



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Tribology

### Course

Field of study

Construction and Exploitation of Means of Transport

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

9

Laboratory classes

9

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

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Institute of Internal Combustion Engines and

Drives

ul. Piotrowo 3; 60-965 Poznań

Responsible for the course/lecturer:

### Prerequisites

Knowledge: Has basic knowledge of: physics, chemistry, materials science, basics of machine construction.

SKILLS: Getting to know the surrounding technical reality and its development in a non-accidental, i.e. scientific way

SOCIAL COMPETENCES: Belief in the need for lifelong learning.



### Course objective

Acquainting with the phenomena and processes taking place in frictional contact in terms of controlling the durability of kinematic nodes of machines.

### Course-related learning outcomes

#### Knowledge

1. Has ordered basic knowledge of the main divisions of technical mechanics: statics, kinematics and dynamics of a material point and a rigid body.
2. Has a basic knowledge of the tribological processes occurring in machines, ie friction, lubrication and wear

#### Skills

He can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, as well as create and justify opinions

#### Social competences

He is ready to critically assess his knowledge and received content.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam

### Programme content

History of the development of tribology. Real contact of solids. More important parameters of surface unevenness; nominal, contour and actual contact surfaces. Adsorption, adhesion and diffusion in the process of friction. Definition, structure and importance of the surface layer for tribological processes. Friction processes, basic concepts, classification, more important parameters, classical laws of sliding friction. Dry and sliding friction theories.

Special cases of friction, friction in a vacuum, friction of non-metals: polymers, including composite friction materials, layered materials (graphite, MoS<sub>2</sub>), friction on ice and snow, friction with very high speeds and temperatures. Rolling friction.

Lubrication - goals, methods of obtaining fluid friction: hydrostatic, hydrodynamic (HD), elastohydrodynamic (EHD) lubrication, limits of lubrication efficiency. Tribological wear - measures, time course, running-in, wear classification. Abrasive wear. Adhesive tacking hypotheses. Tribochemical wear, adhesive wear, adhesive scuffing, fretting, fatigue wear (peeling, pitting). Consumption of polymers. The influence of vibrations on tribological processes. Selected problems of nanotribology.

### Teaching methods

Lecture with multimedia presentation, laboratory classes



## Bibliography

### Basic

1. Nosal S., Tribologia. Wprowadzenie do zagadnień tarcia, zużywania i smarowania, Wyd. Politechniki Poznańskiej, Poznań 2012.
2. Hebda M., Procesy tarcia, smarowania i zużywania maszyn, Wydawnictwo ITeE - PIB, Warszawa - Radom 2007
3. Barwell F. T., Łożyskowanie, WNT, Warszawa 1984

### Additional

## Breakdown of average student's workload

	Hours	ECTS
Total workload	60	3,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for tutorials, preparation for tests) <sup>1</sup>	30	1,5

<sup>1</sup> delete or add other activities as appropriate