Ministry of Education and Science of Ukraine
Dnipro University of Technology

MECHANICAL ENGINEERING

DEPARTMENT OF DESIGN, AESTHETICS AND TECHNICAL DESIGN

"APPROVED"
Head of Department

K.A. Ziborov _____

"____" _____ 2018

WORK PROGRAM OF THE ACADEMIC DISCIPLINE

" Details of machines and mechanisms "

Field of study…….....	18 Production and Technology
Specialty.....	185 Oil and Gas Engineering and Technology
Academic degree.....	Bachelor
Academic program.....	Oil and Gas Engineering and Technology
Language of study.....	English

Prolonged: for 20 __ / 20__ academic year _____ (_____) "__" ___ 20__.
(Signature, name, date)

for 20 __ / 20__ academic year _____ (_____) "__" ___ 20__.
(Signature, name, date)

Dnipro
NTU "DP"
2018

Work program of the academic discipline “Details of machines and mechanisms” for bachelor’s specialty 185 “Oil and Gas Engineering and Technology” / I.M. Matsyuk / NTU “Dnipro Polytechnic” Department of Design, Technical Aesthetics And Design. - DA: NTU «DP» 2018 - 13 p.

Autors:

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The work program regulates:

– key goals and objectives;
– the disciplinary learning outcomes generated through the transformation of the intended learning outcomes of the degree program;
– the content of the discipline formed according to the criterion “disciplinary learning outcomes”;
– the discipline program (thematic plan by different types of classes);
– distribution of the discipline workload by different types of classes;
– an algorithm for assessing the level of achievement of disciplinary learning outcomes (scales, tools, procedures and evaluation criteria);
– criteria and procedures for evaluating the academic achievements of applicants by discipline;
– the contents of the educational and methodological support of the discipline;

The work program is designed to implement a competency approach in planning an education process, delivery of the academic discipline, preparing students for control activities, controlling the implementation of educational activities, internal and external quality assurance in higher education, accreditation of degree programs within the specialty.

CONTENTS

1 DISCIPLINE OBJECTIVES

In the educational and professional programs of the Dnipro University of Technology specialty 185 “Oil and gas engineering and technology”, the distribution of program learning outcomes (NRN) for the organizational forms of the educational process is done. In particular, the following learning outcomes are attributed to the discipline F26 "Details of machines and mechanisms":

SR5	To apply mathematical methods to determine the specific values of process parameters gas wells, preparation of oil and gas industry and main gas, hazonaftoshovysch other system elements hazonaftopostachannya
SR7	To analyze the technical condition of elements of process equipment production, transportation and storage of oil and gas using methods based on the fundamentals of materials science and mechanics machines

The objective of discipline - familiarize students with the principles, calculation and design of machine parts and mechanisms for general purposes. Study kinematic calculations, the basis of calculation for strength and rigidity, construction methods, the rational choice of materials.

The implementation of the objective requires transforming program learning outcomes into the disciplinary ones as well as an adequate selection of the contents of the discipline according to this criterion.

2 INTENDED DISCIPLINARY LEARNING OUTCOMES

Code NRN	**Disciplinary learning outcomes (DRN)**	
	DRN code	**content**
SR5 CP7	SR5-F26-1 SR7-F26-1	perform calculations kinematic mechanisms and machines
SR5 CP7	SR5-F26-2 SR7-F26-2	determine the load on the machine parts, including inertial
SR5 CP7	SR5-F26-3 SR7-F26-3	know the basics of calculation of machine parts for general purpose
SR5 CP7	SR5-F26-4 SR7-F26-4	know the basic principles of calculation parameters and mechanical transmission
SR5 CP7	SR5-F26-5 SR7-F26-5	know the basic principles of calculation of shafts, axles and bearings. Know the main types of construction joints.
SR5 CP7	SR5-F26-6 SR7-F26-6	know the types of connections details and methods of calculation.

3 BASIC DISCIPLINES

Subjects	**The acquired learning outcomes**
B1 Mathematics 1	To apply mathematical methods to determine the specific values of process parameters gas wells, preparation of oil and gas industry and main gas, hazonaftoshovysch other system elements hazonaftopostachannya
B3 Physics 1	Use basic concepts, the basic laws of physics and chemistry for forecasting and analysis of physical and chemical properties of oil, condensate and natural gas in their production, drilling, transportation and storage
B4 Engineering	Use modern software design and operational parameters calculation

Subjects	The acquired learning outcomes
Graphics	processes of mining, drilling, transportation and storage of oil and gas
F25 theoretical mechanics and strength of materials	To apply mathematical methods to determine the specific values of process parameters gas wells, preparation of oil and gas industry and main gas, hazonaftoshovysch other system elements hazonaftopostachannya

