COURSE DESCRIPTION CARD - SYLLABUS

Course name
Theory of aircraft engines

Course

Field of study
Aerospace Engineering

Year/Semester
3/6

Area of study (specialization)
Onboard systems and aircraft propulsion

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes

Other (e.g. online)

Tutorials
30

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
dr inż. Bartosz Ziegler

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tel.6652344

Responsible for the course/lecturer:

Prerequisites

Knowledge of the basic principles of dynamics and thermodynamics, as well as the principles of operation of flow machines and the basics of the theory of combustion.

Course objective

Learn the principles of operation of the basic types of aircraft propulsion

Course-related learning outcomes

Knowledge

has detailed knowledge related to selected issues in the field of construction of aircraft propulsion systems and design of their components

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

can use formulas and tables, technical and economic calculations using a spreadsheet and run a simple relational database

Skills

can obtain information from literature, the Internet, databases and other sources. Is able to integrate obtained information, interpret and draw conclusions from them

can create a description of the principle of operation of a simple machine or its components from the group of machines covered by the selected specialty

can use formulas and tables, technical and economic calculations using a spreadsheet and run a simple relational database

Social competences

can properly prioritize the implementation of tasks specified by him or others based on available knowledge

Understands the need for critical assessment of knowledge and continuous learning

is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment, and the associated responsibility for the decisions taken

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written test for both lecture and tutorials.

Programme content

Physical basics of thrust generation by aircraft propulsion; Course of gas dynamic parameters along the flow channel of the turbine engine; Quasi-real thermodynamic cycle of a single flow engine; Influence of flight parameters (speed, ceiling) and engine parameters (compression, heating, compression and decompression efficiency, etc.) on unit engine performance parameters (unit thrust, unit fuel consumption, components and overall efficiency); Two-flow engines (auxiliary channel circulation, characteristics); Fundamentals of construction and thermodynamic cycles of rocket engines. Calculation of the work of the turbine / jet engine cycle; determination of unit parameters (unit string, unit fuel consumption, components and overall efficiency) based on flight parameters and thermodynamic cycle parameters; Calculation of the optimal springs and the required springs of the compressor units for the given flight parameters; Calculation of parameters of circulation components; Calculating basic rocket performance based on simplified relationships.

Teaching methods

Auditorial lecture and tutorials

Bibliography

Basic

1. Dzierżanowski P. „Turbinowe silniki odrzutowe”, Wydawnictwa Komunikacji i Łączności (posiadanie własnego egzemplarza nie jest obowiązkowe. Wykład pokrywa treść w sposób wystarczający)

Additional

Breakdown of average student's workload

	Hours	ECTS
Total workload	99	4,0
Classes requiring direct contact with the teacher	64	2,5
Student's own work (literature studies, tutorial preparation) [1]	35	1,5

[1] delete or add other activities as appropriate