COURSE DESCRIPTION CARD - SYLLABUS

Course name

Tribology

Course

Field of study

Mechanical and Automotive Engineering

Year/Semester

3/5

Area of study (specialization)

-

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

part-time

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:

Prof. dr hab. inż. Karol Nadolny

email: karol.nadolny@put.poznan.pl

tel. 61 665 219

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

Has ordered basic knowledge of the main divisions of technical mechanics: statics, kinematics and dynamics of a material point and a rigid body.

Has basic knowledge of tribological processes occurring in machines, i.e. friction, lubrication and wear.

Has elementary knowledge of the life cycle of machinery, recycling of machine elements and construction and consumables.

Skills

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

Can use the experience gained in an environment professionally involved in engineering activities related to the maintenance of devices, facilities and systems typical for the field of study.

Has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.

Social competences

Is ready to critically assess his knowledge and received content

Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.

Is ready to initiate actions for the public interest.

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, MoS2), 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	75	3,0
Classes requiring direct contact with the teacher	18	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests) [1]	57	2,0

[1] delete or add other activities as appropriate