COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fuels in aviation [S2LiK1>PwL]

Course

Field of study
Aerospace Engineering

Year/Semester
1/2

Area of study (specialization)
Unmanned Aerial Vehicles

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
15

Number of credit points

3,00

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

Understanding the basic relationships describing the physical and chemical properties of aviation fuels with regard to their storage conditions.

Course-related learning outcomes

Knowledge:
1. Has extended knowledge necessary to understand the profile subjects and specialist knowledge about the construction, methods of construction, production, operation, air traffic management, safety systems, impact on the economy, society and the environment in the field of aviation and cosmonautics for selected specialties: Civil Aviation, UAV.
2. Has detailed knowledge of chemistry, combustion processes, stoichiometry, heat release processes, heat-to-thrust conversion for aviation and aerospace fuels

3. Has structured and theoretically founded knowledge about the application, rheology, properties of propellants and lubricants used in aviation and aerospace

Skills:
1. is able to communicate using various techniques in the professional environment and other environments using the formal notation of construction, technical drawing, concepts and definitions of the scope of the study field .
2. has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.
3. 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
4. is able to carry out detailed technical calculations in the field of fluid mechanics, thermodynamics and combustion, such as e.g. heat and mass balances, calculate thermodynamic waveforms in thermal flow machines, in particular flow and rocket engines
5. is able to apply basic technical standards concerning unification and safety and recycling

Social competences:
1. Understands the need for lifelong learning; can inspire and organize the learning process of other people.
2.Is ready to critically evaluate the knowledge and content received, recognize the importance of knowledge in solving cognitive and practical problems, and consult experts in case of difficulties in solving the problem on its own.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Passing the lecture in writing, passing the laboratories on the basis of reports from exercises and partial tests, passing the project on the basis of completed tasks.

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

Classes:
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 way) - may be of a course (introductory) or monographic (specialist) character.
Laboratory method.
Project.

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.

Breakdown of average student's workload

	Hours	ECTS
Total workload	85	3,00
Classes requiring direct contact with the teacher	55	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00