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**Federal State Autonomous Educational Institution
The Russian Peoples' Friendship University of Higher Education**

PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA

(name of the main training unit (MTU) developing the postgraduate programme)

ENGINEERING ACADEMY

(name of the basic training unit (BTU) - developer of the postgraduate programme)

DISCIPLINE WORK PROGRAMME

THEORETICAL MECHANICS, MACHINE DYNAMICS

(name of discipline/module)

Scientific speciality:

1.1.7 Theoretical mechanics, machine dynamics

(code and name of the scientific speciality)

The discipline is taught as part of the postgraduate programme:

Theoretical mechanics, machine dynamics

(name of postgraduate programme)

2022

1. PURPOSE OF THE DISCIPLINE

The aim of the discipline "Theoretical Mechanics, Dynamics of Machines" is to prepare for the candidate examinations, as well as to master the competences (AK - academic competences, RC - research competences).

2. REQUIREMENTS FOR THE RESULTS OF THE DISCIPLINE

The study of the discipline "Theoretical Mechanics, Dynamics of Machines" is aimed at preparing for the candidate examinations.

3. SCOPE OF THE DISCIPLINE AND TYPES OF STUDY

The total workload of the discipline "Theoretical Mechanics, Dynamics of Machines" is 3 credits.

Table 4.1. Types of academic work by period of study of the postgraduate programme

Type of study	TOTAL, ac. h.	Course			
		1	2	3	4
<i>Contact work, ac.h.</i>	60			60	
including:					
Lectures (LC)	30			30	
Laboratory work (LW)					
Practical/seminar classes (SP)	30			30	
<i>Independent work of students, ac.h.</i>	48			48	
<i>Control (credit with grading), ac.h.</i>					
Total time commitment of the discipline	ac.h.	108		108	
	credits	3		3	

5. CONTENT OF THE DISCIPLINE

Table 5.1. Content of the discipline (module) by type of study work

Name of discipline section	Section (topic) content	Type of study
Section 1: Basic concepts of mechanics. Fundamentals of Mechanics of Structural Materials.	Mechanical reliability issues in mechanical engineering. Economic aspects of machine dynamics and strength. Basic hypotheses. Real structures and their design diagrams. Sectional method. Internal force factors. Types of core deformation. General assumptions about material properties. Concepts of stresses and strains. Tensor of stresses. Law of pairing of tangential stresses. Principal sites and principal stresses. Particular cases of stress state.	SP, SRS

Name of discipline section	Section (topic) content	Type of study
Section 2: Basic concepts of the theory of reliability of machines and structures. Stability of structural elements	Basic concepts of the theory of structural reliability. Failures, defects, durability, service life of machines and structures. Limit state. Limit and allowable stresses. Safety factor and its statistical justification. Calculation of strength under allowable stresses. Selection of standard safety factor. Kinematic characteristics of oscillating processes.	SP, SRS
Section 3: Bending calculations. Torsion and shear calculations. Shafts and springs. Calculation of shells of rotation.	Geometric characteristics of plane sections: static moments, axial and centrifugal moments of inertia of sections. Calculation of the position of the centre of gravity of a section. Main central axes of a section. Standards for rolled sections. Torsion of an elastic cylindrical rod. Tangential stresses and twisting angle. Torsional stiffness and strength conditions. Potential energy of elastic deformation. Basic concepts of elastic stability theory. Stable and unstable equilibrium states. Stability of rectilinear rods in longitudinal compression. Critical force. Euler's formula and the limits of its application.	SP, SRS

6. LOGISTICS OF THE DISCIPLINE

Table 6.1. Logistical support for the discipline

Type of audience	Classroom equipment	Specialised training/laboratory equipment, software and materials for the discipline (if necessary)
Lecture room	Study rooms №554 for lectures, practical classes, group and individual consultations, current monitoring and interim certification. Set of specialized furniture: technical means: plasma TV Samsung PS-50 A410C1	
Laboratory	Study rooms №554 for lectures, practical classes, group and individual consultations, current monitoring and interim certification. Set of specialized furniture: technical means: plasma TV Samsung PS-50 A410C1	
Seminar room	Study rooms №554 for lectures, practical classes, group and individual consultations, current monitoring and interim certification.	

