COURSE DESCRIPTION CARD - SYLLABUS

Course name
Tribology [S1Trans1>TRIB]

Course

Field of study
Transport

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr hab. inż. Arkadiusz Stachowiak prof. PP
arkadiusz.stachowiak@put.poznan.pl

Lecturers

dr inż. Grzegorz Kinal
grzegorz.kinal@put.poznan.pl

dr hab. inż. Arkadiusz Stachowiak prof. PP
arkadiusz.stachowiak@put.poznan.pl

dr inż. Aleksandra Rewolińska
aleksandra.rewolinska@put.poznan.pl

dr inż. Kasper Górny
kasper.gorny@put.poznan.pl

dr hab. inż. Łukasz Wojciechowski prof. PP
lukasz.wojciechowski@put.poznan.pl

Prerequisites

The student has basic knowledge of physics with par ticular emphasis on the properties of construction materials applied in modern technics.

Course objective

The objective of the course is to acquaint students with the issues of modern tribology concerning the phenomenon of friction as well as wear and lubrication processes in friction pairs occurring in means of transport.

Course-related learning outcomes

Knowledge:
1. The student has extended and in-depth knowledge of physics useful for formulating and solving selected technical tasks, in particular for correct modeling of real problems in the aspect of friction, wear and lubrication.
2. The student has an ordered, theoretically founded general knowledge of technology, transport systems and various means of transport with particular emphasis on their operational durability.
3. The student has a basic knowledge of the life cycle of means of transport, both equipment and software, and in particular about the key processes occuring in the product life cycle.

Skills:
1. The student is able to obtain information from various sources, including literature and databases (both in Polish and in English), integrate it properly, interpret it and critically evaluate it, draw conclusions, and comprehensively justify his/her opinion.
2. The student is able to properly plan and conduct perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions.
3. Student is able to assess - at least in a basic scope - various aspects of the risk associated with a transport project - in this case, primarily in terms of operation.
4. The student is able to organize, cooperate and work in a group, assuming various roles in it, and is able to properly define priorities for the implementation of a task set by himself or others.

Social competences:
1. The student understands that in technology, knowledge and skills very quickly become obsolete.
2. The student is aware of the social role of a technical university graduate, in particular, he/she understands the need to formulate and transfer to the society, in an appropriate style, information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the transport engineer profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture - final test
Laboratory - class reports

Programme content

Definition, structure, and importance of the surface layer for tribological processes. Shaping the technological surface layer. Surface topography. Contact of rubbing surfaces.
Friction processes, basic concepts, classification, more important parameters, classical laws of friction. Sliding friction, rolling friction, friction at the atomic level.
Wear - measures, time course, running-in, wear classification. Abrasive, adhesive, tribochemical wear, fretting, fatigue (spalling, pitting).
Special cases of friction and wear, including polymer and composite material wear, stick-slip phenomenon, friction against ice and snow, friction in a vacuum.
Lubrication - purposes, classifications. Fluid friction: hydrostatic, hydrodynamic (HD), elastohydrodynamic (EHD) lubrication, limits of lubrication efficiency.
Friction pairs typical for means of transport: braking systems, tire-road surface system.

Teaching methods

Multimedia presentation, laboratory exercises

Bibliography

Basic
1. Nosal S., Tribologia. Wprowadzenie do zagadnień tarcia, zużywania i smarowania, Wyd. Politechniki Poznańskiej, wyd. 2., Poznań 2016 (in polish)
Additional
1. Płaza S., Margielewski L., Celichowski G., Wstęp do tribologii i tribochemia, Wyd. Uniwersytetu Łódzkiego, Łódź 2005 (in polish)
2. Stachowiak G.W., Batchelor A.W., Engineering tribology, Elsevier, wyd. 3, 2005
3. Bushan B., Modern tribology handbook, 1st ed., CRC Press 2000

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00