COURSE DESCRIPTION CARD - SYLLABUS

Course name
Aircraft propulsion systems [S1Lot1-BTL>NSP]

Course

Field of study
Aviation

Year/Semester
2/4

Area of study (specialization)
Air Transport Safety

Profile of study
general academic

Level of study
first-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
15

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

Knowledge: Basic knowledge of physics, mechanics, fluid mechanics, thermodynamics Skills: Ability to think analytically, carry out cause-and-effect analysis Social competencies: Can work in a group, present own thoughts and assessments supported by justification.

Course objective

Introduced to the types and construction of aircraft propulsors, and the consequences of their use. Overview of contemporary aircraft propulsion designs.

Course-related learning outcomes

Knowledge:
1. Has extended and in-depth knowledge of mathematics including algebra, analysis, theory of differential equations, probability, analytical geometry as well as physics covering the basics of classical mechanics, optics, electricity and magnetism, solid state physics, thermodynamics, useful for formulating and solving complex technical tasks related to engineering aeronautical and modeling
2. Has ordered, theoretically founded general knowledge in the field of technology and various means of air transport, about the life cycle of means of transport, both hardware and software, and in particular

about the key processes taking place in them
3. Has ordered and theoretically founded general knowledge in the field of key technical issues and detailed knowledge of selected issues related to air transport, knows the basic techniques, methods and tools used in the process of solving tasks related to air transport, mainly of an engineering nature
4. Has detailed knowledge related to selected issues in the field of manned and unmanned aircraft construction, in the field of on-board equipment, control systems, communication and recording systems, automation of individual systems, has basic knowledge of flight simulation training devices and simulation methods used to solve air transport issues
5. 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.
6. Has basic knowledge of environmental protection in transport, is aware of the risks associated with environmental protection and understands the specificity of the impact of mainly air transport on the environment as well as social, economic, legal and other non-technical conditions of engineering activities7. Abc.

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
2. Is able to design elements of means of transport with the use of data on environmental protection
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
4. Student is able to make a comprehensive assessment of the ecological parameters of an aircraft propulsion unit based on the values of emission factors for harmful gaseous compounds and particulate matter

Social competences:
1. Understands that in technology, knowledge and skills very quickly become obsolete
2. 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
3. Is aware of the social role of a technical university graduate, in particular understands the need to formulate and provide the society, in an appropriate form, with information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the engineer profession
4. Correctly identifies and resolves dilemmas related to the profession of an aerospace engineer

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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The knowledge and skills of the lecture will be tested in the form of a written exam at the end of semester. Classes will be assessed on the basis of a written test, while the laboratory grade will consist of partial grades from reports and tickets..

Programme content

History of aircraft propulsion development.
Theoretical foundations of drive operation and thrust force generation.
Classification of aviation propulsion systems, comparison of propulsion systems types.
The concept of a jet engine thrust, engine performance indicators.
Flow theory of propeller, enclosed propeller, gas stream theory.
Characteristics of propeller and jet propulsors.
Selection of the engine for the aircraft.
An overview of the design of modern aircraft propulsors and prospects for their development

Teaching methods

Informative (conventional) lecture (providing information in a structured way) - may be of a course (introductory) or monographic (specialist) character
The exercise method (subject exercises, practice exercises) - in the form of auditorium exercises (application of the acquired knowledge in practice - may take various forms: solving cognitive tasks or training psychomotor skills; transforming a conscious activity into a habit through repetition)
Laboratory method.

Bibliography

Basic
1. Piotr Strzelczyk. Wybrane zagadnienia aerodynamiki śmigieł. Oficyna Wydawnicza Politechniki Rzeszowskiej. Rzeszów 2008.
2. W. Cheda, M. Malski Techniczny poradnik lotniczy. Silniki. WKiŁ, Warszawa 1984
3. The Jet Engines. Wyd. Rolls Royce 1986 r.
4. Dzierżanowski P., Kordziński W., Otyś J., Łyżwiński M., Szczeciński S., WiatrekR.: Napędy Lotnicze. Turbinowe silniki odrzutowe. WKŁ, Warszawa 1983.
5. Dzierżanowski P., Kordziński W., Otyś J., Szczeciński S., WiatrekR.: Napędy Lotnicze. Turbinowe silniki śmigłowe i śmigłowcowe. WKŁ, Warszawa 1985.
Additional
1. Kotlarz W.: Turbinowe zespoły napędowe źródłem skażeń powietrza na lotniskach wojskowych. (Turbine Driving Systems as Pollution Sources at Military Airports), Air Forces Academy, Dęblin 2004

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	47	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	78	3,00