**Syllabus**

**the educational program 5B060100 - Theoretical Mechanics**

**Fall Semester 2019-2020 uch. Year**

**Academic course information**

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| Code dis-tsipliny | Name of discipline | | SIW | lek | | Pract | Laboratory | | Number of loans | SIWT |
| TM2208 | theoretical mechanics | |  | 2 | | 1 |  | | 3 | 7 |
| Lecturer | | Temirbekov E., Doctor of Technical Sciences, prof. | | | Office s | | | Scheduled | | |
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| Telephones | | Phone: 87013148888 | | | Lecture hall | | | 401 | | |
| Assistant | |  | | | Office s | | |  | | |
| e-mail | | E-mail: | | |
| Telephones | | Telephone: | | | Lecture hall | | |  | | |

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| **Academic presentation of the course** | Course objective: develop students' logical thinking, the formation of the basic concepts of a wide range of phenomena relating to the simplest form of motion - mechanical motion; the assimilation of students the fundamental laws of mechanical motion and equilibrium of material bodies, their use in solving concrete problems of modern technology. |
| **Prerequisites** | For this course you need to know the main content of the following previous disciplines: mathematical analysis, differential equations |
| **Postrekvizity** |  |
| **Informational resources** | Textbooks:   1. Yablonsky A. Course of Theoretical Mechanics: A Textbook. M., Graduate School of 2002 (and previous editions) 2. Nikitin N. Course of Theoretical Mechanics: A Textbook. M., Graduate School, 1990 3. Targ SM Short Course of Theoretical Mechanics: A Textbook. M., Graduate School, 1998 (and previous editions) 4. Meshchersky IV Problems in Theoretical Mechanics: A Textbook. allowance. Nauka, Moscow, 2008 (and previous editions) 5. A collection of short problems on the theoretical mechanics: Proc. allowance. / Ed. O.E.Kepe. M., Graduate School 1989 6. Collection of tasks for term papers on theoretical mechanics: Proc. manual / Ed. A.A.Yablonskogo. M., Graduate School of 2008 (and previous editions)   additional literature  Butenyne N., Luntz Y., Merkin D. Course of Theoretical Mechanics: A Textbook, Moscow, Higher School of 2002 (and previous editions)  Bach M., Dzhanelidze G., Kelzon A. Theoretical Mechanics in examples and problems. Part I, II: Proc. allowance. Moscow, 1984  Eisenberg TB, Voronkov IM, VM Ossetski Guide to solving problems in theoretical mechanics: Textbook. M., 1965  Internet resources:  <https://mpei.ru/Structure/Universe/pmam/structure/rmdsm/Pages/theoretical_mechanics.aspx>  <http://www.teoretmeh.ru/> |
| **Academic policy course in the context of university values** | **Rules of academic conduct:**  Obligatory presence in the classroom, the inadmissibility of the delay. From­absence and lateness to class without the teacher warning valued at 0 points. Mandatory compliance with deadlines and delivery tasks (for CPC, mid-term, monitoring, Labora­Torn, design, etc..), projects, exams. In case of violation the date of the assignment is estimated taking into account the deduction of penalty Ball­fishing.  **Academic values:**  According to Article 5 of the Code of Honor of the Kazakh national university student­versity of Al-Farabi, the student must strictly fulfill their educational responsibilities and to prevent academic and legal violations (pla­GIATA, forgery, use of crib sheets, and the teacher cheating neuvazhi­Tel'nykh attitude, absenteeism and tardiness without valid when­rank).  All students can get advice in person, by UCA­bound by telephone or e-mails |
| **Policy evaluation and certification** | **Criteria-based assessment:** estimation results in accordance with descriptors (formulation of a competency check on the boundary control weeks, intermediate and final examination)  **Summative assessment:**  Grade discipline = 0.2 ∙ (PK1 + RK (MT) + PK2) +0.4 ∙ IR PK1, RK (MT), PK2 - landmark control, MT - intermediate exam, IR - final control.  Interest-rating alphabetic system of evaluation of educational achievements of students:  95% - 100%: A 90% - 94% A-  85% - 89%: B + 80% - 84%: The 75% - 79%: B-  70% - 74%: C + 65% - 69%: C 60% - 64%: C  55% - 59%: D + 50% - 54%: D-  25% -49%: FX 0% -24%: F |

