



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of operation of on-board systems and aircraft engines

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

Onboard systems and aircraft propulsion

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

4/7

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

Tutorials

Projects/seminars

15

Other (e.g. online)

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

### Prerequisites

Air unrest news. In this respect, the construction of drive units, the strategy of fluid mechanics, thermodynamics and the rules for its functioning. Knowledge of aircraft aerodynamics in various phases of aircraft flight.

### Course objective

Getting to know the on-board systems, in particular those responsible for flight management and aircraft control systems. The construction of the drive unit, its control, possibilities and limitations.

### Course-related learning outcomes

Knowledge

has basic knowledge of measurement methods, characteristics of measuring instruments and their



classification according to purpose, principles of operation and features, knows sensors and measuring transducers, registration of results, measurement systems, measurement errors - the influence of external factors, statistical analysis of measurement results, principles of organization of an active experiment and passive

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

has basic knowledge about metal, non-metallic and composite materials used in machine construction, in particular about their structure, properties, methods of production, heat and thermo-chemical treatment and the impact of plastic treatment on their strength as well as fuels, lubricants, technical gases, refrigerants e.t.c.

#### Skills

can use a language to a degree enabling understanding of technical texts in the field of aviation (knowledge of technical terminology)

has the ability to self-study using modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books

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

#### 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 social role of a technical university graduate, and in particular understands the need to formulate and convey to the public, in particular through the mass media, information and opinions on technological achievements 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:

##### Lecture

continuous assessment in every class, rewarding activity and quality of perception.

written final

##### Design

implementation of the assigned task



continuous assessment during each class - rewarding the increase in the ability to use the learned rules and methods,

assessment of knowledge and skills related to the implementation of the exercise task

final grade based on the submitted project

### Programme content

The lecture concerns on-board systems, in particular those responsible for flight management and aircraft control systems. The other aspects are the radiocast, navigation and anti-collision systems for aircraft. Their integration with the drive unit and methods of controlling the operation of the drive unit along with the functions of the engine's operating systems will be discussed.

The functioning of the systems will be discussed among the underlying systems

-TCAS - Traffic Alert and Collision Avoidance System

-ACAS - Airborne Collision Avoidance System

- TCAD - Traffic Collision Avoidance Device

-GPWS - Ground Proximity Warning System

- TAWS - Terrain Awareness Warning System

- FMS - Flight Management System

- FADEC - Full Authority Digital Engine Control

### Teaching methods

lecture and design task for independent solution

### Bibliography

Basic

Andrzej Tomczyk. Pokładowe cyfrowe systemy sterowania samolotem Oficyna Wydawnicza PRz.

S. Bociek, J. Gruszecki - Układy sterowania automatycznego samolotem - Oficyna Wydawnicza PRz. - 1999

Z. Polak, A. Rypulak - Awionika, przyrządy i systemy pokładowe - WSOSP Dęblin. - 2002

A. Tomczyk, P. Rzucidło - Systemy pośredniego sterowania dla samolotów ogólnego przeznaczenia - Oficyna Wydawnicza PRz. - 2012

Additional

I. Moir, A. Seabridge - Aircraft Systems - Wiley. - 2008



I. Moir, A. Seabridge - Design and Development of Aircraft Systems - AIAA. - 2004

### Breakdown of average student's workload

	Hours	ECTS
Total workload	79	3,0
Classes requiring direct contact with the teacher	49	2,0
Student's own work (literature studies, making presentations) <sup>1</sup>	30	1,0

<sup>1</sup> delete or add other activities as appropriate