Type of audience	Classroom equipment	Specialised training/laboratory equipment, software and materials for the discipline (if necessary)
	Set of specialized furniture: technical means: plasma TV Samsung PS-50 A410C1	
Computer lab	Computer room for classes, group and individual consultations, current control and interim certification, equipped with personal computers (____ pcs.), blackboard (screen) and technical means of multimedia presentations.	
For independent work of students	An auditorium for students' independent work (can be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the EIOS.	

* - the classroom for students' independent work is obligatory!

7. TRAINING, METHODOLOGICAL AND INFORMATION SUPPORT FOR THE DISCIPLINE

Basic literature:

1. Znanium. com. Yatsun S. F. Kinematics, dynamics and strength of machines, devices and equipment: tutorial / S.F. Yatsun, V.Y. Mishchenko, E.N. Politov. - M.: Alfa-M: Infra-M, 2012. - 208 c. - Access mode: <http://znanium.com/>

Further reading:

1. eLibrary "Znanium. com. Khrunicheva T.V. Machine Parts: Typical Calculations of Strength: Textbook / T.V. Khrunicheva. - M.: FORUM: INFRA-M, 2007. - 224 c. - Access mode: <http://znanium.com/>.

2. electronic library system "Znanium. com. Matveev, Y.A. Theory of Mechanisms and Machines: Textbook / Y.A. Matveev, L.V. Matveeva. - M.: Alfa-M: INFRA-M, 2009. - 320 c. - Access mode: <http://znanium.com/>

3. Technology of thin films and coatings: tutorial / L.N. Maskaeva, E.A. Fedorova, V.F. Markov ; under general editors L.N. Maskaeva ; Ministry of Education and Science of the Russian Federation, Ural Federal University named for the first President of Russia B.N. Yeltsin. - Yekaterinburg : Ural University Press, 2019. - 236 c. - ISBN 978-5-7996-2560-3.

Resources of the information and telecommunication network "Internet":

1. the RUDN electronic library system and third-party electronic libraries to which university students have access on the basis of contracts:

- RUDN Electronic Library System - RUDN EBS <http://lib.rudn.ru/MegaPro/Web>

- The University Library Online electronic library system <http://www.biblioclub.ru>
- The Yurite electronic library system <http://www.biblio-online.ru>
- Student Consultant electronic library system www.studentlibrary.ru
- Lan LGS <http://e.lanbook.com/>
- Trinity Bridge

2. databases and search engines:

- electronic collection of legal and normative-technical documentation <http://docs.cntd.ru/>
 - search engine Yandex <https://www.yandex.ru/>
 - Google search engine <https://www.google.ru/>
 - SCOPUS abstract database <http://www.elsevierscience.ru/products/scopus/>
- Teaching materials for students' independent work while mastering the discipline/module*:*

1. Course of lectures on the discipline "Theoretical Mechanics, Dynamics of Machines".

* - all teaching materials for students' independent work are placed in accordance with the current procedure on the discipline page in TUIS!

8. ASSESSMENT MATERIALS AND SCORING SYSTEM FOR ASSESSING THE LEVEL OF COMPETENCE IN THE DISCIPLINE

The assessment materials and grading system for the discipline are presented in the Appendix to this Work Programme of the discipline.

* - OM and BRS are formed based on the requirements of the relevant local normative act of PFUR.

DEVELOPERS:

Assistant Professor of the Basic

Department of Nanotechnology and
Microsystem Technology



M.O. Makeev

Position, BD

Signed

Name and surname

THE HEAD OF THE BUP:

Assistant Professor of the Basic

Department of Nanotechnology and
Microsystem Technology



S.V. Popov

Position, BD

Signed

Name and surname

THE HEAD OF THE

EDUCATIONAL PROGRAMME:

Professor of the Basic Department of
Nanotechnology and Microsystem
Technology



V.V. Belyaev

Position, BD

Signed

Name and surname