4 WORKLOAD DISTRIBUTION BY THE FORM OF EDUCATIONAL PROCESS ORGANIZATION AND TYPES OF CLASSES

Type of classes	**Workload** hours	**Distribution by forms of education**, *hours*					
		Full-time		**Part-time**		**Distance**	
		Classes (C)	Individual work (IW)	Classes (C)	Individual work (IW)	Classes (C)	Individual work (IW)
lecture	80	34	46			12	68
practical	40	17	23			4	36
laboratory	-	-	-			-	-
workshops	-	-	-			-	-
TOGETHER	120	51	69			16	104

5 DISCIPLINE PROGRAM BY TYPES OF CLASSES

Ciphers DRN	Types and topics of training sessions	The volume of components, *hours*
	LECTURES	**80**
SR5-F26 SR7-F26	Details of machines and mechanisms. Details of machines and mechanisms.	6
	The load on the machine parts. The methods of calculation. Inertia efforts.	6
	The structure of mechanisms and machines.	6
	Kinematics of mechanisms and machines.	6
	Power calculations of mechanisms and machines.	6
	Bad inertial load.	5
	Designing mechanisms.	5
	Involute gear engagement.	5
	The mechanical transmission. Gear mechanisms.	5
	Conical and worm gears	5
	Friction, The belt and chain transmission.	5
	Shafts and axles. Calculation of the strength and rigidity.	5
	Support shafts and axles.	5
	The main types of couplings. Features of the calculation.	5
	Connections machine parts.	5
	PRACTICAL TRAINING	**40**
SR5-F26 SR7-F26	The structure of the mechanisms. Solution problems.	6
	Kinematics mechanisms. Solution problems.	6
	The power calculation mechanisms. Solution problems.	7
	The geometry of cylindrical gear transmission. Solution problems.	7
	The geometry of bevel and worm gears. Solution problems.	7
	Calculation of shafts and bearings. Calculation joints machine parts.	7
	TOTAL	**120**

6 KNOWLEDGE PROGRESS TESTING

Certification of student achievement is accomplished through transparent procedures based on objective criteria in accordance with the University Regulations “On Evaluation of Higher Education Applicants' Learning Outcomes”.

The level of competencies achieved in relation to the expectations, identified during the control activities, reflects the real result of the student's study of the discipline.

6.1 GRADING SCALES

Assessment of academic achievement of students of the Dnipro University of Technology is carried out based on a rating (100-point) and institutional grading scales. The latter is necessary (in the official absence of a national scale) to convert (transfer) grades for mobile students.

The scales of assessment of learning outcomes of the NTUDP students

Rating	Institutional
90 ... 100	Excellent
74 ... 89	Good
60 ... 73	Satisfactory
0 ... 59	Failed

Discipline credits are scored if the student has a final grade of at least 60 points. A lower grade is considered to be an academic debt that is subject to liquidation in accordance with the Regulations on the Organization of the Educational Process of NTUDP.

6.2 DIAGNOSTIC TOOLS AND EVALUATION PROCEDURES

The content of diagnostic tools is aimed at controlling the level of knowledge, skills, communication, autonomy, and responsibility of the student according to the requirements of the National Qualifications Framework (NQF) up to the 7th qualification level during the demonstration of the learning outcomes regulated by the work program.

During the control activities, the student should perform tasks focused solely on the demonstration of disciplinary learning outcomes (Section 2).

Diagnostic tools provided to students at the control activities in the form of tasks for the intermediate and final knowledge progress testing are formed by specifying the initial data and a way of demonstrating disciplinary learning outcomes.

Diagnostic tools (control tasks) for the intermediate and final knowledge progress testing are approved by the appropriate department.

Type of diagnostic tools and procedures for evaluating the intermediate and final knowledge progress testing are given below.

Diagnostic and assessment procedures

INTERMEDIATE CONTROL			FINAL ASSESSMENT	
training sessions	**diagnostic tools**	**procedures**	**diagnostic tools**	**procedures**
lectures	control tasks for each topic	task during lectures	comprehensive reference work (CCW)	determining the average results of intermediate controls; CCW performance during the examination at the request of the student
practical	control tasks for each topic	tasks during practical classes		
	or individual task	tasks during independent work		

During the intermediate control, the lectures are evaluated by determining the quality of the performance of the control specific tasks. Practical classes are assessed by the quality of the control or individual task.

If the content of a particular type of teaching activity is subordinated to several descriptors, then the integral value of the assessment may be determined by the weighting coefficients set by the lecturer.

Provided that the level of results of the intermediate controls of all types of training at least 60 points, the final control can be carried out without the student's immediate participation by determining the weighted average value of the obtained grades.

Regardless of the results of the intermediate control, every student during the final knowledge progress testing has the right to perform the CDF, which contains tasks covering key disciplinary learning outcomes.

