



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fuels and lubricants [S1Lot2-SLiPL>PiS]

Course

Field of study

Aviation

Year/Semester

3/5

Area of study (specialization)

Aircraft Engines and Airframes

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Has knowledge of physics, covering the basics of classical mechanics, optics, electricity and magnetism, solid state physics, quantum and nuclear physics Has the ability to self-educate with the use of modern didactic tools Is able to obtain information from literature. Understands the need to learn.

Course objective

Getting to know the basics of construction, production, properties and use of fuels, oils, plastic lubricants (and specialist liquids) in aviation technology.

Course-related learning outcomes

Knowledge:

1. Has ordered, theoretically founded general knowledge covering key issues in the field of technical thermodynamics, fluid mechanics, in particular aerodynamics. [L1_W04]
2. Has basic knowledge of metal, non-metal and composite materials used in machine construction, in particular about their structure, properties, methods of production, heat and thermo-chemical treatment and the influence of plastic processing on their strength, as well as fuels, lubricants, technical
3. Has a basic knowledge of the mechanisms and laws governing human behavior and psyche. [L1_W23]

Skills:

1. Is able to obtain information from various sources, including literature and databases, both in Polish and in English, integrate them properly, interpret them and make a critical evaluation, draw conclusions and exhaustively justify the opinions they formulate. [L_U01]
2. Is able to properly plan and perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions from them [L_U03]
3. Can analyze objects and technical solutions, can search in catalogs and on manufacturers' websites, ready components of machines and devices, including means and devices, assess their suitability for use in their own technical and organizational projects. [L_U16]

Social competences:

1. Is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of faulty engineering projects that have led to serious financial and social losses, or to a serious loss of health and even life. [L_K02]

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: written test

Laboratories: assessment on the basis of the average of the grades in the reports

Programme content

Basics of lubrication: types, an application. Lubricants used in aviation: preparation, composition, additives. Properties of oils and greases - standardized tests to assess their condition/quality. Aviation fuels - beginnings, evolution. Properties of aviation fuels, standardized tests assessing the condition of the fuel. Types and composition of aviation fuels. Fuel additives.

Course topics

Lectures:

1. Basics of lubrication technology: hydrodynamic, elastohydrodynamic, hydrostatic, boundary lubrication.
2. Oils in the aviation industry: types, composition, additives, application.
3. Gears in the aviation industry: types, composition, additives, application.
4. Tests assessing the condition/quality of lubricants applied in aviation.
5. The beginnings of aviation fuels. The evolution of jet fuels. Aviation fuels market in the world.
6. Properties of aviation fuels.
7. Tests assessing the condition of aviation fuels.

Lab:

1. Oils resistance to shear testing and kinematic viscosity measurements.
2. Examination of the lubricity of oils using a four-ball test.
3. The test for cone penetration of greases.
4. Determination of solid impurities and water in oils and fuels.
5. Measurements of the flash point and pour point of oils.
6. Measurement of conductivity of aviation fuels.

Teaching methods

Informative (conventional) lecture (providing information in a structured manner) - may be of a course (introductory) or monographic (specialist) character

Bibliography

Basic:

1. Aviation Fuels Technical Review, Chevron Products Company, 2007
2. Przemysłowe środki smarne - Poradnik, TOTAL, Warszawa, 2003;
3. Stachowiak G.W., Batchelor A.W., Engineering Tribology, wyd. 3, Elsevier, 2005;
4. Totten G.E., Shah R., Forester D., Fuels and Lubricants Handbook: Technology, Properties, Performance, and Testing, wyd. 2, ASTM International, 2019.

Additional:

1. Pałowski Z., Lotnicze paliwa i oleje, Prace Instytutu Lotnictwa, 2009.

2. Kurzawska P., Jasiński R., Overview of Sustainable Aviation Fuels with Emission Characteristic and Particles Emission of the Turbine Engine Fueled ATJ Blends with Different Percentages of ATJ Fuel, Energies - 2021.

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