



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fuels and lubricants [S2MiBP1E>PiS]

Course

Field of study

Mechanical and Automotive Engineering

Year/Semester

1/2

Area of study (specialization)

Product Engineering

Profile of study

general academic

Level of study

second-cycle

Course offered in

English

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

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Lecturers

Prerequisites

KNOWLEDGE: Has knowledge of the construction and production of fuels, oils, plastic lubricants and specialized liquids in transport means. **SKILLS:** Can learn using various sources of information. **SOCIAL COMPETENCES:** the student is aware of the social and economic importance of environmental protection

Course objective

Getting to know the basics of construction, production, ownership and use of fuels and lubricants for means of transport

Course-related learning outcomes

Knowledge

2

Has knowledge of the principles of safety and ergonomics in the design and operation of machines and the threats that machines pose to the natural environment.

Has basic knowledge about selected technologies of machine works in agriculture, construction, transport, food industry, etc.

Has extended knowledge of the life cycle of machines, the principles of operation of working machines

and destructive processes occurring during operation, such as tribological wear, corrosion, surface fatigue and volumetric aging of the material.

Skills

He can correctly select the optimal material and its processing technology for typical parts of working machines, taking into account the latest achievements in material engineering.

Can plan and carry out experimental research of specific processes taking place in machines and routine tests of a working machine or a vehicle from a selected group of machines.

He can design the technology of exploitation of a selected machine with a high degree of complexity.

Social competences

It is ready to initiate actions for the public interest.

Is willing to think and act in an entrepreneurial manner.

Is ready to fulfill professional roles responsibly, taking into account changing social needs, including:

- developing the professional achievements,
- maintaining the ethos of the profession,
- observing and developing the rules of professional ethics and acting towards the observance of these rules.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam.

Programme content

Basic information about the operation of friction pairs including the classification, types, formulations, and properties of oils, greases, and fuels used in transportation. Knowledge of lubricant servicing and standardized tests for monitoring lubricant and fuel conditions.

Course topics

Classes:

1. Friction pairs operations. Types of lubrication.
2. Hydrodynamic, hydrostatic, elastohydrodynamic lubrication.
3. Case study: calculation of oil film thickness in rolling bearings.
4. Engine and gear oils: types, classifications, formulations, properties.
5. Oils ageing and degradation, methods of their condition monitoring.
6. Greases: types, classifications, formulations, properties.
7. Wear under lubricated conditions.
8. Fuels for automotive and aviation.

Laboratories:

1. Oils resistance to shearing. Kinematic viscosity measurements.
2. Lubricity of oils: four-ball test.
3. Test for cone penetration of greases.
4. Determination of water content and solid impurities in oils and fuels.
5. Measurement of the flash point and pour point of oils.
6. Measurement of the fuels conductivity.

Teaching methods

1. Lecture: multimedia presentation.
2. Laboratory exercises: carrying out the tasks given by the teacher - practical exercises

Bibliography

Basic

1. Stachowiak G., Batchelor A., Engineering tribology, 3 ed., Elsevier, 2004.
2. Bhushan B. (ed.), Modern tribology handbook, vol. 1 - Principles of tribology, CRC Press, 2001.
2. Bhushan B. (ed.), Modern tribology handbook, vol. 2 - Materials, coatings and industrial applications, CRC Press, 2001.

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