The number of specific tasks of the CDF should be consistent with the allotted time for completion. The number of CDF options should ensure that the task is individualized.

The value of the mark for the implementation of the CDF is determined by the average evaluation of the components (specific tasks) and is final.

The integral value of the CDF performance assessment can be determined by taking into account the weighting factors established by the department for each NLC descriptor.

6.3 EVALUATION CRITERIA

The actual student learning outcomes are identified and measured against what is expected during the control activities using criteria that describe the student's actions to demonstrate the achievement of the learning outcomes.

To evaluate the performance of the control tasks during the intermediate control of lectures and practicals the assimilation factor is used as a criterion, which automatically adapts the indicator to the rating scale:

$$O_i = 100\ a / m,$$

where a - number of correct answers or significant operations performed according to the solution standard; m - the total number of questions or substantial operations of the standard.

Individual tasks and complex control works are expertly evaluated using criteria that characterize the ratio of competency requirements and evaluation indicators to a rating scale.

The content of the criteria is based on the competencies identified by the NLC for the Bachelor's level of higher education (given below).

General criteria for achieving learning outcomes 7th qualification for LDCs (BA)

Integral competence is the ability to solve complex problems and specialized practical problems in a particular area of professional activities or in a learning process that involves the use of certain theories and methods of the relevant scientific areas and characterized by complexity and conditions uncertainty.

descriptors NLC	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
Knowledge		
♦ Conceptual knowledge acquired during the training and professional activities, including some knowledge of modern achievements; ♦ critical understanding of the main theories, principles, methods, and concepts in education and careers	- A great - proper, reasonable, sensible. Measures the presence of: - conceptual knowledge; - a high degree of state ownership issues; - critical understanding of the main theories, principles, methods and concepts in education and careers	95-100
	A non-gross contains mistakes or errors	90-94
	The answer is correct but has some inaccuracies	85-89
	A correct some inaccuracies but has also proved insufficient	80-84
	The answer is correct but has some inaccuracies, not reasonable and meaningful	74-79
	A fragmentary	70-73
	A student shows a fuzzy idea of the object of study	65-69
	Knowledge minimally satisfactory	60-64
	Knowledge unsatisfactory	<60
Ability		
♦ solving complex problems and unforeseen problems in specialized areas of professional and/or training, which involves the collection and interpretation of information (data), choice of methods and tools, the use of innovative approaches	- The answer describes the ability to: - identify the problem; - formulate hypotheses; - solve problems; - choose adequate methods and tools; - collect and interpret logical and understandable information; - use innovative approaches to solving the problem	95-100
	The answer describes the ability to apply knowledge in practice with no blunders	90-94
	The answer describes the ability to apply knowledge in practice but has some errors in the implementation of a requirement	85-89
	The answer describes the ability to apply knowledge in practice but has some errors in the implementation of the two requirements	80-84
	The answer describes the ability to apply knowledge in	74-79

descriptors NLC	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
	practice but has some errors in the implementation of the three requirements	
	The answer describes the ability to apply knowledge in practice but has some errors in the implementation of the four requirements	70-73
	The answer describes the ability to apply knowledge in practice while performing tasks on the model	65-69
	A characterizes the ability to apply knowledge in performing tasks on the model, but with uncertainties	60-64
	The level of skills is poor	<60
Communication		
♦ report to specialists and non-specialists of information, ideas, problems, solutions and their experience in the field of professional activity; ♦ the ability to form an effective communication strategy	- Fluent problematic area. Clarity response (report). Language - correct; - - net; - - clear; - - accurate; - - logic; - - expressive; - - concise. Communication strategy: coherent and consistent development of thought; availability of own logical reasoning; relevant arguments and its compliance with the provisions defended; the correct structure of the response (report); correct answers to questions; appropriate equipment to answer questions; the ability to draw conclusions and formulate proposals	95-100
	Adequate ownership industry issues with minor faults. Sufficient clarity response (report) with minor faults. Appropriate communication strategy with minor faults	90-94
	Good knowledge of the problems of the industry. Good clarity response (report) and relevant communication strategy (total three requirements are not implemented)	85-89
	Good knowledge of the problems of the industry. Good clarity response (report) and relevant communication strategy (a total of four requirements is not implemented)	80-84
	Good knowledge of the problems of the industry. Good clarity response (report) and relevant communication strategy (total not implemented the five requirements)	74-79
	Satisfactory ownership issues of the industry. Satisfactory clarity response (report) and relevant communication strategy (a total of seven requirements not implemented)	70-73
	Partial ownership issues of the industry. Satisfactory clarity response (report) and communication strategy of faults (total not implemented nine requirements)	65-69
	The fragmented ownership issues of the industry. Satisfactory clarity response (report) and communication strategy of faults (total not implemented 10 requirements)	60-64

