Course code **Course item**

1. INFORMATION ABOUT THE COURSE

a. Basic information

Course title	***Mechanics***
Field of study	*Mechanical Engineering*
Cycle	*first degree*
Study profile	*general academic*
Study mode	*full-time or part-time*
Specialization	*Machine technology*
Unit responsible for the field of study	*Department of Mechanics and Computer Methods*
Lecturer	*Mariusz Kukliński, PhD*
Introductory courses	*Mathematics, basic physics*
Prerequisites	*No prerequisites*

b. Semester/ weekly timetable

Semester	Lectures (W)	Classes (C)	Laboratories (L)	Project classes (P)	Seminars (S)	Fieldwork (T)	ECTS credits ECTS*
	15^{E}	30					4

C. Assumed outcomes and aims - aims bind the course programme with the study programme and are referred to in learning outcomes point 2

2. LEARNING OUTCOMES (acc. to National Qualifications Framework)

No.	Description of learning outcomes	Reference to learning outcomes for the field of study	Reference to learning outcomes for the area of study
KNOWLEDGE			
K1	has knowledge of technical mechanics	K_W04	P6S_WG
Skills			
S1	is able to prepare the technical documentation of simple projects	K_U02	P6S_UW
S2	has the ability to self-study, inter alia, to improve professional competences	K_U12	P6S_UU
SOCIAL COMPETENCES			

SC1	understands the need and knows the possibilities of continuous training - improving professional, personal and social competences	K_K01	P6S_KK

3. TEACHING METHODS

Multimedia lectures & exercises

4. METHODS OF EXAMINATION

Lectures: oral or written examination
Exercises: computational test or project

5. COURSE CONTENT

Specify the content separately for each type of classes in accordance with point I.B.	*LECTURES* *1. Fundamental properties of vectors, representation of vectors using rectangular components, basic operations with vectors.* *2. Numbers of degrees of freedom, Newton's Third Law, principle of transmissibility, parallel forces, center of parallel forces.* *3. Resultant force of the system, equilibrium equations of concurrent force system.* *4. Moment of force about a point and an axis, reducing a force system to a force and a couple, equilibrium equations of non-concurrent force system.* *5. Velocity and acceleration in rectilinear and curvilinear motion of a particle.* *6. Equations of motion in rectangular and polar coordinate system.* *7. Relative motion of particles, the Coriolis acceleration.* *8. Planar motion of rigid bodies, instantaneous centre of rotation.* *9. Spherical motion of rigid bodies, Euler angles.* *10. Dry friction, Coulomb's friction laws, static and kinetic friction, sliding friction, belt and cable friction, rolling friction.* *11. Work and kinetic energy, potential energy, conservation of energy.* *12. Newton's Second Law in rectilinear motion, linear impulse and linear momentum, conservation of linear momentum, collisions.* *13. Mass moment of inertia.* *14. Newton's Second Law in angular motion, impulse and momentum in angular motion.* *15. Conservation of angular momentum, gyroscopic motion.* *EXCERCISES* *1. Practicing basic operations with vectors.* *2. Solving planar truss constructions.* *3. Solving spatial truss constructions.* *4. Solving simple and complex planar beams.* *5. Solving planar frames.* *6. Calculation of velocities and accelerations in rectilinear motion, equations of motion of particles in Earth's gravitational field.*

	7. Calculation of velocities and accelerations in angular motion of particles, cases of relative motion and Coriolis acceleration. *8. Planar motion of rigid bodies.* *9. Spherical motion of rigid bodies.* *10. Solving problems involving friction.* *11. Solving problems related to conservation energy.* *12. Newton's Second Law and conservation of momentum, collisions.* *13. Calculation of moments of inertia of continuous bodies.* *14. Solving problems related to Newton's Second Law in angular motion and conservation of angular momentum and energy, gyroscopic motion.* 15. *Computational test or discussion of computational project.*

6. VALIDATION OF LEARNING OUTCOMES

(Each learning outcome from the list requires validation methods to ensure that it was achieved by a student.)

Learning outcome	Form of assessment (for example:)					
	Oral examination	Written examination	Test	Project	Report	Class attendance
K1	x	x	x	x		x
S1-S2	x	x	x	x		x
SC1	x	x	x	x		x

7. LITERATURE

Basic literature	*1. Hendzel Z., Żylski W., General mechanics: statics, Rzeszów, 2016.* *2. Hendzel Z., Żylski W., General mechanics: kinematics, Rzeszów, 2016.* *3. Hendzel Z., Żylski W., General mechanics: dynamics, Rzeszów, 2016.* *4. Hughes J. H., Martin K. F., Basic Engineering Mechanics, Hong Kong, 1985.*
Supplementary literature	*1. Kurnik W., Theoretical mechanics for engineers, Warszawa, 2017.*

8. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity		Student workload– number of hours (for example:)
Classes conducted under a direct supervision of an academic teacher or other persons responsible for classes	Participation in classes indicated in point 2.2	45
	Supervision hours	5
Student's own work	Preparation for classes	15
	Reading assignments	15
	Other (preparation for exams, tests, carrying out a project etc)	20
Total student workload		100
	Final number of ECTS credits	4