STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Tribology		**1010621171010610420**

Field of study	Profile of study (general academic, practical)	Year /Semester
Mechanical Engineering	**(brak)**	**4 / 7**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Mass Transport Vehicles	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours				No. of credits
Lecture: **2**	Classes: **-**	Laboratory: **-**	Project/seminars: **-**	**2**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

Prof. dr hab. ing Nosal Stanisław
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3 Piotrowo street, 60-965 Poznan, Poland

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Student has the basic knowledge of: physics, chemistry, materials science and machine design.
2	**Skills**	Can integrate information from the different areas of knowledge.
3	**Social competencies**	Understanding of the need for lifelong learning.

Assumptions and objectives of the course:

Understanding of phenomena and processes of the friction contact in the aspect of control reliability and durability kinematic nodes machines.

Study outcomes and reference to the educational results for a field of study

Knowledge:

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]

Skills:

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]

Social competencies:

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]

Assessment methods of study outcomes

credit on the basis of a written test and exam

Course description

http://www.put.poznan.pl/

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, MoS2. 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. Aadhesive scuffing, fretting. Fatigue wear (Peeling, pitting, peeling). Wear of polymers. Effect of vibration on the tribological processes. Selected problems nanotribologii.

Basic bibliography:

1. Nosal S., Tribologia. Wprowadzenie do zagadnień tarcia, zużywania i smarowania, Wydawnictwo Politechniki Poznańskiej, Poznań 2012.

2. Hebda M., Procesy tarcia, smarowania i zużywania maszyn, Wydawnictwo ITeE - PIB, Warszawa - Radom 2007.

3. Nadolny K., Tribologia kół zębatych. Zagadnienia trwałości i niezawodności. Biblioteka Problemów Eksploatacji.Wyd. Instytut Technologii Eksploatacji, Radom, 1999r

Additional bibliography:

1. Bowden F.P., and Tabor D. The Friction and Lubrication of Solid, Part II. Clarendon Press, Oxford 1964

2. Dowson D., History of Tribology. Longman, New York 1979.

3. Barwell F. T., Łożyskowanie, WNT, Warszawa 1984.

Result of average student's workload

Activity	Time (working hours)
1. Participation in the lecture	30
2. Consultation	2
3. Exam Preparation Exam Preparation	15
4. Participation in the exam	2

Student's workload

Source of workload	hours	ECTS
Total workload	49	2
Contact hours	34	1
Practical activities	0	0

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