

1.4 Seminars are evaluated by the quality of the individual task / abstract.

2 Evaluation of the current performance of applicants for higher education is carried out at each practical lesson (laboratory or seminar) on a four-point scale ("5", "4", "C", "2") and recorded in the journal of accounting for academic performance.

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

– "good": the applicant has well mastered the theoretical material, owns the main aspects from primary sources and recommended literature, reasonably teaches it; has practical skills, expresses his reasoning about certain problems, but assumes certain inaccuracies and errors in the logic of presenting theoretical content or in the analysis of practical;

– "satisfactory": the applicant has mainly mastered the theoretical knowledge of an educational topic or discipline, is oriented in primary sources and recommended literature, but unconvincingly answers, 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, 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, is almost not oriented in primary sources and recommended literature, there is no scientific thinking, practical skills are not formed.

3 The final score for current activities is recognized as the arithmetic average sum of points for each lesson, for individual work, current tests according to the formula:

$$K^{curent} = \frac{K1 + K2 + \ldots + Kn}{n},$$

where K^{curent} is the final assessment of success based on the results of current control; K1, K2, ..., Kn – assessment of the success of the -th measure of current control; nn – the number of measures of current control.

Oprices are converted into points according to the scaleof recalculation (Table 1).

 Table 1 – Recalculation of the average score for current activities in 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
						Reasser	nbly
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	Re-study	

Final assessment

1 The applicant for higher education receives credit at the last lesson in the discipline based on the results of the current assessment. The average score for current activities is converted into points on a 1 00-point scale, according to the recalculation table (Table 1). Applicants for higher education who have an average current grade in a discipline lower than "3" (60 points) in the last lesson can increase their current score by passing tests in the discipline.

Evaluation of the knowledge of applicants by testing is carried out on a scale:

- " Excellent": not 90% 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 the test is:

- working out all missed classes;

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

3 For the implementation of individual independent work and participation in scientific events, applicants are awarded additional points.

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

3.2 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;

- prizes 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 KhNADU in the discipline – 5 points;

 implementation of individual research (educational and research) tasks of increased complexity – 5 points.

3.3 The number of additional points may not exceed 20 points.

4 The result of training is evaluated *(choose the right one)*:

- on a two-point scale (credited/not credited) according to table 2

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

 Table 2 – Scale of transfer of points to the national grading system

On a 100-point scale	On a national scale
from 60 points to 100 points	enrolled
less than 60 points	unzarached

Course Policy:

- ursinvolves working in a team, with the audience being friendly, creative, open to constructive criticism;

- mastering the discipline involves the obligatory attendance of lectures and practical classes, as well as independent work;

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

insi, the tasks envisaged by the program must be completed within the prescribed period;
 if the applicant for higher education is absent from the classroom for a good reason, he presents the completed tasks during the independent preparation and consultation of the teacher;

– while studying the course, applicants for 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 KhNADU"

(https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.p df), "Academic integrity. Verification of the text of academic, scientific and qualification 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 KhNADU" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_M EK_1.pdf).

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

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

Recommended literature:

1 Bukreeva O.S., Rybalko I.V. Fundamentals of standardization and evaluation of correspondence: electron. training. posib. in diagrams and table. [Electronic resource]. Kharkiv: KhNADU, 2019. 76 p. URL:

https://dspace.khadi.kharkov.ua/dspace/bitstream/123456789/2532/3/Bykreeva_Ryb alko_osnovy_stand_2019.pdf.

2 Yanushkevich D. A. International and national standardization: teaching-method. posib. / D. A. Yanushkevich, O. A. Koval; Kharkiv. National. automob.-dor. un-t. Kh.: KhNADU, 2010. 295 pp.

3 Metrology and measuring technique : Textbook: 2nd ed., add. and reworked. / E.S.Polishchuk, M.M. Dorozhovets, V.O. Yatsuk, V.M. Vanko, T.G. Boyko ; 3a ed. E.S. Polishchuk. Lviv: Lviv Polytechnic Publishing House, 2012. 544 p.

Additional Sources:

- 1. http://surl.li/eljbg
- 2. <u>http://surl.li/eljbr</u>

Developer syllabus of the discipline

Head of the Department

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