MODULE DESCRIPTION

Module code	**Z-ZIP-1005**
Module name	**Mechanika techniczna**
Module name in English	**Mechanics for Engineers**
Valid from academic year	**2016/2017**

A. MODULE PLACEMENT IN THE SYLLABUS

Field of study	**Management and Production Engineering**
Level of education	**1st degree** *(1st degree / 2nd degree)*
Studies profile	**General** *(general / practical)*
Form and method of conducting classes	**Full-time** *(full-time / part-time)*
Specialisation	**All**
Unit conducting the module	**The Department of Production Engineering**
Module co-ordinator	**Dariusz Bojczuk, PhD hab., Eng., Professor of the University**
Approved by:	

B. MODULE OVERVIEW

Type of subject/group of subjects	**Major** *(basic / major / specialist subject / conjoint / other HES)*
Module status	**Compulsory** *(compulsory / non-compulsory)*
Language of conducting classes	**English**
Module placement in the syllabus - semester	**3rd semester**
Subject realisation in the academic year	**Winter semester** *(winter / summer)*
Initial requirements	**No requirements** *(module codes / module names)*
Examination	**No** *(yes / no)*
Number of ECTS credit points	**3**

Method of conducting classes	Lecture	Classes	Laboratory	Project	Other
Per semester	**15**	**15**			

C. TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Module target	The aims of the module are as follows: acquiring knowledge and skills as regards formulating and analysing conditions equilibrium for various balance of forces (including sliding friction together with rolling resistance) and in terms of reducing balance of forces and determining centres of gravity.

Effect symbol	Teaching results	Teaching methods *(l/c/lab/p/other)*	Reference to subject effects	Reference to effects of a field of study
W_01	A student is knowledgeable about formulating and analysing the conditions of equilibrium of force systems as well as their reduction.	l/c	K_W02	T1A_W01 T1A_W02 T1A_W07
W_02	A student has knowledge of taking sliding friction and rolling resistance into consideration as regards statistics.	l/c	K_W02	T1A_W01 T1A_W02 T1A_W07
W_03	A student has knowledge of centres of gravity and the methods of determining them.	l/c	K_W02	T1A_W01 T1A_W02 T1A_W07
U_01	A student is able to conduct simple static analyses including balances of force and their reduction.	c	K_U17	TA1_U09
U_02	A student is able to conduct simple static analyses including sliding friction and rolling resistance.	c	K_U17	TA1_U09
U_03	A student is able to determine the setting of a centre of gravity, flat surfaces, and lines.	c	K_U17	TA1_U09
U_04	A student has the ability to assess the usefulness of static analyses in solving simple engineering issues.	l/c	K_U19	TA1_U15
K_01	A student understands the need of continuous improvement of his/her knowledge from the field of mechanics for engineers.	l/c	K_K01	TA1_K01

Teaching contents:

1. Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	General knowledge, elements of vector calculus, basic notions of mechanics. The laws and axioms of statics. The moment of a force about the axis, and a pair of forces.	W_01 K_01
2	Bonds and the rules of releasing from bonds. Reducing a given balance of forces to a point, main vector as well as main moment, and balanced static sets. The conditions of equilibrium. The classification of types of balance of forces.	W_01 K_01
3	Concurrent coplanar force system – equilibrium conditions, examples. Arbitrary coplanar force system – reduction of a system to a resultant (reduction condition), central axis equation, and continuous load – reduction to a resultant	W_01 U_04 K_01
4	Arbitrary coplanar force system – conditions of equilibrium, examples of analysing simple and complex systems Sliding friction, developed and undeveloped friction, friction angle, cone of static friction, examples.	W_01 W_02 U_04 K_01
5	Journal friction. Band friction – developed friction relation, examples. Rolling resistance, rolling condition.	W_02 U_04 K_01

6	Parallel force system – reduction of a system to a resultant. Gravity and mass centres – integral and total formulas.	W_03 K_01
7	Examples of determining centres of gravity for flat surfaces and lines. Spatial force system – reduction of a system to a wrench, reduction invariants, and cases of reduction. Spatial concurrent force system – equilibrium conditions, constraints, examples.	W_01 W_02 U_04 K_01
8	Spatial arbitrary force system – equilibrium conditions, constraints, examples.	W_01 U_04 K_01

