

Syllabus
educational component

**Technological processes processing materials
with using numerical software management**

Name disciplines:	Technological processes processing materials with using numerical software management
Level higher Education:	the first (bachelor's)
Page course in Moodle:	https://dl.khadi.kharkov.ua/course/view.php?id=1616
Amount educational component	4 loans (120 hours)
Form final control	Test
Consultations:	by schedule
Name departments:	chair technologies metals and materials science
Language teaching:	English
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Short content educational component:

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The goal is the formation of a set of knowledge, abilities and skills in students to solve problems tasks automation and Instrumentation in questions technological preparation production at the material processing stage using CNC equipment. IN as part of the bachelor's program of the course "Technological processes of materials processing with using numerical software management" students are studying principles effective application machines with CNC on base educational and technological center "KHNADU-HAAS", which is equipped with a VF2 milling machine and a lathe ST20 production firm HAAS (USA).

Subject: theoretical and practical foundations of preparation of processing technological processes materials on metal cutting machines with CNC

The main ones tasks study educational disciplines is:

- receiving of knowledge of technological opportunities and technical characteristics metalworking equipment with CNC;
- study basic technological understand precision and roughness surfaces details, methods achievement of tasks values;
- order carrying out technological preparation production on equipment with CNC, necessary technological documentation;
- specifics application machines with CNC, preparation managers programs;
- assimilation methods increase manufacturability structures products, in sonumber of for machines with CNC

Prerequisites for study educational component:

Mechanical science.

Narysna geometry, engineering and computer graphics

Algorithmization and programming.

Computer technologies and means solution engineering tasks

Electrical engineering and electromechanics.

Processes mechanical processing

Competencies, whose acquires getter:**General competences :**

Ability apply knowledge in practical situations

Skills implementation safe activity

Desire to preservation surrounding environment

Special (professional) competences:

Ability apply knowledge physics, electrical engineering, electronics and microprocessor techniques, in volume, necessary for understanding processes in systems automation and computer-integrated technologies.

Ability to design automation systems taking into account requirements relevant legal documents and international standards.

Ability to freely use modern computer and information technologies for solving professional tasks, program and use applied and specialized computer-integrated environment for solving problems automation.

Ability consider social, ecological, ethical, economic aspects requirements of labor protection, industrial sanitation and fire safety during formation technical solutions.

The results teaching according to educational programs:

IN as a result development disciplines students should:

To understand the essence of the processes taking place in the objects of automation industries Instrumentation and automation construction, road cars and equipment, and be able to analyze automation objects and justify the choice of structure, algorithms and schemes of their management on basis results research their properties

Know the principles of operation of automation technical means and be able to justify their choice based on the analysis of their properties, purpose and technical characteristics with taking into account requirements to systems automation and operational conditions; have skills set-up technical means automation and systems management.

Be able to perform work on the design of automation systems, know content and rules design design materials, storage design documentation and the sequence of execution of project works taking into account requirements of the relevant normative legal documents and international ones standards

To be able to use a variety of specialized software provision for solving typical engineering problems in the industry automation, in particular, mathematical modeling, automated designing, management bases data, methods computer graphs

Thematic plan

Topic No	Title of topics (LC, LW, PW, SS, InW)	Number of hours
		intramural
1	LK Introduction. Subject and object disciplines General concepts of the discipline. Structure production and technological processes.	-
	LR (PR, NW)	3
	SR Modern state engineering in Ukraine and in the world	4
2	LK Automated metalworking equipment for different types production	-
	LR (PR, NW)	3
	SR Types productions and characteristic their technological processes. Metalworking equipment for different types production	5
3	LK Automation metalworking equipment. Kinds metalworking automated equipment.	-
	LR (PR, NW)	3

