



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fuels and lubricants [S1Lot2-ORL>PL]

### Course

Field of study

Aviation

Year/Semester

3/6

Area of study (specialization)

Air Traffic Organisation

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

15

### Number of credit points

4,00

### Coordinators

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### Lecturers

### 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). 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 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 e.t.c. [L1\_W18]

#### Skills:

1. 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]
2. Is able to properly select materials for simple aviation structures, and can indicate the differences between the fuels used in aviation. [L\_U09]

#### Social competences:

1. Correctly identifies and resolves dilemmas related to the profession of aerospace engineer. [L\_K05]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: written test

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

Project: evaluation of the student's own work on the basis of the project created during the course

### Programme content

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. The beginnings of aviation fuels. The evolution of jet fuels. Aviation fuels market in the world.
2. Properties of aviation fuels, part 1: energy and tribological aspects.
3. Properties of aviation fuels, part 2: rheological and corrosion aspects.
4. Properties of aviation fuels, part 3: pollution and conductivity.
5. Obtaining and composition of aviation fuels.
6. Aviation fuel additives.
7. Tests assessing the condition of aviation fuels.

#### Laboratories:

1. Fuel conductivity measurements.
2. Comparison of the lubricity of oil and fuel for turbine aircraft engines.
3. Determination of free water content in aviation fuel.
4. The influence of fuel impurities on the dynamic viscosity of engine oil.
5. The influence of fuel impurities on the ignition temperature of oils for turbine and piston aircraft engines.
6. Determination of the fuel system icing inhibitor content in aviation fuel.

### Teaching methods

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

### Bibliography

#### Basic:

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#### 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	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00