descriptors NLC	Requirements for knowledge, communication, autonomy and responsibility	Indicator evaluation
	The level of poor communication	<60
Autonomy and responsibility		
♦ management actions or complex projects, responsible for decision-making in unpredictable conditions; ♦ responsible for the professional development of individuals and/or groups ♦ the ability to continue study with a high degree of autonomy	- Excellent individual ownership management competencies focused on: 1) management of complex projects, providing: - exploratory learning activities marked the ability to independently evaluate various life situations, events, facts, detect and defend a personal position; - the ability to work in a team; - control of their own actions; 2) responsibility for decision-making in unpredictable conditions, including: - justify their decisions the provisions of the regulatory framework of sectoral and national levels; - independence while performing tasks; - lead in discussing problems; - responsibility for the relationship; 3) responsible for the professional development of individuals and/or groups that includes: - use of vocational-oriented skills; - the use of evidence from independent and correct reasoning; - possession of all kinds of learning activities; 4) the ability to further study with a high degree of autonomy, which provides: - degree possession of fundamental knowledge; - independent evaluation judgments; - high level of formation of general educational skills; - search and analysis of information resources	95-100
	Confident personality possession competency management (not implemented two requirements)	90-94
	Good knowledge management competencies personality (not implemented three requirements)	85-89
	Good knowledge management competencies personality (not implemented the four requirements)	80-84
	Good knowledge management competencies personality (not implemented six requirements)	74-79
	Satisfactory ownership of individual competence management (not implemented seven requirements)	70-73
	Satisfactory ownership of individual competence management (not implemented eight claims)	65-69
	The level of autonomy and responsibility fragmented	60-64
	The level of autonomy and responsibility poor	<60

7 TOOLS, EQUIPMENT, AND SOFTWARE

Technical training tools via multimedia software.
Distance learning platform Moodle.

8 RECOMMENDED SOURCES

1. Machine parts: lectures / NI Khomyk, AD Dovbush, AP Tson. - Ternopil: FOP Palyanytsya VA, 2016. - 160p.
2. Analysis flat lever mechanism. Guidance for homework for students of non-mechanical specialties edition revised and updated / NV Winter, IN Matsyuk, EM Shlyakhov. - Nat. Hearne. Univ. - D., NSU, 2016. - 40 p.
3. **Calculation of cylindrical gear. Guidance for homework for students enrolled in "Mining", "Mineral Processing", "Road transport" and "transport technology." / Compilation .: KA Ziborov, IN Matsyuk, EM Shlyakhov. - D .: NSU, 2009. - 28 p.**
4. Matsyuk IM, road EM, Ziborov KA Kinematic and dynamic study of plane lever mechanisms. Dnipropetrovsk, Ukraine RICK NSU, 2010. 132s.
5. Matsyuk IM Kinematic analysis of the implementation of an oscillating crank mechanism [electronic resource]: teach. - naoch. guidances. / IM Matsyuk, EM Shlyakhov, NV Winter; Nat. Hearne. Univ. - video. - D .: SHEE "NSU" 2016 - Access:**http://okmm.nmu.org.ua/ua/tmm1.php**(Date of appeal: 05/20/2016). - Name of the screen.
6. Matsyuk IM Power analysis implementation of an oscillating crank mechanism [electronic resource]: teach. - naoch. guidances. / IM Matsyuk, EM Shlyakhov, NV Winter; Nat. Hearne. Univ. - video. - D .: SHEE "NSU" 2016 - Access:**http://okmm.nmu.org.ua/ua/tmm1.php**(Date of appeal: 05/20/2016). - Name of the screen.
7. EM Shlyakhov Synthesis of kinematic scheme planetary gear transmission [electronic resource]: teach. - naoch. guidances. / EM Road, IN Matsyuk; Nat. Hearne. Univ. - video. - D .: SHEE "NSU" 2016 - Access:**http://okmm.nmu.org.ua/ua/tmm1.php**(Date of appeal: 05/20/2016). - Name of the screen.
8. Theory of mechanisms and machines. (Lecture for students of mechanical specialties) / Y. Tymokhin, VJ Belanov, VM VU Savyenko Timokhina, Donetsk: DonIZT, 2009 - 144Se.
9. Fundamentals of machines: Textbook for students of engineering specialties of higher education. 2nd ed., Be refurbished. - Krivoy Rog: Publisher FO-P Cherniavsky DO, 2015. - 492 p .; with silt.

Educational edition

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Prepared for publication
Dnipro University of Technology.
Certificate of registration in the State Register, control number 1842
49005, Dnipro, Dmytro Yavornytskoho Ave. 19