



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fuels and lubricants

### Course

Field of study

Aviation

Area of study (specialization)

Aircraft engines and airframes

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

Polish

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

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Łukasz Wojciechowski

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Wydział Inżynierii Lądowej i Transportu

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

mgr inż. Paula Kurzawska

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### Prerequisites

Knowledge: Has knowledge of the operating conditions of fuels, oils, plastic lubricants (and specialist liquids) in aviation technology, with particular emphasis on the conditions prevailing during the flight of various types of aircraft. He knows the composition of aviation fuels and other consumables, technologies for their production, diagnostic methods in the storage and use phases.

Skills: Is able to define the most important functional properties of aviation fuels, lubricants and technical fluids. He is able to select the appropriate consumables for various aircraft systems and indicate appropriate substitutes (from the list of international measures).

Social competences: Understands the impact of fuel combustion and the use of lubricants on the environment. Is aware of the proper management of used petroleum products (oils and greases).



### 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 gases, refrigerants, etc. [L1\_W18]
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:

Lecture: written test

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

### Programme content

Chemical composition and methods of obtaining fuels and lubricants from crude oil. Operating conditions in various types of engines. Physicochemical and functional properties of aviation fuels (aviation gasoline for piston engines, aviation kerosene and broad-fraction fuels - for turbine engines). Technology of fuel preparation before application to aircraft tanks. Properties of lubricating oils and



greases. Properties of technical (special) liquids. Diagnostics of fuels and other consumables. Petroleum products and the natural environment. Aviation biofuels and technologies for their production.

### Teaching methods

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

### Bibliography

Basic

1. Górski K., Górski W., Napędy lotnicze. Materiały pędne i smary, Wydawnictwo Komunikacji i łączności, Warszawa - 1986
2. Zwierzycki W., Płyny eksploatacyjne do środków transportu drogowego, Wydawnictwo Politechniki Poznańskiej, Poznań - 2006
3. Czarny R., Smary plastyczne, Wyd. NT, Warszawa 2004

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	2,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for classes, preparation for tests,) <sup>1</sup>	20	0,5

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