

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Mechanika techniczna**
 Name in English: **Technical Mechanics**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable):
 Level and form of studies: **1st level, full-time**
 Kind of subject: **obligatory**
 Subject code: **MMM012013**
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	30	15			
Number of hours of total student workload (CNPS):	60	30			
Form of crediting:	crediting with grade	crediting with grade			
For group of courses mark (X) final course:					
Number of ECTS points:	2	1			
including number of ECTS points for practical (P) classes :		1			
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40	0.70			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Acquisition of the knowledge, skills and competence resulting from the completion of the courses Calculus, algebra and analytic geometry, physics.

SUBJECT OBJECTIVES

- C1. Solving technical problems pursuant to the laws of mechanics.
 C2. Performing static strength analyses of machine elements. Performing kinematic and dynamic analyses of machine elements.
 C3. Acquisition and strengthening of the social competence including emotional intelligence that is relying on the ability to cooperate in a group of students, which is aimed at effective problem solving. Responsibility, honesty and diligence in one's code of conduct; obeying the customs of the academic community and society.

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Knows vectorial operations on forces and moments in mechanics.
 PEK_W02 Knows the methods of solving beams and frames.
 PEK_W03 Knows the kinematics and dynamics of the material particle and rigid body.

relating to skills:

- PEK_U01 Can determine internal forces in beams, frames and trusses and prepare their diagrams.
 PEK_U02 Can use the principle of momentum and angular momentum to describe the dynamics of a movement,
 PEK_U03 Can use the principle of conservation of energy to describe the movement of a rigid body.

relating to social competences:

- PEK_K01 Adherence to the customs and rules of the academic community.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours:
Lec 1	Programme. Requirements. Vectors. Terms of statics. Axioms of statics. Degrees of freedom. Support of constrained solid.	2
Lec 2	Force and moment of force. Resultant moment and main vector of a force system. Change of the pole of a moment. Reduction of forces in an arbitrary spatial force system. Wrench.	2
Lec 3	Reduction of plane forces system. Equations of equilibrium.	2
Lec 4	Trusses, reactions, internal forces.	2
Lec 5	Beams, reactions, internal forces and their diagrams.	2
Lec 6	Moments of inertia, definitions, Huygens-Steiner theorem.	2
Lec 7	Kinematics of a material particle in the orthogonal coordinates. Distribution of acceleration in the natural system, classification of movements.	2
Lec 8	Relative motion of a material particle, general motion of a rigid body.	2
Lec 9	Work of elementary force, gravitational force, elastic force, power, energy, principle of conservation of energy.	2
Lec 10	Basic tasks of dynamics, equation of vibrations of single degree of freedom.	2
Lec 11	Dynamics of the system of particles, law of center mass motion, momentum and angular momentum of the system of particles.	2
Lec 12	Dynamics of a rigid body, momentum and angular momentum of a rigid body in general motion.	2
Lec 13	Eulerian equations.	2
Lec 14	2nd order Lagrange's equations.	2
Lec 15	Test.	2
Total hours:		30

Form of classes - class		Number of hours:
CI 1	Solving statics problems within the scope of lectured subject: reduction of planar force system.	1
CI 2	Trusses. Calculation of the forces in bars using the method of joints, method of sections (the analytical Ritter method).	1
CI 3	Beams, reactions, internal forces and their diagrams.	1
CI 4	Use of the composition of forces in a coplanar force system to solve frames.	1
CI 5	Solving frames, reactions, internal forces and their diagrams.	1
CI 6	Determination of the moments of inertia of typical planar and spatial systems	1
CI 7	Calculation of central and resultant moments of inertia.	1
CI 8	Determination of velocity and acceleration vectors of the movement of a point.	1
CI 9	Plane motion, velocity field, instantaneous centre of rotation.	1
CI 10	Problems concerning dynamics of a material particle.	1
CI 11	Vibrations with one degree of freedom.	1
CI 12	Dynamics of a rigid body, momentum and angular momentum of a rigid body in general motion.	1
CI 13	Work of elementary force, gravitation force, elastic force, power, energy.	1
CI 14	Potential, potential energy, principle of conservation of energy.	1
CI 15	Final test.	1
Total hours:		15

TEACHING TOOLS USED

- N1. Traditional lecture with the use of transparencies and slides
- N2. Calculation exercises
- N3. Self-study – preparation for the classes
- N4. Tutorial
- N5. Self-study and preparation for the test

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation <i>F – forming (during semester) P – concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(W)	PEK_W01 PEK_W02 PEK_W03 PEK_K01	Test
P(W)	P=F1	
F1(C)	PEK_U01 PEK_U02 PEK_U03 PEK_K01	Oral answers
F2(C)	PEK_U01 PEK_U02 PEK_U03 PEK_K01	Written test
P(C)	P=0,3F1+0,7F2	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: <ol style="list-style-type: none"> 1. B. Gabryszewska, A. Pszonka, „Mechanika”, cz. I, Statyka, PWr , 1988 2. J. Zawadzki, W. Siuta, „Mechanika ogólna”, PWN, Warszawa 1971 3. Misiak J., „Mechanika ogólna. Statyka i kinematyka”. Tom 1, WNT, Warszawa 1993 4. Jaśniewicz Z., „Zbiór zadań ze statyki”, OW PWr, Wrocław 1996 5. M. Klasztorny, Mechanika. Statyka, kinematyka, dynamika, DWE, Wrocław SECONDARY LITERATURE: <ol style="list-style-type: none"> 1. B. Skalmierski, „Mechanika”, PWN, Warszawa 1977 2. J. Leyko , „Mechanika ogólna”, WNT, Warszawa 1980 3. S. Piasecki , J. Rżysko, „Mechanika”, WNT, Warszawa 1972 4. J. Giergiel, „Mechanika ogólna”, WNT, Warszawa 1980 5. W. Siuta, „Mechanika techniczna”, WNT, Warszawa 1968

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT MMM012013 - Technical Mechanics AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Electrical Engineering				
Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subject objectives	Programme content	Teaching tool number
PEK_W01	K1ETK_W13	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.4 N.5
PEK_W02	K1ETK_W13	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.4 N.5
PEK_W03	K1ETK_W13	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.4 N.5
PEK_U01	K1ETK_U10	C.2	CI1 CI2 CI3 CI4 CI5 CI6 CI7 CI8 CI9 CI10 CI11 CI12 CI13 CI14 CI15	N.2 N.3 N.4
PEK_U02	K1ETK_U10	C.2	CI1 CI2 CI3 CI4 CI5 CI6 CI7 CI8 CI9 CI10 CI11 CI12 CI13 CI14 CI15	N.2 N.3 N.4
PEK_U03	K1ETK_U10	C.2	CI1 CI2 CI3 CI4 CI5 CI6 CI7 CI8 CI9 CI10 CI11 CI12 CI13 CI14 CI15	N.2 N.3 N.4
PEK_K01	K1ETK_K09	C.3	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15 CI1 CI2 CI3 CI4 CI5 CI6 CI7 CI8 CI9 CI10 CI11 CI12 CI13 CI14 CI15	N.4 N.5