COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6"></td><td colspan="2">Degree level and programme type</td><td>Bachelor's degree
Master's degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td colspan="2">Study profile</td><td></td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Engineering Mechanics</td><td colspan="2">Course code</td><td>IS-FME-00089S</td></tr>
<tr><td colspan="2">Course type</td><td>Elective</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td colspan="2">Semester</td><td>Summer</td></tr>
<tr><td>30</td><td>30</td><td>15</td><td></td><td></td><td></td><td></td><td colspan="2">No. of ECTS credits</td><td>6</td></tr>
<tr><td>Entry requirements</td><td colspan="9"></td></tr>
<tr><td>Course objectives</td><td colspan="9">The course provides students with basic knowledge of Classical Mechanics. Terms, assumptions, principles and methods of Statics, Kinematics and Kinetics are treated. General methods based on the principles of conservation of momentum and energy are considered for a particle, a body and a system of bodies. The main emphasis is on the development of skills to efficiently schematise, solve and analyse typical problems.</td></tr>
<tr><td>Course content</td><td colspan="9"><u>Statics</u>. 1. Equivalent systems of forces. Force. Moment of a force. Force couple. 2. Statics of bodies. Static equilibrium conditions. Newton’s third law. 3. Distributed forces. Static moments. Centroid. Centre of mass. <u>Kinematics</u>. 4. Kinematics of a particle. Radius vector, trajectory, path. Displacement, velocity, acceleration. Tangential and normal acceleration. 5. Kinematics of a body. Translation and rotation. Angular displacement, velocity and acceleration. Instantaneous centre of rotation. Rolling. Plane motion. 6. Kinematics of bodies. Mechanisms. Velocity ratio. Absolute and relative motion. Coriolis acceleration. <u>Kinetics</u>. 7. Kinetics of a particle. Newton's second law of motion. Linear and angular momentum. Impulse. Principle of impulse and momentum. Friction. 8. Kinetics of particles. System of particles. Motion of the mass centre. Impact. 9. Energy methods. Work of a force. Power. Kinetic energy. Principle of work and energy. Conservative forces. Potential energy. Principle of conservation of total mechanical energy. 10. Rotation of a body about a fixed axis. Equation of rotational motion. Moment of inertia. Parallel-axis theorem. 11. Plane motion. Motion of the mass centre of a body. Rotation of a body about its mass centre. Conservation principles. System of bodies. 12. Generalised methods. Virtual displacement. Principle of virtual work. Dynamic equilibrium. D’Alembert’s principle.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Regular/online lectures: blackboard lectures, presentations by teacher, discussions.
Regular/online classes: blackboard classes, discussions.
Work at home: home assignments, preparation for exams.</td></tr>
<tr><td>Assessment method</td><td colspan="9">Home assignment reports, exam reports</td></tr>
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Symbol of learning outcome	Learning outcomes	Reference to the learning outcomes for the field of study
LO1	Demonstrate knowledge of the basic terms, assumptions, principles and calculation methods of Mechanics.	M1_W02, M1_W04, M1_U07
LO2	Demonstrate ability to apply the static equilibrium conditions for solving problems of Statics.	M1_W02, M1_W04
LO3	Demonstrate ability to solve problems of Kinematics.	M1_W02, M1_W04, M1_U18
LO4	Demonstrate ability to apply the principles of conservation of momentum and energy for solving problems of Kinetics.	M1_W02, M1_W04, M1_U18
LO5	Demonstrate ability to apply the generalised methods of Mechanics.	M1_W02, M1_W04, M1_U18
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
LO1	Home assignment report, exam report	C
LO2	Home assignment report, exam report	C
LO3	Home assignment report, exam report	C
LO4	Home assignment report, exam report	C
LO5	Home assignment report, exam report	C
Student workload		No. of hours
Calculation	Attendance of regular/online lectures	30
	Attendance of regular/online classes	75
	Work on home assignments	75
	Preparation for exams	30
	TOTAL:	210
Quantitative indicators		No. of hours / No. of ECTS credits
Student workload – activities that require direct teacher participation		105 / 6
Student workload – self study		105
Basic references	1. F.P. Beer et al., Vector Mechanics for Engineers: Statics and Dynamics, McGraw Hill, 2012. 2. I.V. Meshchersky, Collection of Problems in Theoretical Mechanics, The Higher School, 1962. 3. R.D. Gregory, Classical Mechanics, Cambridge University Press, 2006.	
Supplementary references	1. A. Ruina, R. Pratap, Introduction to Statics and Dynamics, Oxford University Press, 2015. 2. H. Goldstein, C. Poole, J. Safko, Classical Mechanics, Addison Wesley, 2002. 3. T.W.B. Kibble, F.H. Berkshire, Classical Mechanics, Imperial College Press, 2004.	
Organisational unit conducting the course	Department of Mechanics and Applied Computer Science	Date of issuing the programme
Author of the programme	Dariusz Perkowski	19.03.2021

L – lecture, C – classes, LC – laboratory classes