STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Aircraft propulsions systems		**1010601151010623533**

Field of study	Profile of study (general academic, practical)	Year /Semester
Aerospace Engineering	**general academic**	**3 / 5**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Aircraft Transport	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours					No. of credits
Lecture: **2**	Classes: **-**	Laboratory: **1**	Project/seminars: **-**		**4**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
major	**from field**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**4 100%**
Technical sciences	**4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

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

Assumptions and objectives of the course:

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

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. has ordered, theoretically founded general knowledge covering key issues in the field of technical thermodynamics, i.e. the theory of thermodynamic transformations, heat flow, thermal and cooling machines - [[T1A_W03]]

2. has detailed knowledge related to selected issues in the field of building air propulsion systems and designing their subassemblies - - [[T1A_W03]]

3. has a basic knowledge of the life cycle of devices, objects and technical systems, as well as the methods of their technical description - [[T1A_W06]]

Skills:

1. knows how to use native and international languages to the extent that it allows to understand technical texts and write technical descriptions of machines in the field of aviation and astronautics (technical terminology) - [[T1A_U01]]

2. can obtain information from literature, the Internet, databases and other sources. Is able to integrate the obtained information, interpret and draw conclusions from them and create and justify opinions - [[T1A_U01]]

3. can prepare and present a short verbal and multimedia presentation devoted to the results of an engineering task - [[T1A_U04]]

4. is able to carry out elementary technical calculations in the field of fluid mechanics, and thermodynamics, such as thermal and mass balances, pressure losses in flows around technical flying objects and their modules, choose the parameters of fans, compressors and turbines for flow systems, and calculate thermodynamic waveforms in thermal machines - [[T1A_U09]]

5. can draw a schematic and a simple machine element in accordance with the principles of technical drawing - [[T1A_U14]]

Social competencies:
1. understands the need to learn throughout life; can inspire and organize the learning process of other people - [[T1A_K01]]
2. is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for decisions - [[T1A_K02]]
3. is able to properly determine the priorities for the implementation of the task set by himself or others - [[T1A _K04]]
4. is aware of the social role of a technical university graduate, and especially understands the need to formulate and communicate to the public, in particular through mass media, information and opinions on the achievements of technology and other aspects of engineering activities; makes efforts to provide such information and opinions in a widely understood way - [[T1A _K07]]

Assessment methods of study outcomes
Exam or pass

Course description
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.

Basic bibliography:

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 bibliography:

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.

Result of average student's workload

Activity	Time (working hours)
1. Preparation for the lecture	4
2. Participation in classes	30
3. Consultations related to the lecture	5
4. Preparation for the exam	10
5. Participation in the exam	1
6. Preparation for laboratory exercises	5
7. Participation in laboratory exercises	15
8. Preparation for passing laboratory exercises	5
9. Participation in the pass	1

Student's workload

Source of workload	hours	ECTS
Total workload	76	4
Contact hours	45	3
Practical activities	15	1