



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Aircraft engines

Course

Field of study

Aerospace Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

Dr hab. inż. Rafał Ślefarski

Responsible for the course/lecturer:

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Wydział Inżynierii Środowiska i Energetyki

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Prerequisites

Has analytical and conceptual thinking skills, can read simple technical diagrams. Has general knowledge about the construction of machines, in particular energy machines.

Course objective

The main aim of the subject is to learn about propulsion systems and propulsion systems used in aviation. Mastering technical vocabulary, understanding the principles of operation of individual drives and its distinctive features.

Course-related learning outcomes

Knowledge



1. has detailed knowledge related to selected issues in the field of construction of aviation propulsion systems and design of their components
2. has ordered, theoretically founded general knowledge covering key issues of aircraft engine construction
3. has ordered, theoretically founded general knowledge covering key issues in the field of fluid mechanics, theory of heat-flow, piston, electric and hybrid machines

Skills

1. knows how to use a language sufficient to understand technical texts in the field of aviation (knowledge of technical terminology)
2. has the ability to self-study using modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books
3. is able to obtain information from literature, the Internet, databases and other sources. Is able to integrate obtained information, interpret and draw conclusions from them

Social competences

1. can appropriately define priorities for the implementation of tasks specified by himself or others based on available knowledge
2. Understands the need for critical assessment of knowledge and continuous learning
3. is aware of the social role of a technical university graduate, and in particular understands the need for formulation and transmission to the public, in particular through the mass media, information and opinions on the achievements of technology and other aspects of engineering activities; endeavors to provide such information and opinions in a generally understandable way

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

written final test

Programme content

1. General characteristics of aircraft drives
2. Drives with piston engines
3. Construction of piston engines
4. Turbine drives
5. Pulse and rocket jet engines
6. Electric drives
7. Operational issues, restrictions



8. Emissions: emission reduction standards

PART - 66 (THEORY - 11.25 hours)

MODULE 16. PISTON ENGINE

16.1 Fundamentals

Mechanical, thermal and volumetric efficiency;

Principles of operation - two-stroke, four-stroke, Otto and Diesel;

Cylinder displacement and compression ratio;

Engine configuration and firing order. [2]

16.2 Engine performance

Power calculation and measurement;

Factors influencing engine power;

Low calorie mixes / mixes, pre-ignition.

16.3 Engine Design

Crankcase, crankshaft, camshaft, oil pan;

Auxiliary gearbox;

Cylinder and piston assemblies;

Connecting rods, intake manifolds and exhaust manifolds;

Valve mechanisms;

Propeller reduction gears. [2]

16.9 Lubrication systems

System operation / layout and components. [2]

16.10 Engine Indicating Systems

Engine speed;

Cylinder head temperature;

Coolant temperature;

Oil pressure and temperature;



Flue gas temperature;

Fuel pressure and flow;

Loading pressure. [2]

Teaching methods

lecture

Bibliography

Basic

Boliński Benedykt, „Eksploatacja silników turbinowych”, Wydawnictwo Komunikacji i Łączności, Warszawa 1981.

Dzierżanowski Paweł, „Turbinowe silniki odrzutowe”, Wydawnictwo Komunikacji i Łączności, Warszawa 1983.

Niewiarowski K.: „Tokowe silniki spalinowe”, Wydawnictwa Komunikacji i Łączności, Warszawa 1983

A. Kowalewicz, „Tworzenie mieszanki i spalanie w silnikach o zapłonie iskrowym”, Wydawnictwa Komunikacji i Łączności, Warszawa 1984, ISDN 83- 206-0399-4

Jaźwiński J., Borgoń J., „Niezawodność eksploatacyjna i bezpieczeństwo lotów”, Wydawnictwo Komunikacji i Łączności, Warszawa 1989.

Dzierżanowski P., Łyżwiński M., Szczeciński S.: „Napędy Lotnicze. Silniki tłokowe”, Wydawnictwo Komunikacji i Łączności, Warszawa 1981

Additional

Wajand J.A., Wajand J.T.: Tłokowe silniki spalinowe średnio- i szybkoobrotowe, WNT Warszawa 2000

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	15	0,6
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	10	0,4

¹ delete or add other activities as appropriate