

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Tribology</b>		Code <b>1010614171010610420</b>
Field of study <b>Mechanika i budowa maszyn</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>4 / 7</b>
Elective path/specialty <b>Maszyny robocze</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>18</b> Classes: <b>-</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>2</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b>		ECTS distribution (number and %) <b>2 100%</b>
<b>Responsible for subject / lecturer:</b> Prof. dr hab. ing Nadolny Karol email: karol.nadolny@put.poznan.pl tel. +4861 665 2219 Faculty of Machines and Transportation 3 Piotrowo street, 60-965 Poznan, Poland		<b>Responsible for subject / lecturer:</b> Prof. dr hab. ing Nosal Stanisław email: stanislaw.nosal@put.poznan.pl tel. +4861 647 5852 Faculty of Machines and Transport 3 Piotrowo street, 60-965 Poznan, Poland
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Student has the basic knowledge of: physics, chemistry, materials science and machine design.
2	<b>Skills</b>	Can integrate information from the different areas of knowledge.
3	<b>Social competencies</b>	Understanding of the need for lifelong learning.
<b>Assumptions and objectives of the course:</b> Understanding of phenomena and processes of the friction contact in the aspect of control reliability and durability kinematic nodes machines.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Student has knowledge of the tribological processes - friction, wear and lubrication. Knows the types of friction and its effects. Has detailed knowledge of how to obtain the fluid friction and wear mechanisms (inter alia abrasive, adhesive, fatigue, fretting, peeling). - [K1A_W11]		
<b>Skills:</b> 1. Depending on the operating conditions of friction pair a student is able to select effective means of seizing and method for reducing wear intensity. Knows how to select materials for parts subject to wear and the way the formation of the surface layer - [K1A_U03]		
<b>Social competencies:</b> 1. Understands the effects of degradation occurring during the operation of machinery. Recognizes the importance of the depletion potential operating machines and the importance of this fact in the economic and environmental aspects. - [K1A_K01]		
<b>Assessment methods of study outcomes</b>		
credit on the basis of a written test and exam		
<b>Course description</b>		

<p>History development of tribology. Pin actual solids important parameters of inequality area. Nominal area, surface contour, the actual contact area. Adsorption, adhesion and friction in the process of diffusion. Definition, structure and importance of the surface layer for tribological processes. Friction processes-basic concepts, important parameters, classical laws of friction. Theories of dry sliding friction. Special cases of friction: in vacuum, friction non-metallic, friction polymers, composites, layered materials - graphite, MoS<sub>2</sub>. Friction on ice and snow, at very high speeds and temperatures. Rolling friction. Lubrication - the objectives, the means by which fluid friction: Hydrostatic lubrication, Hydrodynamic (HD), elastohydrodynamic (EHD), magneto-hydrodynamic lubrication (MHD). Limits boundaries the effectiveness of lubrication. Tribological wear - measure the time course, reaching out, the classification of wear. Abrasive wear. Hypotheses tack adhesive. Tribochemical wear. Aadhensive scuffing, fretting. Fatigue wear (Peeling, pitting, peeling). Wear of polymers. Effect of vibration on the tribological processes. Selected problems nanotribologii.</p>		
<p><b>Basic bibliography:</b></p>		
<p><b>Additional bibliography:</b></p>		
<p><b>Result of average student's workload</b></p>		
<p><b>Activity</b></p>		<p><b>Time (working hours)</b></p>
<p>1. Participation in the lecture</p>		<p>30</p>
<p>2. Consultation</p>		<p>2</p>
<p>3. Exam Preparation Exam Preparation</p>		<p>15</p>
<p>4. Participation in the exam</p>		<p>2</p>
<p><b>Student's workload</b></p>		
<p><b>Source of workload</b></p>	<p><b>hours</b></p>	<p><b>ECTS</b></p>
<p>Total workload</p>	<p>49</p>	<p>2</p>
<p>Contact hours</p>	<p>34</p>	<p>1</p>
<p>Practical activities</p>	<p>0</p>	<p>0</p>