



Subject card

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| Subject name and code | Mechanics I, PG_00050273 | | | | | | |
| Field of study | Mechanical Engineering, Mechanical Engineering | | | | | | |
| Date of commencement of studies | October 2020 | Academic year of realisation of subject | | | 2020/2021 | | |
| Education level | first-cycle studies | Subject group | | | Obligatory subject group in the field of study Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | Mode of delivery | | | at the university | | |
| Year of study | 1 | Language of instruction | | | English | | |
| Semester of study | 2 | ECTS credits | | | 6.0 | | |
| Learning profile | general academic profile | Assessment form | | | exam | | |
| Conducting unit | Department of Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Marek Skowronek | | | | | |
| | Teachers | dr inż. Marek Skowronek | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 30.0 | 0.0 | 0.0 | 0.0 | 60 |
| | E-learning hours included: 0.0 | | | | | | |
| Adresy na platformie eNauczanie: Mechanics I - Design and Production Engineering - Moodle ID: 8413 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=8413 | | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM | | |
| | Number of study hours | 60 | 8.0 | 82.0 | 150 | | |
| Subject objectives | Acquainting students with the essential law of mechanics and forming abilities of solving problems practical, in static issues and kinematics of the point. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | K6_W04 | Has knowledge of mechanics, including the process of modeling mechanical systems of statics, and point kinematics | | | [SW1] Assessment of factual knowledge | | |
| | K6_U01 | He is able to obtain information from professional literature, databases and other resources necessary to solve engineering tasks; He is able to integrate the obtained information and make their interpretation, as well as draw conclusions and present opinions with justification | | | [SU4] Assessment of ability to use methods and tools | | |
| | K6_U06 | Is able to use mathematical and physical models to analyze the processes and phenomena occurring in mechanical devices in the field of mechanics and selected issues of strength of materials | | | [SU4] Assessment of ability to use methods and tools | | |

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| Subject contents | <p>Students are acquainted with organization of the course, expected knowledge, conditions to complete the course, and suggested literature. Introduction to the subject: historical feature, mechanics and its division. Modeling in mechanics: real system, physical and mathematical models, and also meanings of: ideal rigid body, dimension-less point, concentrated force. The basic Newton's principles, and primitive notions and axiom's of mechanics. Equilibrant systems of forces. Resultant force of concurrent system of forces. Momentum of pair of forces. Resultant force and resultant momentum of spatial system of forces. Degrees of freedom, strains and their reaction forces. Statically determinate and in determinate systems. Conditions of equilibrium of system of forces, and particular systems: coplanar, concurrent, and parallel. Substitute conditions of equilibrium. Formulas of superposition, and independence of force acting. Forces, and their sources. Division of forces: reactive and active, external and internal. Gravity force and coordinates of centre of gravity. Friction forces, rolling resistance and belt drive friction. Analysis of forces in bars of truss. Basic meanings in kinematics of point: position coordinates, velocity, acceleration, and equations of motion. Description of motion of point in: vector, Cartesian, normal, and polar coordinates. Analysis of kinematics' parameters of particular systems: linear track motion, circle and ellipse track motion, uniform and uniformly accelerated motion, harmonic motion, crank-shaft system motion.</p> | | |
| Prerequisites and co-requisites | <p>Physics and mathematics on the secondary level school, including in particular: geometry, trigonometry, and also vector calculus.</p> | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Practical exercise | 56.0% | 50.0% |
| | Written exam | 56.0% | 50.0% |
| Recommended reading | Basic literature | Wittbrodt E., Sawiak S.: Mechanika ogólna. Teoria i zadania. Wyd. PG, Gdańsk 2012 | |
| | Supplementary literature | <p>Osiński Z.: Mechanika ogólna. T. I i 2, PWN, Warszawa 1987</p> <p>Nizioł J.: Metodyka rozwiązywania zadań z mechaniki. WNT, Warszawa 2002</p> <p>Sawiak S., Wittbrodt E.: Mechanika. Wybrane zagadnienia. Teoria i zadania. Wyd. PG, Gdańsk 2007</p> | |
| | eResources addresses | <p>Mechanics I - Design and Production Engineering - Moodle ID: 8413 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=8413</p> | |

Example issues/
example questions/
tasks being completed

Exemplary examination questions of Mechanics I

1. projection of power onto the axis
2. dot product of vectors
3. vector product of vectors
4. folding and de-folding forces (analytically and graphic)
5. moment of forces with respect to point and respect the axis
6. reduction arbitrary sets of forces to a single force and to a single pair of forces (the main force and the main torque)
7. invariants of the arbitrary set of forces
8. equilibrium conditions for arbitrary sets of forces
9. particular equilibrium conditions for arbitrary sets of forces (plat, coincident and parallel agreements)
10. alternative equilibrium conditions for planar arbitrary sets of forces
11. constraints and their reactions
12. particular arrangements: statically definable, nondefinable and unstable
13. sliding friction
14. friction cone
15. friction of cords
16. rolling resistance
17. practical methods of determining of the coefficients of friction
18. the centres of gravity, the terms and formulas
19. the centres of gravity for homogeneous lines
20. the centres of gravity for homogeneous plane figures
21. the centres of gravity for homogeneous three dimensional bodies
22. description of motion of point in the rectangular coordinate system
23. description of motion of point with the position vector
24. description of motion of point in natural coordinates

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| | 25. path of the point 26. definition of the speed and accelerations 27. tangent and normal acceleration 28. uniform and monotonously precipitated linear motion 29. circular motion of point |
| Work placement | Not applicable |