2. Teaching contents as regards classes

Class number	Teaching contents	Reference to teaching results for a module
1	Revision of a vector calculus. Calculating the moment of a force about a point and axis.	W_01 K_01
2	Releasing from bonds, formulating the conditions of equilibrium, and determining the reaction – concurrent coplanar force system.	W_01 U_01 U_04 K_01
3	Releasing from bonds, formulating the conditions of equilibrium, and determining the reaction – arbitrary coplanar force system.	W_01 U_01 U_04 K_01
4	Test 1 Analysing problems as regards sliding friction.	W_01 W_02 U_01 U_02 U_04 K_01
5	Analysing problems regarding sliding friction, band friction, and rolling resistance	W_02 U_02 U_04 K_01
6	Determining centres of gravity of solids, flat surfaces, and lines.	W_03 U_03 U_04 K_01
7	Releasing from bands, formulating the conditions of equilibrium, and determining the reaction – spatial concurrent force system and spatial concurrent force system.	W_01 U_01 U_04 K_01
8	Test 2	W_01 W_02 W_03 U_01 U_02 U_03 U_04 K_01

3. Teaching contents as regards laboratory classes

Laboratory class number	Teaching contents	Reference to teaching results for a

		module

4. The characteristics of project assignments

The methods of assessing teaching results

Obtaining a credit for the classes based on two tests.

Obtaining a credit for the lectures on the basis of a written test containing questions and simple tasks.

Effect symbol	**Methods of assessing teaching results** *(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)*
W_01	A test during the lecture, a test during the classes.
W_02	A test during the lecture, a test during the classes.
W_03	A test during the lecture, a test during the classes.
U_01	A test and active participation in the classes.
U_02	A test and active participation in the classes.
U_03	A test and active participation in the classes.
U_04	A test and active participation in the classes.
K_01	A test during the lecture, tests during the classes, comments during the lectures and a discussion during the classes.

D. STUDENT'S INPUT

ECTS credit points		
	Type of student's activity	**Student's workload**
1	Participation in lectures	**15**
2	Participation in classes	**15**
3	Participation in laboratories	
4	Participation in tutorials (2-3 times per semester)	**6**
5	Participation in project classes	
6	Project tutorials	
7	Participation in an examination	
8		
9	**Number of hours requiring a lecturer's assistance**	**36** *(sum)*
10	**Number of ECTS credit points which are allocated for assisted work** *(1 ECTS point=25-30 hours)*	**1.4**
11	Unassisted study of lecture subjects	**10**
12	Unassisted preparation for classes	**15**
13	Unassisted preparation for tests	**10**
14	Unassisted preparation for laboratories	
15	Preparing reports	
15	Preparing for a final laboratory test	
17	Preparing a project or documentation	
18	Preparing for an examination	
19	Preparing for a test during the lecture	**10**
20	**Number of hours of a student's unassisted work**	**45** *(sum)*
21	**Number of ECTS credit points which a student receives for unassisted work** *(1 ECTS point=25-30 hours)*	**1.6**
22	**Total number of hours of a student's work**	**81**
23	**ECTS points per module** *1 ECTS point=25-30 hours*	**3**
24	**Work input connected with practical classes** *Total number of hours connected with practical classes*	**43**
25	**Number of ECTS credit points which a student receives for practical classes** (1 ECTS point=25-30 hours)	**1.5**

E. LITERATURE

Literature list	1. Leyko J., *Mechanika ogólna, T. I* . Warszawa, PWN 2001 (lub inne wydania). 2. Gierulski W., Miksa M., Radowicz A., *Mechanika techniczna,* Politechnika Świętokrzyska, Skrypt 291, Kielce 1996. 3. Engel Z., Giergiel J., *Mechanika ogólna, Cz.1, Statyka i kinematyka*. Warszawa, PWN 1990. 4. Konarzewski Z., *Podstawy technicznej mechaniki ciała stałego*. Warszawa, WNT 1985. 5. Leyko J., Szmelter J., *Zbiór zadań z mechaniki ogólnej, T. I*. Warszawa, PWN 1980. 6. Barchan A., Wójcik S.: *Mechanika techniczna. Zbiór zadań z rozwiązaniami*, Politechnika Świętokrzyska, Skrypt 247, Kielce 1994.

	7. Giergiel J., Uhl T., *Zbiór zadań z mechaniki ogólnej*, Warszawa, PWN 1987. 8. Nizioł J., *Metodyka rozwiązywania zadań z mechaniki,* Warszawa, WNT 2002.
Module website	