	SR Regions effective using different species metalworking equipment. Functional connections in machine-building GVS	4
4	LK Precision processing on machines Concept about precision. Precision metalworking equipment.	-
	LR (PR, NW) factors, what determine precision processing on machines Rating accuracy metalworking equipment.	3
	SR Rating accuracy processing surfaces	5
5	LK Quality processing on machines Concept about roughness.	-
	LR (PR, SZ) Determination of the quality of processing on machines, Indicators quality factors, what affect on quality processing on machines	3
	SR Roughness surfaces, what is achieved on metalworking equipment	4
6	LK Technology structures products	-
	LR (PR, SZ) Qualitative and quantitative rating manufacturability	3
	SR Kinds manufacturability Technology details at processing on machines with CNC	5
7	LK Metalworking equipment with software management Classification and structure metalworking equipment with software management	-
	LR (PR, NW)	3
	SR Equipment for preparation managers programs and devices for introduction programs Executors drives metal cutting machines with CNC	4
8	LK Basic principles programming for metalworking equipment with CNC	-
	LR (PR, NW)	3
	SR Devices software management.	5
9	LK Programming milling and drilling processing for machines with CNC	-
	LR (PR, NW) development managers programs milling processing for machines with CNC	3
	SR Coding technological information	4
10	LK Programming milling and drilling processing, modeling operations	-
	LR (PR, NW)	3
	SR Preparation managers programs for milling machines, equipped computer systems management.	5
11	LK Programming lathe processing for metalworking equipment with CNC	-
	PR (PR, NW) Programming lathe processing	3
	SR Preparation managers programs for lathes machines, equipped systems management class CNC.	4
12	LK Technological equipment metalworking equipment with CNC Classification devices	-
	LR (LR, NW) Cutting and auxiliary tools for lathes, drilling and milling operations	3
	SR Modular technological equipment for metalworking equipment with CNC	5
13	LK Technological preparation production on metalworking equipment	-
	LR (PR, NW)	3
	SR Principles designing technological processes and operations	4

14	LK Technical normalization works on metalworking equipment	-
	LR (PR, NW) Schemes definition the main time	3
	SR Structure norms time Methods normalization.	5
15	LK Computer designing technological operations for metalworking equipment with CNC	-
	LR (PR, NW) Designing technologies production given details on metalworking equipment with CNC	3
	SR CAD technological processes and computer preparation managers programs for metalworking equipment withCNC	4
16	LK Trends development metalworking equipment with CNC and technologies on him basis	-
	LR (PR, NW) —	3
	SR High technologies. Directions development new ones technologies and metalworking equipment with CNC	5
Togeth er	LK	-
	LR (PR, NW)	48
	SR	72

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:

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

where K^{nomoy} 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
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			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	Satisfactorily		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.

Score in points	Evaluation on a national scale		Evaluation according to the ECTS scale	
	examination	test	Rating	Criteria
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 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 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 academic, scientific and qualification papers 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 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: (*literature no later than 10 years old, except for 1 fundamental classic textbook or monograph*)

1. Hladkyi I. P., Moshchenok V. I., Tarabanova V. P., Lalazarova N. A., Hlushkova D. B.

Tekhnolohiya konstruktsonnykh materyalov y materyalovedenye: uchebnoe posobyе s hryfom MON.- Kharkov: Yzd-vo KhNADU, 2008. – 274 s.

2. Hladkyi I.P. Vlastyvosti ta tekhnolohiia obrobky metalevykh ta nemetalevykh konstruktsiinykh materialiv / I.P. Hladkyi, V.I.Moshchenok, V.P. Tarabanova. – Kharkiv : Vyd- vo KhNADU, 2004. – 274 s.

4. Прялін М.А. Технології механообробного виробництва. – Дніпропетровськ: Наука і освіта, 2000. – 136 с.

Додаткові джерела:

1. дистанційний курс:

<https://dl.khadi.kharkov.ua/course/view.php?id=1615>

2. Офіційний сайт фірми ХААС [Електронний ресурс]. – 2015. - Режим доступу: www.HaasCNC.com.

3. Сайти для фахівців по верстатам з ЧПУ фірми HAAS [Електронний ресурс]. – 2015. - Режим доступу:

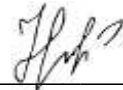
atyourservice.haascnc.com, diy.haascnc.com, haasparts.com,

www.youtube.com/user/haasautomation www.facebook.com/HaasAutomationInc,

www.twitter.com/Haas_Automation, www.linkedin.com/company/haas-automation,

www.flickr.com/photos/haasautomation/

Developer(s)
syllabus of the educational
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