**Calendar implementation of the contents of the course:**

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| A week | Topic Title | Clock | Max.  mark |
| 1 | Lecture 1. Main objectives and concepts of statics. The strength and power system. | 1 | 2 |
| Lecture 2. Axioms statiki.Svyazi. A convergent system of forces. | 1 | 2 |
| Workshop 1. The convergent system of forces. | 1 | 8 |
| 2 | Lecture 3. Moments forces relative to the point and the axis. A pair of forces. The fundamental theorem of statics. Parallel transfer of power. | 1 | 2 |
| Lecture 4. varignon's theorem. Arbitrary Plane Systems sil.Algebrichesky torque | 1 | 2 |
| Seminar 2. arbitrary plane system of forces. | 1 | 8 |
| 3 | Lecture 5. The spatial force system. | 1 | 2 |
| Lecture 6. Torque about the axis. | 1 | 2 |
| Seminar 3. The spatial system of forces | 1 | 8 |
|  | SRMP 1. Shodyaschayayasya parallel and spatial system of forces |  | 20 |
| 4 | Lecture 7. The main vector and the main point of an arbitrary spatial system of forces. | 1 | 2 |
| Lecture 8. Balance arbitrary spatial system of forces. | 1 | 2 |
| Seminar 4. Balance arbitrary spatial system of forces | 1 | 8 |
| 5 | Lecture 9. Parallel forces. Determination of the center of gravity. | 1 | 2 |
| Lecture 10. The centers of gravity of the various figures | 1 | 2 |
| Seminar 5. The centers of gravity of various shapes | 1 | 8 |
|  | SRMP 2. The centers of gravity of various shapes |  | 20 |
|  | Landmark control 1. |  | 100 |
| 6 | Lecture 11. Introduction to kinematics. Kinematics, material system solid. The speed and acceleration of the rectilinear motion of a point | 1 | 2 |
|  | Lecture 12. Methods of specifying movement point. Speed ​​and acceleration at the point of the curvilinear movement | 1 | 2 |
|  | Seminar 6. The rectilinear curvilinear motion of a point | 1 | 8 |
| 7 | Lecture 13. The forward movement of the body. Rotation of a rigid body about a fixed axis. Particular cases of the solid body rotation. | 1 | 2 |
|  | Lecture 14. The speed and acceleration of the point during a solid body rotation about a fixed axis. | 1 | 2 |
|  | Seminar 7. The translational and rotational motion of the body | 1 | 8 |
| 8 | Lecture 15. Equations plane-parallel motion of a rigid body | 1 | 2 |
|  | Lecture point 16. The speed at plane-parallel motion of a rigid body. | 1 | 2 |
|  | Workshop point 8. The rate at a plane-parallel motion of a rigid body. | 1 | 8 |
|  | 3. SRMP translational, rotational and planar movement of the body |  | 20 |
| 9 | Lecture 17. Projection Theorem of speeds of two points of a plane figure.  Instantaneous velocity center. | 1 | 2 |
|  | Lecture 18. Plano-parallel movement of the body | 1 | 2 |
|  | Seminar 9. The balance of an arbitrary spatial system of forces | 1 | 8 |
| 10 | Lecture at point 19. The acceleration plane-parallel motion of a rigid body. | 1 | 2 |
|  | 20. Basic Lecture determining when complex movements point. The theorem on addition of speeds terms. | 1 | 2 |
|  | Seminar 10. The plane-parallel and complex motion of a point | 1 | 8 |
|  | SRMP 4. The plane-parallel and complex motion of a point |  | 20 |
|  | Landmark control (MT) |  | 100 |
| eleven | Lecture 21. Introduction to dynamics. Dynamics of a material point. Key aspects of the dynamics. | 1 | 1 |
|  | Lecture 22. The differential equations of motion | 1 | 1 |
|  | Seminar 11. The equations of motion of a point | 1 | 6 |
|  | SRMP 5. The differential equations of motion points |  | 20 |
| 12 | Lecture 23. The rectilinear oscillation of the material point. Free oscillation. | 1 | 1 |
|  | Lecture 24. Non-free swing. Mathematical and physical pendulums. | 1 | 1 |
|  | Seminar 12. Fluctuations in material terms | 1 | 6 |
| thirteen | Lecture 25. The mechanical system. External and internal forces. mass of the system. The center of mass. | 1 | 1 |
|  | Lecture 26. The moments of inertia. TheoremHuygens-Steiner. Common system theorem. | 1 | 1 |
|  | Seminar 13. Problems for general dynamics of the theorem | 1 | 6 |
|  | SRMP 6. Common system theorem |  | 20 |
| 14 | Lecture 27. Communications. The number of degrees of freedom. Virtual work. | 1 | 1 |
|  | 28. The lecture d'Alembert-Lagrange equations. | 1 | 1 |
|  | Seminar 14. The equations of Lagrange, d'Alembert | 1 | 6 |
| fifteen | Lecture 29 Generalized coordinates. Generalized forces. Lagrange function. | 1 | 1 |
|  | Lecture 30. Lagrange equations of the second kind. | 1 | 1 |
|  | Workshop 15. Tasks using Lagrange's equations of the second kind | 1 | 6 |
|  | 7. SRMP Lagrange equations of the second kind. |  | 20 |
|  | Landmark control 2 |  | 100 |

Teacher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ E. Temirbekov

Head of the Department of Mechanics \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Z. Rakisheva

Chairman of methodical bureau

Mechanics and Mathematics Faculty \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ U. Kusherbayev